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# Why climate-responsive architecture will be the future of design

TH PREMIUM

Cavity walls to retain heat, metal *jaalis* to cool buildings — climate-responsive architecture will be key in the days to come. An expert-approved blueprint on indigenous design

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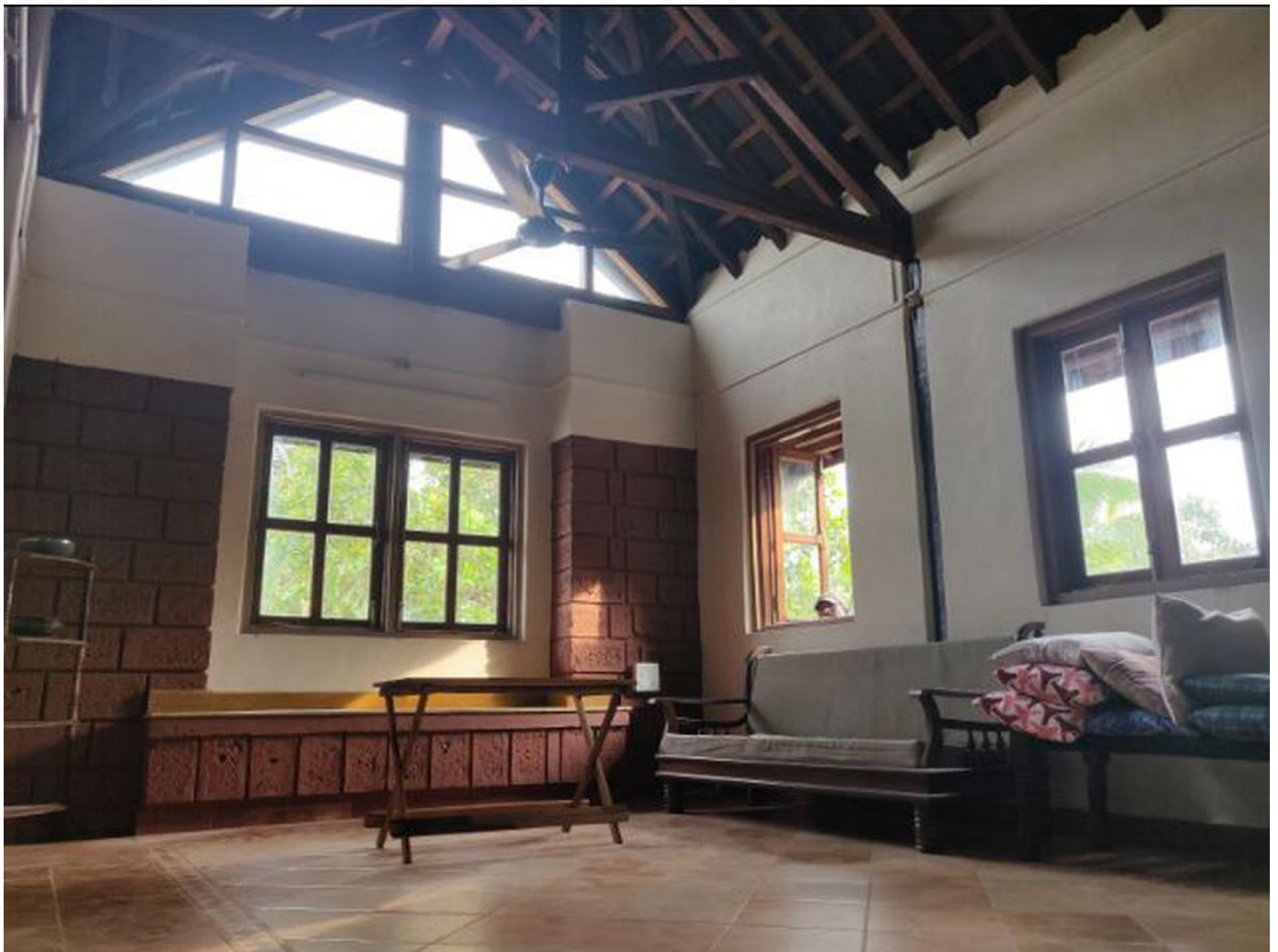
The Lodsi Community Project for Forest Essentials in Uttarakhand | Photo Credit: Noughts and Crosses

A 2020 report by the McKinsey Global Institute, titled 'Will India get too hot to work?' states that 'India could become one of the first places in the world to experience heat

waves that cross the survivability limit for a healthy human being resting in the shade, and this could occur as early as next decade’.

