

REPRESENTATION OF VERNACULAR ARCHITECTURE AND LESSONS FOR SUSTAINABLE AND CULTURALLY RESPONSIVE ENVIRONMENT

B.A. KAZIMEE

School of Architecture & Construction Management, Washington State University, USA.

ABSTRACT

This paper identifies principles that will provide important insights and lessons for those who are involved in the development of future sustainable built environments. Two case studies chosen with particular geographical and cultural contexts, one located in the northeastern mountain valleys of Afghanistan and the other located in the central-arid region of Iran, have been used. This paper will demonstrate principles of vernacular architecture as characterized by sustainable affinity between nature and human settlement that are prevalent in these regions. The value of compact townscape, self-help and participatory building approaches, conservation, the use of natural energy systems, and other strategies that will help preserve the ecological integrity of place and at the same time enrich its cultural heritage will be presented.

Keywords: community/participation, conservation, cultural heritage, density, regional quality, sustainability/affordability.

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. 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 such as global warming, housing crises, and economic equality can be addressed. In his writing, architectural theorist 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 architecture 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 methods [2].

In seeking to apply the property of vernacular architecture to our current times and solution for our urban problems we see that by working in traditional ways, vernacular cultures generated buildings and spaces that are in harmony with nature and resonate the ecological integrity of place. Because of the limitation of resources and building technologies, the vernacular architecture used ways and solutions that were most efficient and affordable. These conditions resulted in sophisticated and 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 while preserving nature at the same time. They became part of the equation and took full account of natural processes rather than resisting and fighting it.

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

2 CASE STUDY I: VILLAGE IN NURISTAN

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

Nuristan is inhabited by distinctive population, relatively isolated villages in deep, narrow mountain valleys. The main village in Nuristan is Kamdesh at about 5907 ft (1800 meters) 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 BC, 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.

Tamerlane's 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 in subduing and converting 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].

Since limited amounts of arable land are available in the Hindu-Kush, Nuristani lower valley and flat land are saved for agriculture and grazing (Fig. 1). 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 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 (Figs 2 and 3). 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 that 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.

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 be required to make 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 with 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].

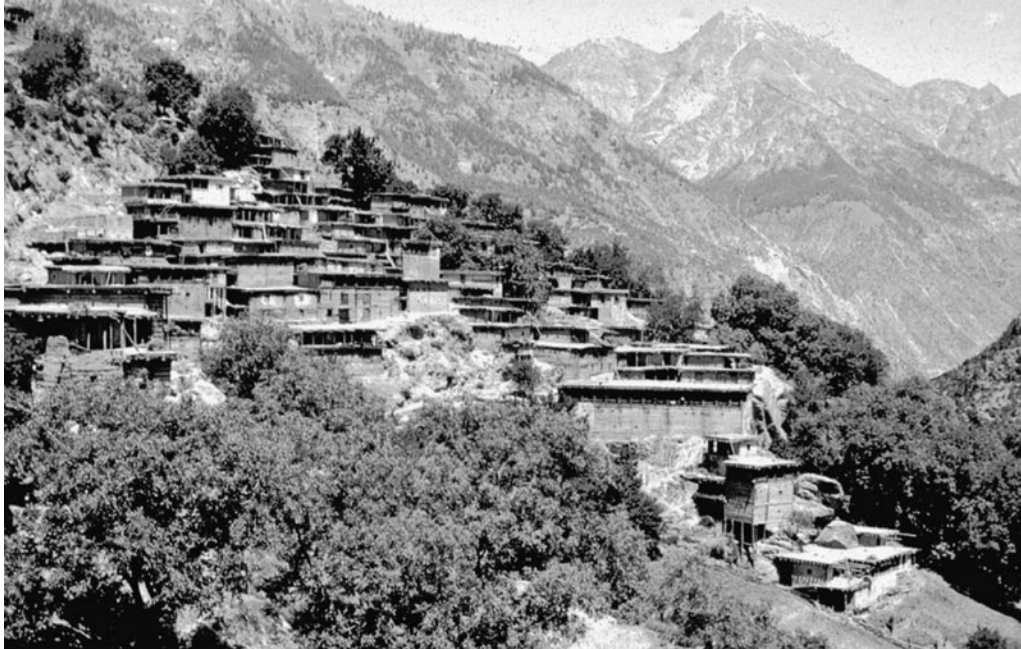


Figure 1: Nested below the top of mountain slope this compact Nuristani village took advantage of logical site topography in exchange for preservation of agricultural land.



