TROPICAL SUSTAINABLE DESIGN CASE STUDIES

Shambala

Project type: Residential

Location: Whyanbeel Valley nr Mossman, QLD, Australia
Year completed: 2004

- **Site impact on the local environment minimised**
- **Pavilion style design separates uses while providing good ventilation, daylighting and shading**
- **All water management and sewer treatment is on site**

OVERVIEW

The clients are a retired couple with a 6.1 hectare property adjacent to the Daintree National Park in North Queensland. They required a residence that could be rented out as an executive holiday home during the peak tourist season and used as their residence for the rest of the year.

The Daintree rainforest has immense biological value and a concentration of plant and animal species that are unique to the region. It houses the oldest rainforest on the planet – the closest living counterpart to the forests that once covered the ancient supercontinent of Gondwanaland.

PLANNING AND MANAGEMENT

It was important that the residence reflect tropical living and be open in plan, incorporating a small lap pool. Views to the North were to be maximised whilst ensuring the house maintained a strong connection to the surrounding ecology. Functional requirements were a two space carport, laundry, store, open plan living, dining and kitchen, a separate TV room/study, and three private bedrooms with ensuites that would be unique and have a connection with the surrounding environment.

SITE

The local climate is warm/hot humid, typically experiencing high humidity and low diurnal temperature ranges. The Daintree is located in a cyclonic area with high rainfall for three to four months during the wet season and long periods of dry sunny weather throughout the remainder of the year.

The building site was selected to have minimum impact on the local environment and to maximise views. The chosen building pad was on an area of the site cleared by previous owners. This reduced the impact on the precious ecology. Minimal disturbance to the natural landform was ensured by constructing slabs on flat areas, whilst lightweight decks were chosen over sloped areas.

The buildings have been arranged on site to shade east and west walls with open living areas in the north catching prevailing monsoon breezes.

DESIGN

At the design stage, a particular challenge was to create an environment that was both a retreat from the city and also reflected the unique character of the surrounding heritage of the Daintree Rainforest. The building also had to be functional, creating a separation of living and bedroom areas. At the same time this all had to be achieved under strict cyclonic wind design parameters.

The designer created a series of three pavilions, connected by open breezeways and verandahs, branching off a central axis running east-west. This creates a flowing rhythm of function and form. Separating the building elements served the dual purpose of good ventilation, daylighting and shading, and at the same time separating uses. The pavilions are open in plan with an indoor/outdoor feel, mostly without walls forming a connection with the external environment. Openable and adjustable windows and doors allow the user to control areas as required, maximising breezes and daylighting.

The entry is spectacular, with a stunning long-axial pathway framed by timber rafters. The axis culminates at a point of dense rainforest drawing the eye through the building making it seemingly blend with the natural environment. This sets the whole tone for the building, which has an almost spiritual quality that pays homage to the unique character of the heritage rainforest. Open walls and courtyards further enhance the connection between inside and outside.

The soaring roofs with glass louvre gable ends are a tropical feature. Rafters are exposed with plasterboard lining hiding a ventilated and well insulated roof space.

The lap pool has been built above ground to minimise the impact on the fragile ecology of the site and has become a feature of the main living area. The use of the wet edge on this pool creates a seamless link across the timber deck to the water and a connection to the view of rainforest and sky. The need for pool fencing around the majority of the pool has been eliminated by the clever use of a sunken garden bed in front and the wet edge drop-off.

Another interesting feature are the indoor/outdoor bathrooms that have views to the rainforest (from the guest bedrooms) and over the dam and rainforest (from the main bedroom).

A feeling of lightness has been created by the use of colour, natural daylight and timber and glass.

MATERIALS

The exterior aesthetics comprise a palate of materials that are consistent throughout. Australian style materials have been selected: the traditional Queensland style Colorbond roof, the use of verandah elements and natural timber finishes.

The walls are rendered and painted a natural beige colour to create an earthy contrast to the dark green of the rainforest. Natural coloured tiles and verandah decking and posts have been utilised extending this earthy theme. There is a solidity created in the use of solid strong timber posts and rafters (all complying with Cyclone ratings) and the slab floor with natural tile finish.

Screens have been imported from Asia featuring pressed pandanus into a roughly textured fabric woven from timber. These have been utilised in the main bedroom walk-in-robe and vanity. Combined with the natural colours of timber and tiles, and the rustic quality of the render, they create an earthy complement to the surrounding rainforest.

ENERGY

The home is designed to reduce energy use, with the buildings being naturally ventilated. There are louvred gable ends, banks of adjustable louvres and bi-fold doors. The building elements are designed to capture summer breezes from the North and North East and exclude colder winds in winter from the South East. The light-coloured, well-ventilated roofs reduce heat. The passive solar design and ventilation system eliminates the need for air conditioning to be cool and comfortable year round.

The only exception is the TV/media room, which can be air-conditioned for additional comfort on humid days and to protect book and electronic equipment. It has also been placed in a well-shaded area of the site to lessen the load on air-conditioning when used. No artificial lighting is required in the daytime.

WATER AND WASTE

Bore water is pumped to a tank at the rear of the house and then gravity-fed to the residence. This provides all drinking and washing water.

There are no gutters, so water falling on the roof is used to water gardens surrounding the building. Highly porous rock beds and native vegetation have been placed around buildings to promote drainage and on-site water retention and minimise the need for additional water use for landscaping.

All sewerage and greywater is treated on site with an environmentally self-sufficient treatment system. An aerated wastewater treatment system has been used that utilises naturally occurring bacteria and enzymes. The residue from the treatment is used to water the gardens and lawns.

OWNERS/USERS STATEMENT

“All these factors combine to create a building that is self-sufficient in terms of heating and cooling (with the entire cooling on-site throughout the year, achieved naturally, eliminating the need for air conditioning). The thermal comfort and health of occupants has been enhanced and the demands on electricity reduced. All water management and sewerage treatment is achieved on site and treated water is recycled through a reticulation system on the gardens and lawns.” John Colless

PROJECT TEAM

Base building architect/ designer: Chris Vandyke – Chris Vandyke Designs
Civil engineer (Site and traffic): Kel Bruce – Bruce Associates
Structural engineer: Kel Bruce – Bruce Associates
Project manager: Chris Vandyke – Chris Vandyke Designs
Energy efficiency rating consultant: Andrew Barrett – Green At Heart
Builder: Keith Tesch Builders

For more information visit: **www.jcu.edu.au/tsd**
www.greenbuild.com.au

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