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APRIL 2022 ₹200

ARCHITECTURE+DESIGN

AN INDIAN JOURNAL OF ARCHITECTURE

ISSN 0097-0239

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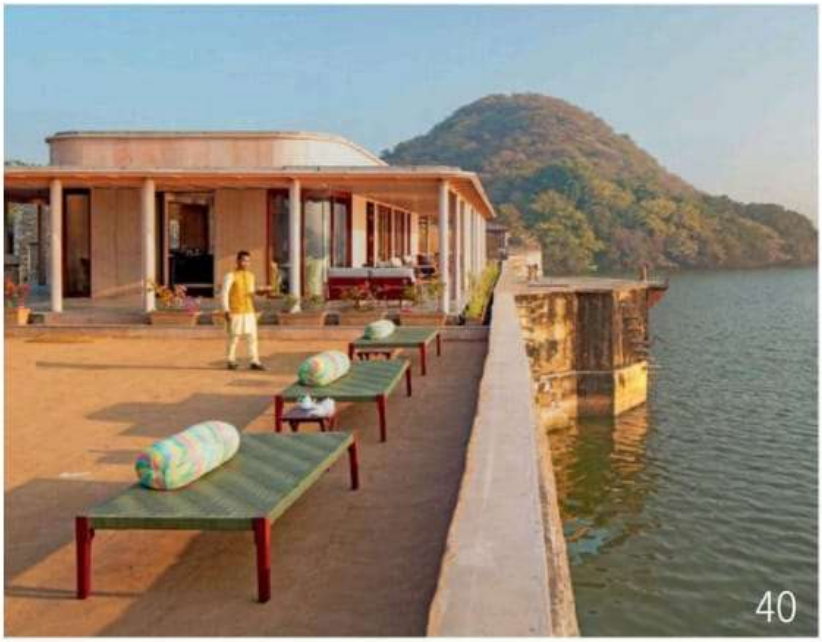
MAGZTER

CONTENTS

ARCHITECTURE+DESIGN
VOL. XXXIX NO. 4 ■ APRIL 2022



MAGZTER

MAGZTER

THE ARCHITECTURE OF SUSTAINABILITY

Architect Rahul Kadri decodes the notion of sustainability in architecture and asserts on how our built environment should be resilient and self sufficient as we build for the future.

Rahul Kadri

Rahul Kadri is a Partner & Principal Architect at IMK Architects, an architecture and urban design practice founded in 1957 with offices in Mumbai and Bengaluru. He spent his formative years amidst lush landscapes exploring the forests of the Kumaon Himalayas while studying at Sherwood College, Nainital. This early relationship with nature infused within him a deep passion to create buildings & spaces, which are in harmony with its natural context. Kadri took over the reins of the practice from his father I. M. Kadri in the 1990s after completing a graduate diploma in architecture from the Academy of Architecture, Mumbai, and a Masters in Urban and Regional Planning from the University of Michigan, USA.

WHAT IS SUSTAINABILITY?

In the realm of architecture and design, sustainability has been reduced to a buzz word in the last few years and is often confused today with terms like green, energy-efficient, net-zero and more. Also, with the emergence of several rating mechanisms and agencies such as the IGBC, GRIHA and LEED, and rising environmental consciousness in the urban middle class, sustainability is increasingly being employed as a marketing gimmick. So, is a building with solar panels on the roof really sustainable? How about a LEED 5-star-rated building? On the other end of the spectrum, do all sustainable buildings have to be constructed in mud and brick? Are glass and concrete buildings inherently unsustainable?

Auric Hall

DESIGNING SUSTAINABILITY

Sustainable design is as much about the process as it is about the product and its principles must follow through the entire lifecycle of the building– from its initial design and construction, and use and maintenance, to its demolition and the reuse of its building materials.