Among other ways to mitigate this, the report suggests undertaking reflective power heat management efforts in cities, and establishing early-warning systems and cooling shelters to protect people. Which is why, adopting climate-responsive design is one of the most crucial aspects the construction industry can look into, given that the sector is responsible for 38% global greenhouse gas emissions, of which steel and cement production itself is responsible for 15%.

“It is important to be aware of the climate and the surroundings that we are building in. We don’t need to reinvent the wheel again and again. Older traditional houses of the region that have stood the test of time can be a good reference, to analyse and document these systems and then tweak them as per our requirements,” says Pune-based Priyanka Gunjkar, Principal Architect of Building in Mud.



Priyanka Gunjkar’s project near Mandangad, Maharashtra | Photo Credit: Special Arrangement

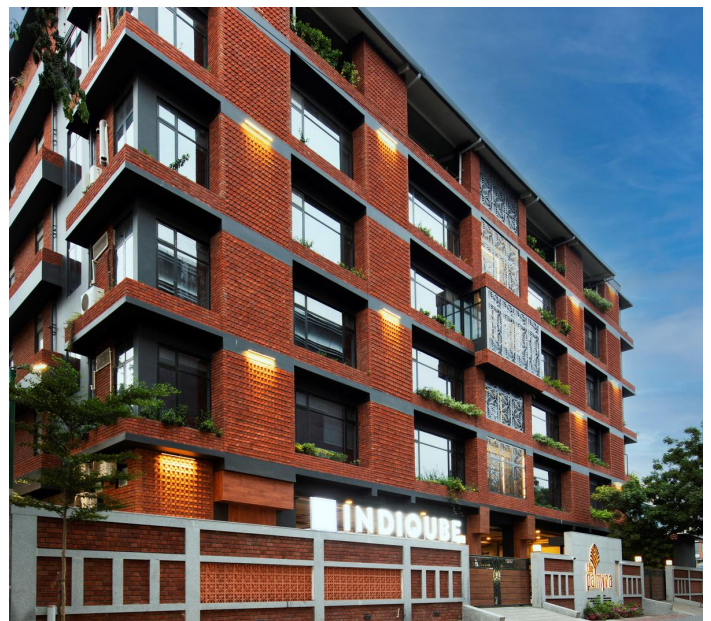
Take for instance Gunjekar's project near Mandangad, Maharashtra. Badly hit by the Nisarg cyclone a few years back, the duo made a framed structure using local wood and laterite infill for the walls as seen in the traditional housing typology of the region. "In such a climate, we did not need thick walls for thermal mass but needed better finishes that act as humidity regulators. When the cyclone hit the structure, a few locals residing around saw the roof on one side go up by two feet and rest back in its original position. The only damage to the house was some minor plaster cracks on the walls. On the other hand, the new RCC structures around us had far more damage with broken slabs, walls and metal roofs that had flown away," explains Gunjekar.

## Construction hazards

Noted architect Benny Kuriakose, known for his sustainable building practices, has always championed indigenous techniques and been vocal about where modern architecture is going wrong. "The environmental circumstances in which the structures are supposed to function are fundamentally changing as a result of climate change and global warming. Climate change poses an existential threat, and buildings are a major contributor," he wrote in his May 2022 blog 'Western Style Construction Influence On Climate Change and Extreme Heat Effect'.

