Ecohouse: Lessons from the Past

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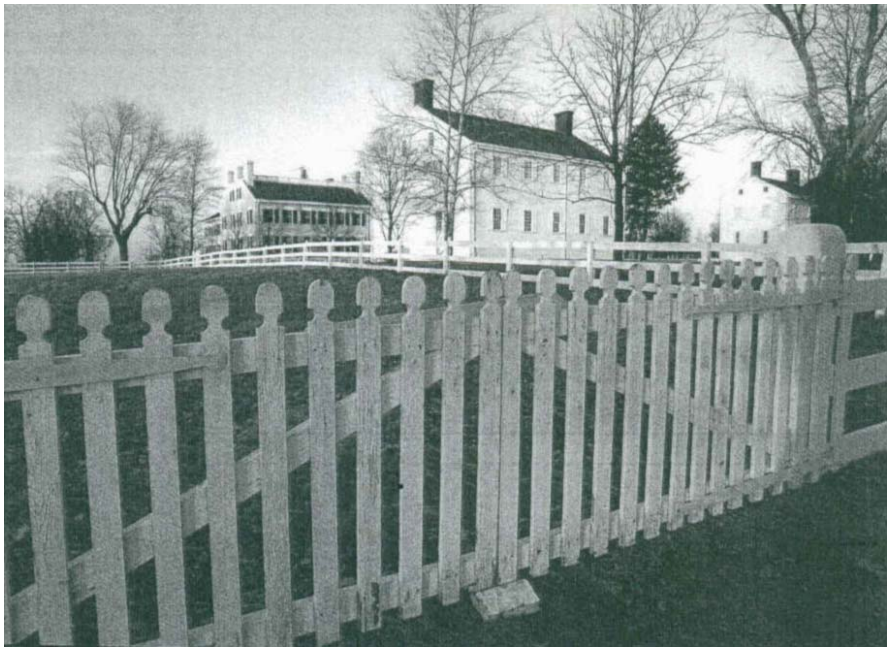
Tahera Jaffer : 99012220 (4B)

From the migration patterns of birds to the metabolic rate of the human body - life is bound by time. Everything that involves life involves interaction and development. 'Progress' brings change. But change does not mean a disregard for the past. As John E. Hancock describes, *"... the past is not just that which we know, it is that which we use, in a variety of ways, in the making of new work… The continuity of these ideas of type, such as they are, and the esteemed examples which have established their identity and assured their continued cultural resonance, constitute an established line of inquiry in which new work may be effectively grounded*".[i] Green design, in terms of ecology, is simply part of a continuum; described by relationships - a wholeness: culturally, biologically, and technologically.

Looking back at vernacular architecture is about searching for direction towards green design. Yet it is not about a return to such traditions. After all, the past was imperfect; riddled with poverty, hardship, cruelty, and narrow-mindedness. And in a world of over five billion people the same methods that once worked are nearly unachievable today, whether it be because of loss of trade or 'progress' of technology. As such, sustainability is essentially a modern issue; caused by environmental damage through irresponsible handling of new technologies. It is the attitude towards materials and resources, embodied in the vernacular approach that needs to be examined and sequentially accommodated in current and future architecture.

The Shakers in the United States of America are an example to the socially responsible ecological view of stewardship of the land. Their settlements would reclaim poor land and construct communities in line with rules of conduct and life in general[ii]. What gave the vernacular form were a structural functionalism and an expression of purpose.



Timber built Shaker house in Kentucky[iii].

The building types that immerged from the basic needs of the Shakers made use of local materials and carried a respect for these resources. They developed a structural and design system appropriate to their specific microclimate, materials, and culture. For example, the size of local timber limited spans, which dictated bay sizes, and ultimately the building width and breadth[iv]. This gave a consistency to the region. Still, overtime, the need to alter and enlarge buildings existed (elements such as windows and doors were reused), but they were not exact replicas of what existed before[v]. The changes implemented reflected developing concerns for that specific time in history -mostly a need for healthy living and changing lifestyles. The Shakers were able to set up a design system that could be repeated so that it was specific to them, but one that could also be altered. The lesson green design can take from a cultural wholeness, and in turn structural functionalism, is not in appearance, but in performance; how there can be accommodation for shelter, comfort, and integrity rooted in the spirit of the people and respect for stewardship of the land.