The process starts with strategically placing the building on the selected site in a way that integrates it with the local ecosystem instead of disrupting natural processes like the flow of water and the growth and sustenance of plants and trees. So, it's always a good idea to save the trees on the site and to design the building around them, or to plant native vegetation if the land is barren, which attracts local biodiversity and gets natural processes going again. Architects and landscape designers also maintain site ecosystems by reducing the amount of non-porous paving or creating shallow swales (water channels) or ponds on the site to allow rainwater to percolate into the soil to recharge groundwater aquifers. Such strategies can improve soil health, reduce irrigation needs, as well as create a comfortable micro climate. For example, houses that are shaded by trees or look out onto small water bodies remain significantly cooler during India's hot summer months.

The next step is to maximise natural light and ventilation in the interiors. Usually achieved via what is called 'passive solar' design, this involves designing the building in a way that it captures, redirects, and/or stores the optimal amount of heat, light and wind for a certain region and climate type. Passive solar design employs several architectural choices, tools and strategies: the building's orientation in response to the sun, the thickness and mass of walls, the size and placement of windows and doors, insulation, thermal chimneys and ventilation shafts, shading devices such as façade screens or *jaalis*, and roof and window eaves and overhangs or *chajjas*. The appropriate use of these can significantly reduce artificial lighting and mechanical heating or

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Photo Credit: Rajesh Vora

cooling loads, thus reducing operational costs and saving energy. Additionally, according to a theory by American biologist E. O. Wilson called biophilia, living in such close contact with nature and its elements has been proven to improve human health and wellbeing.

It is also important to evaluate every material or product that's used in a building through the perspective of 'embodied energy/carbon', which refers to the total energy consumed, or the total GHG emissions generated by all processes required for the production and delivery of a material or product. So, natural and locally available materials have lower embodied energy and carbon when compared to heavily processed materials that have to be transported from afar, and hence, their use and reuse should be prioritised.

We have been experimenting with such strategies in our work at IMK Architects as well. For instance, the use of Compressed Earth Brick (CEB) at the recently completed Symbiosis University Hospital and Research Centre in Lavale, Pune, has ensured 80% less energy consumption to achieve thermal comfort, significantly reducing the building's operational costs. The bricks were created from the red soil and murum soil that was excavated on site to create the foundation for the building. This meant we didn't need to buy or transport bricks and reduced

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Photo Credit: Rajesh Vora

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construction waste. The bricks were naturally compressed and sundried instead of using the traditional kiln fired method, which also reduced carbon dioxide emissions.

Similarly at the Auric Hall, a 16,660sq m landmark we designed for Aurangabad Industrial City (AURIC), India's first greenfield, smart industrial city, a ceramic frit glass surface allows maximum glare-free light, roughly 83.40%, into the indoors to create a conducive work environment, while simultaneously minimizing heat gain. The project also uses locally-manufactured autoclaved aerated concrete (AAC) blocks and recycled building materials resulting in considerably reduced costs and carbon emissions.

URBAN FUTURE

Buildings, however, do not exist in isolation. They are part of a much larger ecosystem and the idea of sustainability must be integrated into how we design and plan our cities too– what powers our cities, how are resources and public services distributed, and how we manage waste. As we build for the future, we should strive for resiliency and self-sufficiency in our built environment. Imagine a neighbourhood where you could access everything you need within a 500m radius from your doorstep– a self-sustaining unit with all public facilities and amenities available locally, from schools and hospitals to gardens and weekly farmer markets; a unit that could be administered with ease and where inhabitants would be able to walk or cycle to work, learn, shop and to play.

Such smart-neighbourhoods can reduce travel times and the need for regular inter-neighbourhood journeys, thereby, reducing the high levels of carbon emissions and pollution associated with cities. They can also ensure optimisation of resources and services, effective costing, and reduce wastage. Paris is already testing this idea and working on becoming a '15-minute city'. So are Melbourne and Milan.

The building sector, undoubtedly, holds massive potential for reducing GHG emissions– and at a relatively low cost. But while architects and designers work on singular 'sustainable' buildings or developments for conscious clients, the impact of their efforts will be limited. There is an urgent need to scale up. We need sweeping policy reforms in the construction industry that incentivise sustainable development and disincentivise bad practices so sustainability can get integrated into mainstream practice– and at the neighbourhood and city levels. We must remember that the buildings and cities we design today will shape energy consumption and emission patterns for years to come. So, let's start now. The climate clock is ticking.

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