So, for someone constructing their home or office in tune with climate-responsive design principles, there are a few key factors to be considered. These include achieving natural ventilation and daylight within buildings, using appropriate building materials that are insulating and regional, and ensuring we have adequate exposure to natural vegetation, says Anupama Mohanram, architect and founder of Chennai-based firm, Green Evolution.

At The Palmyra, Ekkaduthangal, an office building she designed, principles of energy-efficiency and water conservation are a few eco-sensitive features included. "We have also designed a façade of handmade bricks and metal *jaalis* in a custom design. This is to aid ventilation and bring in interesting light and shadow patterns," explains Mohanram.



## A factory in the hills

The Palmyra, Ekkaduthangal | Photo Credit: R RADHAKRISHNAN



Taking us through The Lodsi Community Project for Forest Essentials in Uttarakhand, Sonali Rastogi, co-founding partner of Morphogenesis, who designed it, explains how the manufacturing facility's outline draws inspiration from the traditional Garhwali kholi (house). "The building is essentially a rectilinear volume, oriented along the East-West axis, with a central entry that divides the facility into two parts. Functions that require a cooler environment (herb grinding, packaging, and storage) are located on the upper floor, whereas the preparatory functions with high internal heat gain are located on the lower floor."

While the project does have a minimal air conditioning system "to maintain the air quality and humidity required for the manufacturing of body care products", there are no heaters in the building.

"The heating requirements are taken care of by studying the angles of the sun, regulating the ingress of sunlight, using cavity walls and utilising air cavities within the building to retain heat," says Sonali.

For similar structures constructed in cold regions, she recommends a clear understanding of the sun's path, and the use of cavity walls that have an insulating layer of air between them.

From Uttarakhand's chilly terrain to Kerala's hot and humid climate, Varsha Jain, Principal Architect and co-founder of Creative Architects & Interiors (CAI), who has designed the midway shelters for Sabarimala pilgrims (at a cost of ₹110 crore), says the main idea behind the design of these buildings was to incorporate the traditional Kerala architecture style which is responsive to the local climate. Expected to be ready this year, Jain says the project incorporates a range of passive cooling techniques. These include a sloping roof with Mangalore tiles and puf panels to be responsive for the rain and temperature control, verandas that act as buffer and shading spaces from rain and sun, the roof broken down to multiple levels to ensure clerestory windows can be provided for better internal airflow, among others.

While natural materials outweigh contemporary choices in most ways, they need to be used sensitively. "Their selection needs to be based on the areas where they are found in abundance and on whether they can replenish themselves," says Rastogi, who enjoys



the use of natural stone, wood from renewable forests or from certain kinds of trees that are abundant in the region or that grow quickly.

“I also prefer to use textiles such as jute that bring in an element of natural texture. Mud in its various forms, mud blocks or plaster, is another material that we love to incorporate, but the material that trumps them all is daylight,” she says.

The Lodsi Community Project for Forest Essentials in Uttarakhand | Photo Credit: Noughts and Crosses



## **Cost factor**

Generally, the cost of construction for climate-efficient buildings is equal or slightly higher than that of conventional RCC structures, points out Gunjekar. Having said that, the operational costs of air conditioning and electricity are not considered in the cost for construction of these conventional buildings. “The non-breathable walls and lack of proper ventilation and thermal comfort in these buildings forces one to use high embodied energy systems to cool them down.”

Explaining how climate-efficient buildings largely minimise excessive material use and make use of materials manufactured regionally, Mohanram says this will help in reducing the cost of civil construction. “The use of passive solar design strategies, solar photovoltaics and energy efficient fixtures and equipment will result in long term electricity savings for the occupants through the life of the building. Water conservation strategies will ensure water security for the future and reduce long term cost.”

Adding to the many ways contemporary architecture is going wrong, Gunjekar says the many tall, glass façade buildings which are coming up in many cities without much thought of light and ventilation are increasing operational costs of cooling the internal spaces.

“To remain sustainable, we need to promote our artisans, build local economies, use local and regional materials, and create buildings that are culturally relevant. Such architecture would not only inspire and enliven us but also ensure environmental sustainability,” Mohanram concludes.