Figure 2: A two-story Nuristani house with verandah. Notice the wall construction of horizontal logs with stone fill.



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.

The interior structural columns supporting heavy roof beams are carved with intricate basketry and interlacing patterns (Fig. 4) and decorated by the Bari craftsman (Fig. 5).

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 a variety of decoration and symbolic 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 with elaborately intertwined designs representing interlacing goat horns. Solid wooden shutters are placed between each window post.

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 increasing 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 use of thermal mass for absorbing solar radiation. The compact mass of building increases the effect of insulation against



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

heat loss in winter. The wooded forests around the edges of the villages provide the benefit of windbreak in winter.

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 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 with 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 is spread out on the roof to be dried before 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 serve as socially dynamic congregation spaces where families spend long hours sharing the news of the day.

The vernacular built environment in Nuristan demonstrates that the vernacular architecture is important in more than one way, affording comfort and harmony between one individual and also between people and place.



Figure 5: The exposed timbers on the facade of houses are elaborately carved and variety of decoration and motifs are applied to the exposed wooden surfaces, (Bartuska).

3 CASE STUDY II: COURTYARD HOUSE IN KASHAN

Courtyard houses are one of the oldest continuously used forms of habitation in the architecture of human settlements. This building form played an important role in preservation of cultural and environmental attributes of the communities across the world. The traditional courtyard house presented here is located in the city of Kashan, Iran and is built by artisans and local builders using vernacular building technologies and design principles that are native to this region. Located in central arid region of Iran, the city of Kashan is an oasis town running along the western edge of the *Dasht-e-Kavir*, the Great Desert. Historians and archaeologists date back its historical root well over 7000 and have called the town an important gate to the world civilization. Kashan flourished mainly during the Seljuq (11th century) and Safavid (16th century) periods of the post-Islamic history. Noted for its famous Persian gardens and residential architecture created by Kashan artisans and fine builders, the town is characterized by many picturesque *badgirs* (wind towers), which is an essential natural cooling channel for the town's hot and still-air summers.

Vested with a wealth of cultural gist, the spatial order of this courtyard is the result of evolving tradition and building process that have given rise to its architecture and urban structure. Here we find a combination of palpable, environmental, and cultural patterns of use in time and place that are still extant and operative, giving meaning to the total experience of living tradition in this region.

The courtyard provides a unique cultural experience where the diversity of life comes together with family life at its center; it becomes a symbolic center, which constitutes the ultimate 'inside' (Figs 6 and 7). The character of inside, populated with family activities, is profound and affectionate.



Figure 6: View of shaded courtyard from an entry passageway.

A fountain, a pool, or flower boxes often mark the center of the courtyard. This, conforms to the geometrical form of the symmetrical yard, and supplies a tangible site that helps actualize the yard as a self-directed visual object. The courtyard is kept clean and is given the status of a living place. At times, depending on the climatic situation, it functions as an extension of interior rooms, or it can become a spacious room in itself. In hot climates, it provides shelter against the sun and filters the outside dust. Many courtyards have fountains, water pools, trees, and shrubs, and are ornamented with flowers, foliage, and edible plants that moderate the microclimate and provide a pleasant home environment.

The courtyard serves a place where all types of domestic activities can be organized as needed: a place for cooking family dinners, a place for adults to socialize, a private meeting place, a safe playground for the young children under close supervision by adults, processing farm produce, carpet weaving and handicraft, not to mention the family tutoring of neighbors' children, and more. It is a custom to furnish the open courtyard with colorful rugs and cushions for sleeping on hot summer nights.

In the house, the interior rooms, *Khana*, take a non-specific functional form. Thus, the interior serves the family interchangeably for a variety of domestic events – sleeping, socializing, and eating – in a flexible way. Carpets, mats, and cushions are used to sit on and are rolled up and stored away when not in use. The rooms are often provided with open niches into the surrounding walls and are richly decorated with house valuables (Fig. 8).



Figure 7: View of central courtyard from above. Notice the theatrical disposition of *Aiwan* on the upper floor.