Still, vernacular architecture was limited and constrained. Buildings and

lifestyles were context formed, today they can be inspiration led. The basic paradigm of modern architecture is led by Le Corbusier's analogy of the building being 'a machine for living in'[vi]. Ecological architecture takes a different approach with the building having a symbiotic relationship with the environment in order to create comfort and shelter for its inhabitants. It is like a living creature, both adaptive and responsive, from the passing of a day to the passing of the seasons. It uses technology, but is not bound by it.

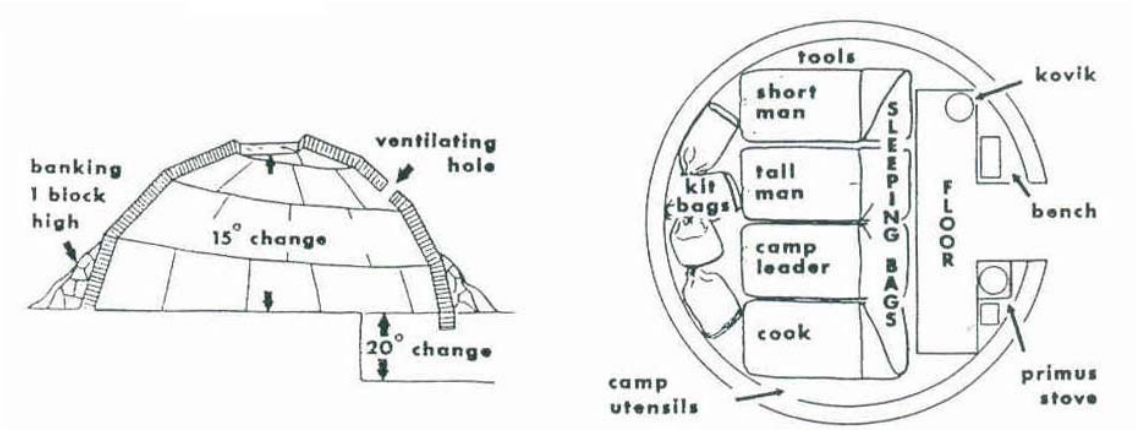
This biologically undifferentiated wholeness of green design takes the best of old wisdom and adapts it to new needs. A clear example of this is how the stratification of air was dealt with and utilized in the past compared to how the same principles are used but with different technologies at present.

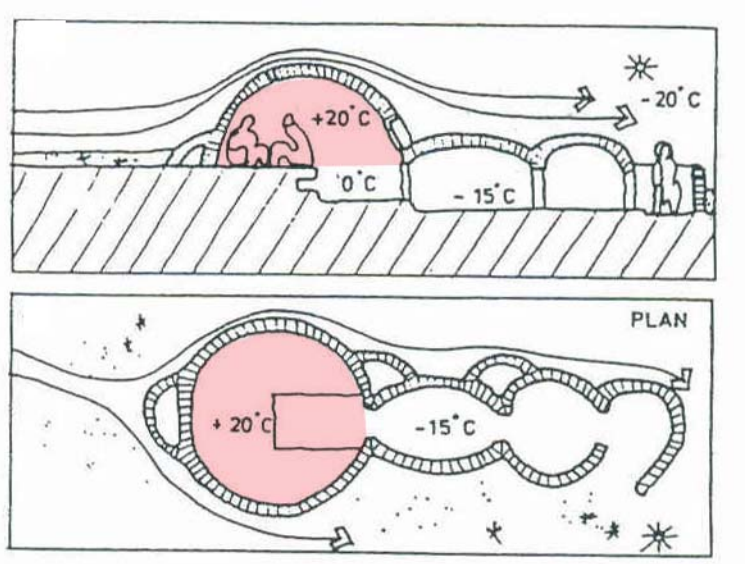
The technology of cooling and heating can take cues from nature. Thermal information is never neutral it is always reflecting what is happening to the body. The thermal sense is located in the skin and is closely related to the senses of touch and pressure[vii]. When one feels metal and experiences a cool sensation, it is not because the metal is cold; it is because of the way metal can conduct heat from your body through your skin[viii]. Sweating works in much the same way, where heat is removed from the skin in order to evaporate the sweat produced, thus producing a cooling effect.

While the skin can experience a variety of temperatures, the core temperature of the body remains the same. In the same way, building cores fluctuate less in temperature than the perimeter spaces or buffering areas. This can be taken advantage of when considering how heat and air behave.

For example, the Eskimo igloo exists amongst the harshest of climates on earth. The cold air is the main concern that must be dealt with. As such, the natural stratification of air is taken advantage of. With hot air rising and cold air sinking, the main living space of the igloo is located on the highest platform[ix].

