



## Tropical architecture

### Key point

- ***With the increasing annual cooling load associated with needs for air-conditioning in tropical climates, tropical architecture is finding renewed emphasis.***

### Tropical architecture explained

Tropical architecture can be regarded as a type of green building applicable specifically for tropical climates, using design to optimally reduce buildings' energy consumption, particularly the cooling load.

Tropical architecture is not a new concept. Countries in the Asia-Pacific region have adopted vernacular designs adapting to their climatic needs over many centuries. For instance, a high ceiling demonstrates an understanding of the stack effect. Malay homes install a large roof overhang and the West Indians use verandas to reduce solar gains. These design solutions allow windows to remain open for natural ventilation in a building during rainy season. Samoans long ago did not install walls to allow free-flow breezes. Malayan homes' plentiful windows aim to maximize cross-ventilation.

### How it works

Tropical architecture works to achieve thermal comfort through the use of design elements, such as sunshades, cavity walls, light shelves, overhangs, roof and wall insulation and even shading from trees.<sup>1</sup> The design principles of tropical architecture include: regional evaluation; climatic elements; site selection; sol-air orientation; solar control on the environment and building; forms, wind effects and air flow patterns; thermal effects of materials; and heliothermic planning.<sup>2</sup> In addition, maximum cross ventilation, natural lighting, louvers and natural materials are key elements for optimizing natural ventilation to cool tropical buildings.

### ***An example of tropical architecture: Golconde in Pondicherry, South India<sup>3</sup>***

Golconde in Pondicherry, South India is a multi-storey dormitory built from 1936 to 1942 and based on design principles of simplicity, economy, directness and closeness to nature. The building is an interesting example of how vernacular design can be integrated into modern tropical architecture. The Golconde's specific design features include:

- **Rooms separated from the corridor by sliding doors:** This allows air to circulate freely when the doors are open. Staggered slats allow for ventilation even when the doors are closed. The topmost part of all the doors has a skylight with a sliding glass pane that also allows for air movement.
- **Room walls finished with eggshells:** The walls aid in the natural lighting because they reflect more light and the rooms are better illuminated with the natural light. Unlike with concrete walls, there is less heat in the room.
- **Double-thick roof made of precast curved cement concrete tiles:** The convection of air keeps the roof and the top-floor rooms as cool as the lower floors.

<sup>1</sup> Amado de Jesus, "Green Architrends: Tropical Architecture", *Philippine Daily Inquirer*, September 16 2011. Available from <http://business.inquirer.net/19613/tropical-architecture> (accessed 6 December 2011).

<sup>2</sup> Victor Olgyay, *Design with Climate: Bioclimatic Approach to Architectural Regionalism* (Princeton, New Jersey, Princeton University Press, 1963).

<sup>3</sup> This section is based on documents stored in the Archives of Sri Aurobindo Ashram and displayed at an Exhibition on Golconde in Pondcherry in October 2011.

- **Large operable horizontal louvers:** The entire building on both the north and south sides is equipped with large operable horizontal louvers that protect from sunlight, wind and rain while allowing for natural ventilation. By avoiding direct sunlight, the building allows rooms to remain cool without the need for mechanical ventilation.
- **Landscaping with surrounding garden:** Trees, grass and shallow pools are used to create a cooling effect. High walls around the property are installed to avoid the heat island effect from non-shaded areas.

### Considerations for replicating

The challenge of introducing tropical architecture is to adapt it to the modern lifestyle – the transformation of local cultures to the modern city. While it is possible to retain enough of the vernacular lifestyle for residential designs, other types of buildings, such as offices and shopping centres, have generally not done so. There is growing interest in developing modern tropical architecture in urbanized countries like Malaysia and Singapore. Modern architecture aligned with existing technologies includes: the angle of the inclination of the roof when using tile roof covering materials, long overhangs, the use of a ventilation crusade to reduce the humidity and hot air temperatures and the correct direction of the orientation of the building.<sup>4</sup>

### Further reading

Tropical Architecture website: <http://tropical-architecture.blogspot.com/2011/07/modern-tropical-architecture.html>

United Nations Educational, Scientific and Cultural Organization website “Australia”:  
[www.unesco.org/en/unitwin/access-by-region/asia-and-the-pacific/australia/unesco-chair-in-tropical-architecture-14](http://www.unesco.org/en/unitwin/access-by-region/asia-and-the-pacific/australia/unesco-chair-in-tropical-architecture-14)

<sup>4</sup> Tropical Architecture website: <http://tropical-architecture.blogspot.com/2011/07/modern-tropical-architecture.html> (accessed 10 December 2011).