Entry to the courtyard is normally indirect and exaggerated. Visitors find themselves first in a small entrance hall but must then traverse, sometimes, long corridors, *Dahlan*, before entering the courtyard (Fig. 9). These entry halls can provide access to neighboring courtyards. The house gateway is often emphasized by the construction of monumental and sometimes highly decorated features. Elaborate metal and brass decorations and inscriptions on the door represent often the family social status. The door conceptualizes the relationship of the inside and outside. Its position in the solid and continuous mass of the wall accentuates the enclosure of the interior. This relationship creates an atmosphere of spirituality that provides direct contact with substance of culture. The doorway offers us entry to the house, but at the same time allows us to pause and think, temporarily suspending our passage to inside.

Passing the entry to the house, *Dahlan*, a covered corridor, lead to central open courtyard, *Haweli*, the heart and the locus of domestic life. *Haweli* makes the total amalgamation of interior places tangible. The facade is punctuated on all sides with porches, *Aiwans*, and loggias, behind which lie dark, deep interior rooms.

Courtyards play a conscious role in the moderation of the climate in hot summer seasons and provide comfortable living conditions for the families. The central courtyard acts as a light well, as well as, an air shaft, bringing both daylight and air circulation into the rooms around it. Taking

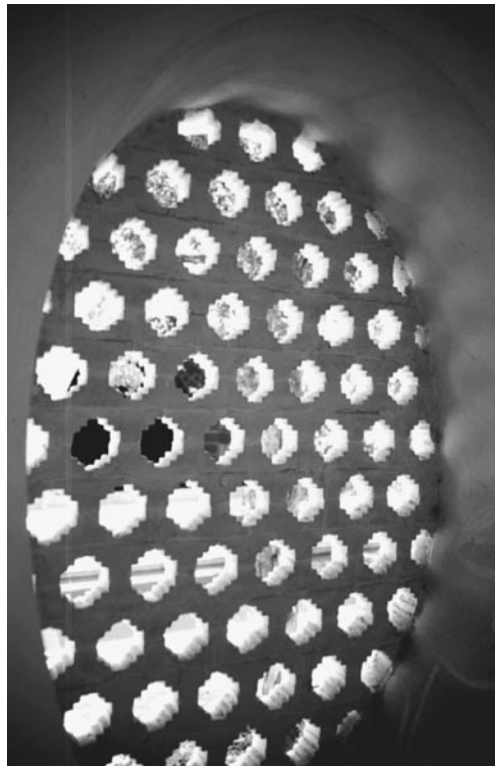


Figure 8: A veil-like window editing both light and view, thereby sustaining privacy and climate.

advantage of the diurnal range of temperature during the summer, at night the cool air descends into the courtyard and fills the surrounding rooms and spaces with cool air, which stays cool and comfortable throughout the day. The use of windcatchers, *badgir*, maximizes additional air circulation into the interior rooms and provides natural cross ventilation (Fig. 10). These unique wind towers, *badgirs*, are elaborately designed to accentuate the architectural character of the city and provide rich visual and aesthetic urban quality.

In a modern world dominated by architectural uniformity, the understanding of traditional built environments and building practices, their sense of meaning and architectural experience, is an essential contribution.

4 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.

4.1 Participatory paradigm

The task of providing adequate housing for the growing global population in the 21st century is extremely challenging, especially in the cities of developing countries and there is no evidence that

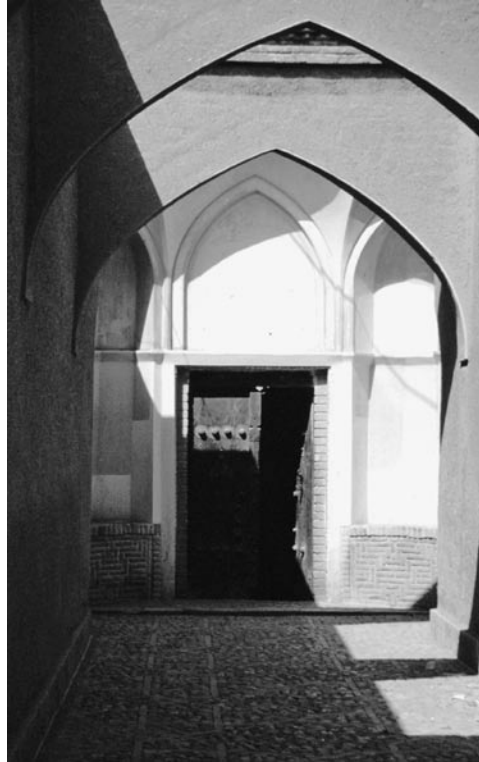


Figure 9: *Dahlan*: a transitional space between the public street and the privacy of house.

