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BUSINESS

Designing for resilience: India's imperative for climate-adaptive architecture

Pranay Kumar, ED, REPL (Rudrabhishek Enterprises) highlights how India is embracing resilient design in the face of climate change

by Staff Writer January 3, 2025



India, with a vast geographical diversity and a rapidly growing population, faces significant challenges due to climate change. With increasing temperatures, unpredictable monsoons, and rising sea levels, the need for climate-adaptive architecture has never been more urgent. Designing resilient buildings is crucial to ensuring the safety, comfort, and sustainability of urban and rural habitats in India. With each passing year, the consequences of environmental volatility are felt more acutely by our communities alike. In this escalating crisis, one truth has become starkly evident; our built environment is woefully unprepared to withstand accelerating climate extremes.

Resilient, climate-adaptive design can no longer be an afterthought. It must become the central ethos driving Indian architecture, urban planning, and the construction sector. This paradigm shift is imperative to safeguard lives, livelihoods, and ecological prosperity in the era of climate disruption we have entered. And India has both the capacities and moral resolve to lead the world in pioneering resilient development solutions.

Nature-Based Solutions and Passive Design Strategies

The priority is for green infrastructure and nature-based interventions that work in harmony with the environment. Cities like Surat are showing the way by integrating interconnected wetlands, urban forests, and vegetative corridors to regulate microclimates and buffer flood impacts. Such landscape-oriented development approaches have proven instrumental — for instance, Mumbai's rejuvenated rivers and drainage corridors prevented billions in damages by enhancing storm water capacity.

This ecological harmonization can be complemented with passive architectural strategies that reduce emissions and infrastructure burdens. Government initiatives promoting integrating green roofs, strategic shading, painting the roof white, and natural ventilation are fostering indoor climate refuges during intensifying heat waves without relying on energy-intensive cooling systems. Low-cost public housing projects in arid regions similarly harness prevailing winds and thermal massing for passive climate control.

For coastal areas facing compounded threats from rising seas, storm surges and cyclones, climate-adaptive measures like elevated construction, permeable surfaces and robust drainage systems are vital. Resilient habitat designs piloted in rural Tamil Nadu offer a model for this integrated flood-proofing. On island territories, mangrove restoration programs provide natural buffering against intensifying storm impacts.

Urban Resilience and Community-Driven Approaches

But resilience demands far more than piecemeal building interventions. We must reconceive entire neighborhoods and cities as decentralized, compact communities capable of withstanding disruptions to infrastructure networks. As climate shocks intensify annually, this urban paradigm of self-sufficient, transit-oriented resilience nodes reduces vulnerability while fortifying localized access to essential services and resources.

Critically, such transformative resilience can only be realized through inclusive, community-driven processes. From slum relocation programs to resilient housing initiatives, participatory planning has ensured climate-adaptive development remains responsive to socio-economic and cultural needs on the ground. This empowers residents as leaders and stakeholders.

Uplifting indigenous and traditional ecological knowledge is equally vital. Nature-based resilience solutions integrating time-honored practices into modern engineering are yielding resilient rural infrastructure optimized for local geo-climatic contexts across states like Sikkim. Fostering resilience also necessitates sustainable materials and construction methods. Cross-laminated timber, bamboo and recycled plastics offer high-performance, low-carbon alternatives to emissions-intensive conventional materials.

Policy and Regulatory Framework for Resilient Design

Most critically, enhancing built environment resilience demands legislative leadership. The Housing Ministry's revised Environmental Building Codes mandating passive design, usage of renewable materials and on-site water management exemplify positive regulatory steps. However, more assertive resilience-oriented policies, enforcement mechanisms and catalytic public investment through a national resilience framework are vital to drive sector-wide transformation at an urgent pace and scale. The spiraling costs of inaction — in lives, assets and prosperity — make resilient design an economic and moral necessity.