INNOVATION, EFFICIENCY, ECOLOGY

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Description: Strategy for sustainable design in hot-dry climate
Sustainability concept: A design strategy and techniques
The collective wisdom of over 4500 years of civilisation in India, based on the basic concept of living in harmony with nature, coupled with common sense, has developed into a vernacular language of architecture responsive to the climate. Here, the recognition of the five natural elements, viz., sun, water, air, fire and earth, as the chief sources of energy and peaceful coexistence with them has always been the basis of life. An exhaustive research has been carried out to understand the traditional architecture in Ahmedabad.
Urban density, orientation and height of buildings, traditional forms and structures were studied in-depth. Through various adaptive measures like thick brick walls and courtyards in the hot-dry climate of Ahmedabad, inhabitants have managed to develop a distinctive architectural typology suited to its climate.
These adaptive measures have not just been restricted to individual houses but are also integrated in the urban planning of towns. The narrow streets of Ahmedabad is one such example that takes into account the harsh climate and passively responds to it, to create a close-knit urban fabric. It is this attitude of yesteryears that needs to be reinterpreted in today's energy-deficient countries like India to give the inhabitants, a living and working environment integrated with nature, to lead a more complete and stress free life.
Adapting traditional wisdom to create sustainable architecture solutions in present-day circumstances
A strategy has been evolved for sustainable construction in a hot dry climate based on traditional knowledge and has resulted in reduced consumption of non-renewable resources in terms of material use and energy usage. In the process user comfort is increase and not compromised. This attempt has been made through the design of a hotel in the city of Ahmedabad, India.
The design strategy is based on a three-tier strategy of passive mode, mixed mode and active mode systems to provide thermal, visual, hygienic and acoustic comfort. A careful daily and annual analysis of various climatic parameters has been undertaken. Design features such as form, orientation, shading devices in the building envelope have been applied. The building envelope is optimised with computer simulations to select appropriate building materials for walls and roofs. Glazing sizes has been studied and selected based on its thermal properties. These optimised building materials have been reintegrated into the simulation model and indoor conditions based on comfort and discomfort levels have been analysed. In spite of all the passive design features, it was noticed that more than 80% of the period in the summer months of April, May and June had high thermal stress.
An appropriate mixed mode system (Evaporative cooling system) was selected and implemented for the period. This installation was able to reduce the cooling load to as low as 21 KWh/m2.
A cost analysis showing the different advantages of the passive/mixed mode system against a full mode system has been analysed and concluded. 70% reduction in installation and running costs has been made possible by using the suggested system.

THE WIND HOUSE

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Lanzarote's grape yards have develop a unique method. Farmers have dig thousands of holes of small hollows into the 11/2 metre thick layer of 'picon' (porous volcanic granules that trap moisture) and planted vines in the volcanic ash that lies beneath. In order to protect the Vines from the Trade Winds, they have then built small semi-circular walls around each of these hollows.

The house is located in a mild slope of a Vineyard. This house takes advantage of the sun and winds orientations providing a weekend shelter and a energy supply system for the house and the Vineyard requirements provided by a micro-wind turbines wall. The house is buried in the soil and has a dough-nut plan surrounding a interior garden. The two entrances are provided by two ramps. The floor follows the site inclination, creating a continuous dynamic space interrupted by the horizontality of normal usage. Kitchen-Dinning- Living areas have open views towards the landscape. Slope down, the house gain in intimacy for the rooms and wet-areas.

SUSTAINABLE FEATURES:

A- ENVIRONMENT ADAPTATION STRATEGY
The house is buried in a mild slope. Protected from the strong winds, as the grape yards of Lanzarote.
B- PASIVE THERMAL CONDITIONING
The buried house in a dry environment, is cool in summer and warm in winter. Lanzarote's temperature average is 20C.
C- ENVIRONMENTAL DESIGN
The house is built using lava stone, a common material in the volcanic island of Lanzarote.
D- REUSE WATER SYSTEM: AEROBIC LAGOONS
Three lagoons recycle the black and grey water for reuse in the grape yard, toilets and the house garden.
E- ENERGY SAFE: EOLIC TURBINES WALL
A wall of micro- wind turbines, provides the energy supply and reduce the visual impact of big propellers.
F- COMPOST GARDEN

LOCATION:	GRAPE YARD IN LANZAROTE/ CANARY ISLANDS/ SPAIN
CLIENT:	MR. CARLOS
PROGRAM:	WEEKEND HOUSE
DESIGN:	JIN TAIRA