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 build their shelters. They take advantage of self-help process and participatory approach, that are economical and affordable. Building with local materials and doing so incrementally to improve their houses and to accommodate their growing family needs [7].

The tradition of user participation in the planning and building process is just beginning to be appreciated and used in many societies. Encouragement of self-help labor force and recognition of the energies and resources that already exist in the skill and determination of people will lay the ground for affordable home ownership for the majority of the 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 and durable, resilient housing stock amenable to adaptation [8].

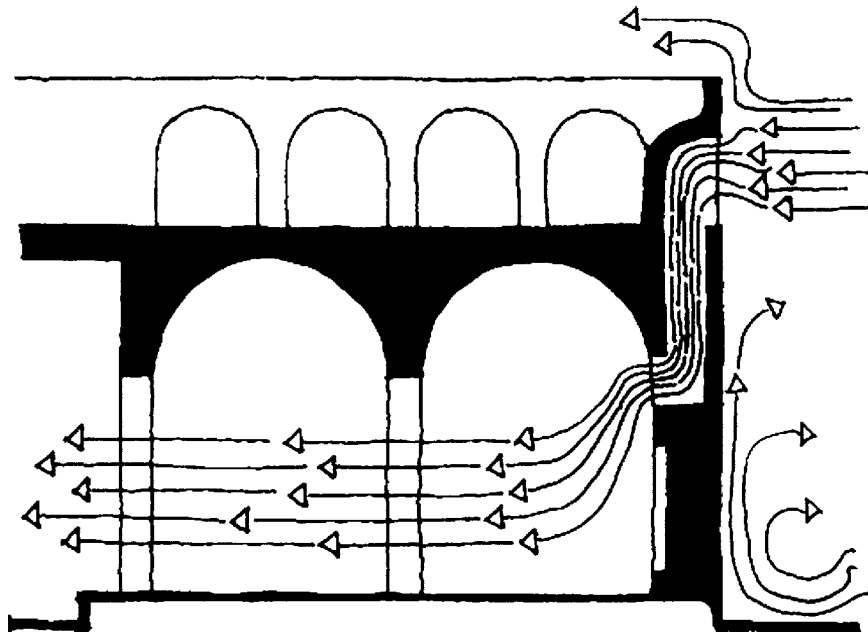


Figure 10: *Badgir*: traditional way of facilitating cross ventilation in the interior of the house.

Buildings that can be used for many different tasks, and are easily adaptable to conversion to many other uses during their lifetime, put less pressure on environmental and energy resources, in contrast to building new structures and demolishing 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, while accommodating the needs of multigenerational users.

4.2 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 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 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 driven by straightforward design principles that create spaces that breed spontaneity. This quality cultivates an urban cultural fabric that promotes opportunity for people 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]. The building types discussed above match perfectly the cultural and environmental condition of these regions with accommodating higher densities. With many variations, both building types are instrumental in producing the required density and an interwoven urban fabric. The compact order and integrated architecture creates a sense of place that celebrates regional character and provides security, peace, and delight [10].

4.3 Local materials and regional flair

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 skill and competence. New building practices should take into consideration the use of local technologies and materials. Local materials are less costly and more easily available, compared to imported industrial products. They are readily accessible to most of the population who are capable of building their houses themselves. Local builders use adobe brick and rammed earth for building shelter in many parts of the world. Adobe has proved to have very good insulating quality in hot arid climate and it 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 saves energy because otherwise a lot of new materials need to be used while many old but usable materials are being discarded. Along the same line is the practice of reuse and recycling of the materials that come off the old buildings that do get them down. Recycling building materials, not only gives new life to old products, but it reduces the energy used to extract new resources 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].

4.4 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. We should learn and improve on the vernacular building principles that provided sustainable solutions for many generations. These principles can be a good leading point and a recipe for complex design requirements in new construction.

Recognizing the microclimatic factors of a site in which a building is located can enhance much of the building's natural energy patterns. Building and site orientation to appropriate 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, and colors of exposed surfaces of the building augment the pattern of energy usage.

