OPINION | Are Indian buildings safe and prepared to deal with Turkey-like earthquakes?

The rampant development dotting the Uttarakhand hills today, actually almost throughout the Himalayas, is built chiefly without codal compliance as it is usually built at pretty low costs and directly with contractors, writes Sonali Rastogi.

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Earthquakes (https://infra.economictimes.indiatimes.com/tag/earthquakes), landslides, and, specifically, the Uttarakhand (https://infra.economictimes.indiatimes.com/tag/uttarakhand) disasters we have been hearing about recently are not unexpected. The Himalayas (https://infra.economictimes.indiatimes.com/tag/himalayas) are young fold mountains, and we know two tectonic plates gave birth to these mountains and are still moving and colliding. However, the Himalayan ranges have always had habitations, but what has caused this kind of disaster is unplanned growth and lack of wisdom.

I believe that science and planning should go hand in hand. Yet, architecture continues to generalize how it constructs across all terrains, and science keeps diving deeper for data and analysis. It's time the two came together with ancient wisdom to create a sustainable roadmap for development.

To create effective ways to reduce their impact on human life and local infrastructure, one of the most critical things is raising local awareness. Speaking from the standpoint of being an architect, this is something that we have lost over the years. I'm talking about how the buildings in the hills were built. They were always low with a low centre of gravity. Materials were sourced and gathered from the local hills, mainly timber and local stones. The science of building was understood over generations. The geology, physics and stability of the hills was a wisdom transferred from generation to generation of masons building there. Unfortunately, the design of buildings and vital infrastructure facilities lacks this fundamental wisdom. So whilst science has made many advancements in mapping hazards, assessing their potential, monitoring, early warning systems and geotechnical data gathering, the principles of 'Himalaya-friendly' architecture have largely regressed.

The rampant development dotting the Uttarakhand hills today, actually almost throughout the Himalayas, is built chiefly without codal compliance as it is usually built at pretty low costs and directly with contractors. It's obvious when you look at these buildings that they are not designed by engineers and architects. Even if they were, I have an issue with the bylaws that allow the construction (https://infra.economictimes.indiatimes.com/news/construction) of concrete and break or block work structures much as we would do it, say, in Delhi (https://infra.economictimes.indiatimes.com/tag/delhi). So I would suggest that the national building code and the building bylaws have a specific code designed for the Himalayas. The sustainability of the forests and the Himalayan geology is a significant concern, but something like renewable forest resources such as timber needs to be considered.

The aspiration for the pakka ghar of the cities needs to be revisited. Awareness and pride in how structures were built in the hills need to be revived. Perhaps something that can be taken up by the skill development programmes of the government could involve learning skills in masonry the way the locals understood it. The new road map has to incorporate a new set of laws that addresses science, geology, and building physics, addresses deforestation issues simultaneously, and recognizes the relevance of the contextual and historical building styles in this region.

The rampant concrete and brick construction that we see in the hills is often not engineered or designed. The construction is usually huddled together along the roadsides in concentrated 4 to 6-storey buildings, using poor-quality cement steel and bricks. The concentration happens Due to the difficulty of transporting these materials up the hills.

Now compare this to the original habitations type, which was of low small buildings dotting the hillside. I think the entire national building code and the building bylaws need to be specially

framed for these geographically sensitive zones. These will also be graded and cannot be uniformly applied across highly sensitive mountains that are still moving. The building bylaw or use the same techniques that we employ in the plains of Uttarakhand, or, for that matter, the entire eastern zone which has seen many more earthquakes.

A couple of decades ago, we devised the coastal regulation guidelines in order not to build next to our water sources. We learned that certain zones were not buildable and that certain zones have to be built in specific ways. We need to follow a similar, thoughtful approach for hill construction.

I want to introduce another concept here: that of the land's carrying capacity. This is a concept not addressed by any bye-laws. Not all soil types are the same, and the same bye-laws should not apply to all. We need a method for establishing; 'what can the land sustain'? I have mostly talked about it in terms of water, but today I want to talk about the carrying capacity of the land on which you are building in these hills; what load can it carry? What is the character of this land; is it ready for habitation? If so, how much and what does geology permit? What does science say about it? How will the movement be handled? What will be the building physics? What is the context in which the buildings of the past have survived? What are the genuinely sustainable materials that can be used? I believe this approach is very sensitive and will require a completely different knowledge bank.

Today we have unskilled masons who are predominantly migrant labour building in these areas. We have lost the original skills handed down from generations of masons trained in sustainable hill architecture. I also feel that the environmental criteria applied to construction in the hills are ill-founded. Simply saying that you cannot cut rock and cannot get timber from the hills is not in line with helping the locals. I am not pro deforesting entire Himalayan ranges to urbanize, but some sustainable way of Renewable forest resources needs to be created. Creating awareness at local levels and reawakening pride in tradition will play an important part. The desire to have multi-storey city-type dwellings must be seen as a route to disaster.

Significant initiatives, studies, and technological interventions have created essential tools to monitor and deal with natural hazards. Several steps have been taken in prediction via monitoring, seismic zonation, assessment of earthquake hazards, landslide zonation, etc. However, I feel that this knowledge should be pre-emptively used. Establishing a road map for urbanization is the key to preparing an effective strategy for its mitigation in the Himalayas.

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