THE MAOSI ECOLOGICAL PRIMARY SCHOOL IN WEST CHINA

By Xi Fang

Maosi Ecological Demonstration Primary school is an innovative project carried out by a team led by Professor Edward Ng and the Department of Architecture of the Chinese University of Hong Kong in the Loess Plateau region of West China. The Maosi Ecological School was awarded by the prestigious World Architecture Festival 2008 held in Barcelona, Spain and by the UNESCO Asia - Pacific Heritage Award for Culture Heritage Conservation programme in 2009.

The project was aimed at creating a school of learning that was ecological, comfortable, with zero carbon emissions, and at the same time economically efficient. The school was realized in a region poor in natural resources with a harsh Alpine climate, characterized by low levels of economic growth, education, and technology. The village has around 2500 villagers and 200 students. Usually, schools of this region were either in caves or in simple one-storey brick huts.

By adopting the motto of *high science and low technology* for the job, the project emphasized a scientific and transferable methodology. According to research on the local environmental and material conditions, as well as traditional construction techniques, it was found that the most basic usage of thermal mass and insulation material, based on earth and other natural products, was the most effective approach to ecological architecture. Besides its practical use, the project also intended to act as a template for similar developments.

The eco-school has been designed to maximize daylight and natural ventilation in summer, thus 10 proposed classrooms were built into five units at two levels following the topography. A tree-based landscape helps create a desirable campus environment for children. The classroom form is derived from local traditional houses with timber structures so as to be constructed easily by villagers.

Thermal mass and insulation are employed in the forms of mud-brick walls, the insulated traditional roof, double-glazed windows, etc. The semi-buried form at the north side, together with the direct-gain mode of passive solar system, can further upgrade the thermal performance, while the angled opening of windows maximizes daylight to the indoor space.

The construction has inherited the local traditional means. It has been implemented by the villagers

themselves mostly with simple traditional tools, hence the cost of materials, manpower, and equipment was much cheaper than those of other local buildings constructed using conventional methods.

Most building materials, such as mud bricks, rubble, straw and reed, are sourced in or around the site with minimum embodied energy. Also due to the involvement of these natural materials, little waste was generated during construction. Off-cut was recycled back into construction, for example off-cut rafter reused for children's facilities, spare mud bricks mixed with straw mud for plaster. The construction has had almost no environmental impact.

The new school has been put into use since September 2007, the same year when the construction was done. According to field measurements, the indoor air temperature of new classrooms is always stable, cool in summer and warm in winter, without needing coal for heating.

Compared to local conventional schools, during its whole life cycle, this ecological school contributes a far better ecological performance in indoor comfort, energy consumption and environmental impact. Furthermore, with the eco-school project the villagers can re-understand their own tradition. The school illustrates to the locals a feasible way towards an ecological architecture suited for the conditions of China's Loess Plateau region. In this way, by selectively employing their familiar techniques and materials the villagers can easily build themselves their most effective and affordable ecological buildings.

According to the information from UNESCO Bangkok, the Ministry of Housing, Urban-Rural Development (MOHURD) has adopted the methodologies of the project and intends to apply these in other contexts. If deployed as a prototype, the school could influence the design of an estimated 200,000 new schools in the future.

To know more

Worldbuildingsdirectory.com

UNESCO website presentation

Article in architecturecentre.co.uk

Cuhk.edu.hk website

Cuhk.edu.hk website