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WHAT CAN BE LEARNED FROM HISTORY?

THE LOST SKILLS OF SUSTAINABLE DESIGN

Sustainable design is not a recent concept - it's a recently lost one.

Elements of sustainable design are integral to every established form of vernacular building. (Vernacular buildings are tried and proven solutions that have evolved over long periods of trial and error using local materials with little or no technology).

Since the time when humans lived in caves and enjoyed the benefits of stable temperatures and natural ventilation with zero mortgage and environmental impact, we have been refining our use of resources to provide improved shelter.

Until very recently in human history, this refinement occurred within sustainable principles because it was dependent on available resources and technologies. These limitations meant that solutions had to be effective yet still work with the environment and available materials rather than transforming and dominating them.

The recent proliferation of technology, cheap accessible energy sources and exciting new materials have encouraged us to solve building problems differently.

Unfortunately, many of these new methods are compromising the ability of our planet home to sustain us in the long or even medium term.

Despite our technological advances, our housing needs have remained similar – albeit with increased levels of comfort and technology. This is because in the last few thousand years, humans have evolved very little physically. It is our technology that has changed and it has changed the way we build – not always for the better.

The new challenge is to choose or adapt our technology to minimise our environmental impact, whilst continuing to improve the comfort and performance of the homes we create.

The following examples of sustainable vernacular buildings are included to illustrate how many simple principles of sustainable design remain as relevant today as they were thousands of years ago. Many examples of these principles have been incorporated into Australian vernacular buildings with great success.

Timeless Nepalese dwellings 2500 metres above sea level are built to a tried and proven formula. The result is an efficient, affordable, comfortable, easily maintained dwelling with minimal embodied energy, that endures century after century.

Passive solar orientation and shading maximises solar gain. East and West glazing is omitted. Walls of rock collected from farm terraces are high in thermal mass and blend with the landscape (they are annually rendered with mud in colours of the landscape). This guarantees longevity and prevents heat loss by caulking cracks and crevices. Early Australian settlers used similar building methods. [See: Passive Solar Heating]

Roofing is lightweight, high insulation thatch of reeds grown on site (estimated R3.0 or better).

Glass is carried to site from Kathmandu by Sherpas and fitted into frames hand sawn on site from highly prized local timber. Unfortunately, many Nepalese forests have been consumed by unsustainable solid fuel heating practices - most recently to cater to tourists.

In the Cappadoccia region of Turkey, soft volcanic rocks were hollowed out to form these 3000 year old thermally efficient homes. Many are still occupied today.

These dwellings possess ultimate levels of thermal mass and "earth coupling" which are ideal for evening out the diurnal extremes of the region. They are ventilated extremely well via stack ventilation principles in summer. They store the heat from wood fires in winter and have no embodied energy. Dwellings in Coober Pedy in Australia use the same principles. [See: Thermal Mass]

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The buildings blend perfectly with the landscape (they are the landscape); take up no valuable productive land; are extremely durable and adaptable and are easily secured via a narrow entrance at ground level.

In Wales, similar construction to the Nepalese example above was used for centuries where it also suited the climate.

The open first floor windows in this photograph show convective ventilation at work causing hot air to rise from the house during the brief Welsh summer, drawing in cooler air at lower levels to cool the building's mass. [See: Passive Design Introduction]

In winter, the small windows reduce heat loss and the high mass construction absorbs radiant heat from open fires, re-releasing it later to keep the occupants warm during freezing nights after the fires die.

Ancient cliff dwellings of American Indians in Mesa Verde exploit the cliff overhang for full passive solar control to not just the walls and windows, but the whole village. Natural updrafts provide excellent ventilation. Buildings are of adobe and rock - high in thermal mass, low in embodied energy.

Indigenous Australians have used similar common sense siting principles for many thousands of years.

The roof is masonry to absorb even more solar warmth in winter and radiate it to the occupants all night. The whole village is passive solar shaded and in summer with no sun, they become ideal, cool sleeping spaces.

Indonesian vernacular buildings use thatch as high level insulation to deal with heat gain in a tropical climate. Open gables allow cross ventilation of the hottest air that would otherwise accumulate in the roof space. Generous eave overhangs shade the building, further reducing heat gain. These principles are employed in the traditional "Queenslander" which is also an excellent example of climate responsive architecture.

The structures employ low thermal mass materials everywhere above floor level allowing the buildings to respond quickly to cooling breezes. [See: Passive Cooling]

High thermal mass floors provide stable sleeping temperatures in better ventilated areas. Where access to cooling breezes is limited, low thermal mass, raised platform floors are used.

The simple sustainable principles of vernacular architecture stand in stark contrast with the principles employed in the majority of contemporary Australian houses. There is little evidence that the change is producing more comfortable or less expensive buildings - in fact it points overwhelmingly in the opposite direction.

The urgent challenges we face are to:

> Rediscover these lost principles.

> Select those appropriate to our climatic and cultural context.

> Adapt and combine them with appropriate current technology.

> Consistently use them in the construction of our homes.

Most of the principles described here are the same as those in the following fact sheets. Our current technology simply makes it easier to apply these principles for increased comfort.

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