

SUSTAINABLE HOUSING IN BAMBOO LAND

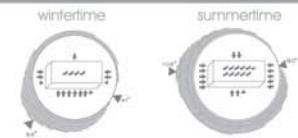
Site

The site (marked by the black arrow) is located in the city of Yong'an of the Fujian province, covering from 116°56' to 117°47' east longitudes and from 25°33' to 26°12' north latitudes, 82 kilometers in west-east direction and 71 kilometers in north-south direction.

Environment Scheme



The following diagram shows the solar radiation and temperature situation of Yong'an



(Notes: The forces are indicated on average clear winter and summer days. The air temperature variation is indicated by the outside concentric circles. Each additional line represents a 2°F difference from the lowest daily temperature. The direction of the impact is indicated according to the sun's direction as temperatures occur. The total (direct and diffuse) radiation impact on the various sides of the building is indicated with arrows. Each arrow represents 250 Btu/sq. ft. day radiation.)

PRIMARY CHALLENGE

Environmental cost resulting from the excessive cooling load in response to the humid and over-heated climate during summer

ULTIMATE GOAL

A sustainable residence that features resource efficiency and lessens the impact on natural environment

Sustainable Construction—*"The creation and responsible management of a healthy built environment based on resource efficient and ecological principles"*.
"Agenda 21 on Sustainable Construction"
 (CIB Report Publication 237, 1999)

OBJECTIVES

1. Minimizing the cooling load and the related non-renewable resource consumption
2. Maximizing the use of renewable resources and ecologically benign materials

STRATEGY

Making the best of the local climatic and vegetation resources to reduce the use of conventional resources for building cooling

SOLUTIONS

Yong'an is characterized by a typical sub-tropical monsoon climate type. The summer-time there is much longer than wintertime and the climate is mild with an average yearly temperature of 19.1°C. The rainfall is abundant with an average yearly precipitation of 1580.7mm.

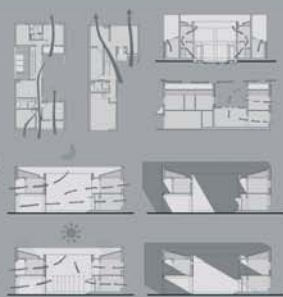
Architectural Means

A duplex living unit constitutes the basic cell of the residential area.

The duplexes can be jointed in line in the west-east direction. Each has a courtyard of 8mX8m.

The concise plan of the duplex and the use of linkage are conducive for building material efficiency.

The plan and section design of the single duplex takes the best advantage of natural ventilation to minimize cooling load.



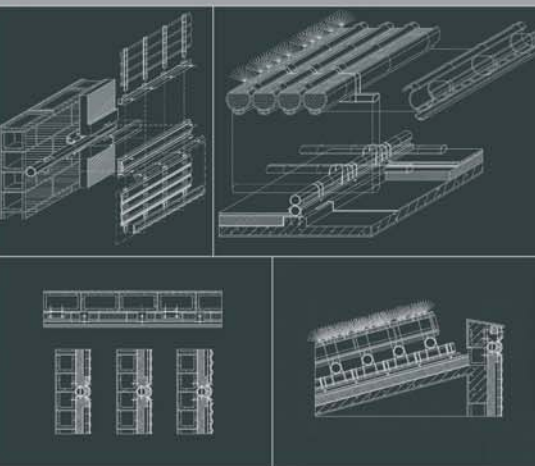
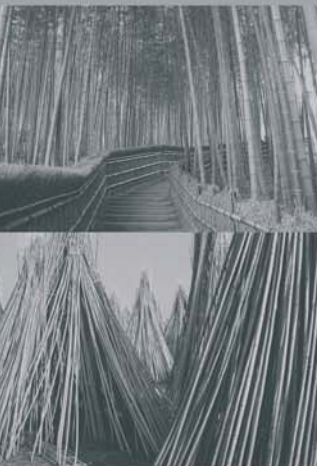
The layout pattern of the rooms is cautiously adjusted to avoid counteracting the natural airflow. The main corridor is oriented in a north-south direction to facilitate continuous cross ventilation; the lighting well over the kitchen also serves as a solar chimney and the airflow through the kitchen and bookroom can therefore be enhanced.



Yong'an features an abundant resource of Chinese bamboo. The total area of bamboo forests adds up to some 46700 ha. Each farmer there possesses about 0.26 ha. Both statistics rank first in China.

Constructional Means

The stems of Mao bamboo or Gang bamboo, two most dominant types in local villages, are used as important building materials in the construction of walls and roofs.



The bamboos per se are low environmental impact, resource-efficient materials. Furthermore, in view of the prosperous local bamboo industries and the facilities in acquiring, processing and transporting bamboos, the energy use and environmental impacts occurring before installation can be minimized.

The bamboos are used to constitute radiation barriers to enhance the performance of walls and roofs; additionally, give rise to a distinctive facade appearance.