This allows the inhabitants to remain comfortably warm while the cold air sinks to the entrance levels of the space. The heat created from the natural warmth of the metabolism of the inhabitants melts the inner shell of the dome creating an insulating ice layer that helps to reradiate the heat generated back to the center[x].

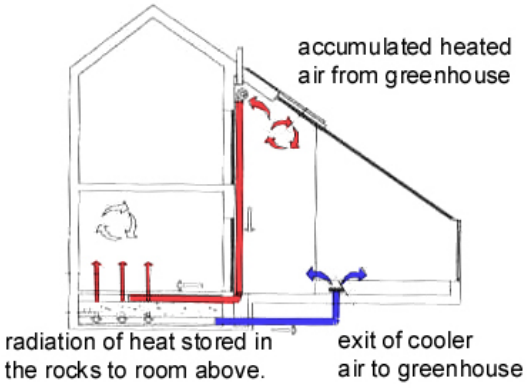




Igloo (section and plan)[xi]

Even in ancient Roman baths there are some very sophisticated systems that modern technology mimics. In the Roman bath the floors were kept warm by under-floor heating. This would be accomplished by heating large tanks of water with fire. The heat generated was then funneled under the floors to heat it and the entire space[xii].

The past was more about following examples and working with experience, rather than creating from ingenuity. Now we have new materials and technologies to solve similar problems. A more contemporary example, using technologies based on similar systems, is that of the Bariloche Ecohouse (featured in Ecohouse: A Design Guide) in the cold mountain areas of Argentina. Its main heat-capturing feature is a large glazed sunspace. Large south facing glazing captures direct solar gains that heat air that accumulates at the peak of the sunroom. It is then transferred, via pipes, to a rock bed system, under the main living space using temperature-controlled fans. The heated rocks retain the heat during the day. The cool air drops to the bottom of the rock bed and is sent back to the sunspace to create air movement. The heated rocks then release heat during the night. The system, connected to the floor slab, functions much in the same way that the radiantly heated roman bathhouse floor used to so long ago.



Greenhouse and rockbed systems in the Bariloche Echohouse by Manuel Fuentes[xiii]

This sunspace also functions to serve other needs. It acts as a thermal buffer space mediating between the temperatures of outside and inside the house. This helps to maintain the indoor temperature at a steady state[xiv]. When the outdoor weather is poor the family can use the sunroom since it is covered and protected from rain and snow. In summer, sun-shading devices, such as screens and plants prevent the space from heating-up. High ventilation windows can also encourage stack effect; drawing cool air into the house and removing hot air from the peak of the sunroom[xv]. In addition, a sunroom provides a space

in the house to leave wet laundry in order to remove moisture from inside the main envelope.

It is spaces like sunrooms that have become additions towards a new vernacular. This does not mean that appearance is unimportant, but allows other concerns to take primary importance in design. These spaces are elements in a new language deeply rooted in function and visual integrity to that function. The ecological approach is about taking past techniques and principles and translating them, within the context of modern needs and technologies. New technologies can help in finding ways of acting in accordance with nature rather than exploiting it. In the past things were simply how they had to be. Trying to copy the past is not good enough in today's society. Ignoring its important lessons is plainly arrogant. Architecture should be adaptive. New generations with new needs will of necessity reinterpret its elements to suit its needs best.

"You employ stone, wood and concrete, and with these materials you build houses and palaces, that is construction. Ingenuity is at work. But suddenly you touch my heart, you do me good, I am happy and I say: 'This is beautiful.' That is architecture. Art enters in." -Le Corbusier.[xvi]

Architecture is perceived on the level of soul nurturing by user and designer alike. The common value is found in a beauty that is necessarily linked to function. After all, the touching of one's heart could not be achieved without the technology that helped to form it. And in an age where humans can so strongly impact the environment they live in, the sensitivity towards an ecological approach to design, of aesthetic functionalism, is understandable and perhaps even necessary. Green design is not just about ecology; it also has an integrity, rooted in spirit and place, is responsive to climate and socio-cultural desires, and satisfies basic archetypal human needs[xvii].

With this in mind it can be seen how *"... the past is not just that which we*

know, it is that which we use, in a variety of ways, in the making of new work…[a] continued cultural resonance… an established line of inquiry in which new work may be effectively grounded"[xviii]. Mind and soul, practical and heart-nurturing, ecological and human stewardship working together to create an undifferentiated wholeness: a consolidated green approach to the built environment that can be accessible and beneficial to all.

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[vi] Le Corbusier. Towards A New Architecture. New York: Dover Publications Inc., 1931.
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