Consider passive cooling methods such as clerestory (stacked) or attic ventilation, traditional windcatcher, *badgir*, drawing replacement air from the cooler north side. Shading southern walls, windows, and living spaces by means of overhangs, trellises, and/or deciduous plants will increase summer comfort. Quality construction, sun space/greenhouses, and gardens on the south side of dwellings are much beneficial in hot summer seasons.

5 CONCLUSION

Central to the vernacular built-environment is the ecological or cyclical approach, which is inclusive and permeates all human and environmental relationships, compared to our modern development paradigm that fosters linear logic (Cartesian thinking), which can help us to progress through science and technology, but not in holistic and sustainable way [12]. We need an integrated vision of both scientific and technological progress and the wisdom of the past to move to a promising and sustainable future. The apparent differences between two approaches should be understood clearly and the changes need to be integrated to our contemporary design solutions. A comparative analysis of the two approaches is listed in Table 1.

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 the elegant use of local materials and technology decrease our burden on the finite energy resources and save 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 build shelter effectively with regard to local materials and technology at hand are available to people and are affordable. Government authorities should set up a self-help building advisory service in the communities to encourage higher standards of construction. By using sustainable concepts, such as the adaptive reuse of structures within the urban environment, the use of flexible designs, and regard for optimum

Table 1: Differences between contemporary and vernacular approaches.

Contemporary approach	Vernacular approach
<ul style="list-style-type: none"> • Linear logic, hierarchical • Reductionist simplicity • Use of fossil fuel (non-renewable) • Use of industrial composite materials • Single use specialized buildings • Independent of site climate • Dominant acquisition of nature • Human centered • Reduced choice for affordable shelter • Economic growth/expansion of wealth • Dispersal and sprawl • Automobile focused priority • Anonymity and fragmentation 	<ul style="list-style-type: none"> • Cyclical logic, optimization • Holistic integration • Use of site natural energy (renewable) • Use of local materials and technology • Multiuse, flexible, and adoptable • Shelter and climate adaptation • Symbiotic harmony between people and place • Participatory and community process • Affordable shelter availability • Ecology/efficiency and need oriented • Density and compact settlement • Walking and cycling friendly • Cultural/historical integrity

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 a valuable lesson for the mainstream architecture of 21st century. We should reconnect intimately with the ecological nuances of region and culture to achieve sustainable human settlements.

REFERENCES

- [1] Frampton, K., *Critical Regionalism: Modern Architecture and Cultural Identity in Modern Architecture: A Critical History*, Thames and Hudson: London, p. 313, 1985.
- [2] Asquith, L., & Vellinga, M., *Vernacular Architecture in the Twenty-First Century: Theory, Education and Practice*, Taylor & Francis: London and New York, p. 16, 2006.
- [3] Asquith, L., & Vellinga, M., *Vernacular Architecture in the Twenty-First Century: Theory, Education and Practice*, Taylor & Francis: London and New York, p. 1, 2006.
- [4] Edelberg, L., *Nuristani Buildings*, Jutland Archaeological Society Publications XVIII, 1984.
- [5] Edelberg, L., *Nuristani Buildings*, Jutland Archaeological Society Publications XVIII, p. 10, 1984.
- [6] Szabo, A. & Barfield, T.J., *Afghanistan: An Atlas of Indigenous Domestic Architecture*, University of Texas Press: Austin and Hong Kong, 1991.
- [7] Oliver, P., *Dwelling: The House Across the World*, Phaidon Press: Oxford, UK, p. 11, 1987.
- [8] Rabeneck, A., Sheppard, D. & Town, P., The structure of space in family housing: an alternative to present design practice. *Progressive Architecture*, p. 103, 1974.
- [9] Oliver, P., *Dwelling: The House across the World*, Phaidon Press: Oxford, UK, p. 12, 1987.
- [10] Kazimee, B.A., Sustainable reconstruction and planning strategies for Afghan cities: conservation in culture and environmental heritage. *The Sustainable City IV: Urban Regenerative and Sustainability*, eds U. Mander, C.A. Brebbia & E. Tiezzi, WIT Press: UK, pp. 49–59, 2006.
- [11] Moughtin, C. & Shirley, P., *Urban Design: Green Dimensions*, 2nd edn, Architectural Press: Oxford, UK, p. 32, 2005.
- [12] Bartuska, T., Sustainability: the emerging new paradigm for environmental design. *Constructing New Worlds, ACSA Proc. of International Conference*, Rio de Janeiro, Brazil, p. 47, 1998.