

Historical Perspective

WHAT CAN BE LEARNED FROM HISTORY?

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

The reason we make buildings today is much the same as the reason we have always built – to make safe, healthy shelters that protect us from wind and rain, keep us warm when it's cold, and keep us cool and shaded when it's hot. Over long periods of time, by trial and error, people have evolved the tried and proven solutions that we call vernacular building – and these solutions all contain elements of sustainable design.

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.

Cheap, accessible, fossil energy sources and the proliferation of technology and 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 use our technology to minimise environment impacts, whilst continuing to improve the comfort and performance of the homes we create.

Indigenous Australians have used common sense siting principles for many thousands of years. Australia's original inhabitants understood the need for lightweight shelter that provided shade whilst allowing air flow, yet in the hottest climates of the country we still build sealed boxes that trap the heat and then require massive amounts of energy to drive machinery to cool them down.



Struggling to find its place in an unfamiliar landscape – Blacksmith's Cottage at Wilpenna Station, SA.

We have become used to the idea that buildings can be heated or cooled as we choose simply by burning energy. Without that option, you would start to look at how to keep warm air in during winter and how to vent warm air out during summer, and that's what our predecessors did.

If you look carefully at some of the buildings that have survived from the early days of colonisation, you can often identify elements that are clearly design responses driven by climate, even if they are as simple as roof vents,

or verandahs designed with vented gables so that the achievement of shade doesn't also trap hot air.

Early colonial buildings in this country often included elements of passive design in response to climate, often borrowing from the experience of other cultures. The ubiquitous verandah that is now so strongly embedded in the culture of Australian building originally came, along with its name, from India. Every culture that has brought its thread into the multicultural weave of Australia has a deeper history that can be drawn on for inspiration and example.



Colonial cottage with vents to main roof and gabled verandah.

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



Timeless Nepalese dwellings are built to a tried and proven formula that produces affordable, comfortable, easily maintained dwellings with minimal embodied energy, that endure century after century. Passive solar orientation and shading maximises solar gain. East and west windows are omitted. Roofing is lightweight, high insulation thatch of reeds grown on site (estimated R3.0 or better). Walls of rock are high in thermal mass and blend with the landscape. Rendering each year with mud guarantees longevity and prevents heat loss by caulking cracks and crevices. Early Australian settlers used similar building methods. [See: 4.5 Passive Solar Heating]

In Cappadocia, Turkey, soft volcanic rocks were hollowed out to form 3000 year old thermally efficient homes that are literally part of the landscape. Durable, adaptable, and taking up no valuable productive land, many are still occupied today. These dwellings possess ultimate levels of thermal mass and earth coupling ideal for evening out the diurnal extremes of the region. They are well ventilated via thermal flues in summer. They store the heat from wood fires in winter and have extremely low embodied energy. Dwellings in Coober Pedy in Australia use the same principles. [See: 4.2 Design for Climate; 4.9 Thermal Mass]



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 the photograph show convective ventilation at work allowing hot air to rise and

escape from the house during the brief Welsh summer, drawing in cooler air at lower levels. In winter, the small windows reduce heat loss and the high mass fireplace and hearth absorbs radiant heat from open fires, re-releasing it later to keep the occupants warm during freezing nights. [See: 4.2 Design for Climate; 4.0 Passive Design]

Ancient cliff dwellings of American Indians in the south western desert country at Mesa Verde exploit a cliff overhang for passive solar control to not just walls and windows, but the whole village. Natural updrafts provide ventilation. Buildings are set into the cliff face and made of adobe and rock – high in thermal mass, low in embodied energy. The whole village is passive solar shaded and in summer provides ideal, cool sleeping spaces. [See: 4.2 Design for Climate]



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: 4.2 Design for Climate; 4.6 Passive Cooling]

The Romans developed the first greenhouses as well as solar-heated bath-houses and access to the sun was made a legal right under the Justinian Code of Law adopted in the sixth century AD. In ancient Pompeii (Italy) the courtyard homes were built with high thermal mass, used adjustable shade and often supported roof gardens. [See: 4.2 Design for Climate]

The earliest green roofs we know of date back thousands of years and include the Hanging Gardens of Babylon (Iraq) which were what we now call 'intensive' green roofs with deep soil. Earth sheltered buildings have been part of the Chinese landscape for centuries and during those same centuries Europe's Vikings were building their homes with what we now recognise as 'extensive' (thin soil) green roofs. [See: 5.14 Green Roofs and Walls]

These sustainable principles of vernacular architecture stand in stark contrast with the principles employed in the majority of contemporary high consumption Australian houses built to rely on cheap fossil energy.

Just as the basic principles of sustainable construction are not new, neither is the idea of solar housing but after the first modern solar house was built in the 1930s in Chicago, Business Week magazine described it as a threat to the domestic fuel industry!

Meanwhile, research and development in climate-sensitive building has continued. There is now a vast amount of information available for building energy-efficient, climate-sensitive structures almost anywhere on the planet. The *Your Home* Technical Manual contains a distillation of that information for use here in Australia.

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.
- > Use them consistently in the construction of our homes.

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

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