

The twin natural calamities of earthquake and tsunami in Japan have made us sit up and take notice of the strength of buildings in the face of any worst case scenario in the island city. It's quite essential to know as Mumbai is known to sit on seismically active zones with many fault lines passing through several of its areas.

Mumbai falls in seismic zone 3, which is defined as a moderate damage risk zone. With the possibility - based on new Coastal Regulatory Zone (CRZ) notification - of 19,000 old and dilapidated buildings and around 146 slum pockets falling within 500 metres of the high-tide line, the housing department now wants to explore ways to ensure that buildings in CRZ 2 areas are earthquake resistant.

Experts, however, observe that though an earthquake zoning for the city is in place, the need is to relook at these seismic maps to ensure that things are well within control.

"Primarily, the earthquake zoning has been done taking into consideration that in the eventuality of an earthquake, its magnitude would not cross 5 or 6 on the Richter Scale in any particular locality," says Gulam Zia, National Director for Research and Advisory services at Knight Frank India. "Based on this, a factor of safety has been prescribed including guidelines allowing deflection of a structure in a particular zone; these are then taken into consideration by developers while undertaking any construction activity."

Around the world, stringent safety standards and building codes are adhered to. In fact, in the case of Japan, hidden inside the skeletons of its high-rise towers, extra steel bracketing, giant rubber pads and embedded hydraulic shock absorbers make them the sturdiest in the world. In India, too, the Disaster Management Act of 2005 proposed setting up a national authority, which, in turn, has made the use of technology in managing emergencies widespread. Both Mumbai's disaster management cell and the Electronic Corporation of Tamil Nadu (Elcot) are now focusing on geographic information systems (GIS) to allow for quick response. Mumbai's GIS is due to be ready in about five months.

The GIS will, ideally, map all above-ground utilities—buildings, electric poles, trees, petrol pumps, hospitals, water pipeline, among others. Additionally, research projects have been carried out for seismic risk assessment of Mumbai. These have estimated the extent of damage to life and property in the event of an earthquake, so that suitable disaster management strategies can be evolved. A United Nations sponsored project on Mumbai Disaster Management Plan resulted in the production of a 30-minute video film titled 'Mumbai Disaster Management—Challenges and Opportunities'. It was made for training government officers (central, state and city) on disaster management and the specific issues concerning Mumbai. MCGM's disaster management cell has commissioned the Indian Institute of Technology, Bombay to study peak-ground acceleration (PGA)—a measure of how hard the ground shakes in an earthquake. "Comparatively, we may be behind, but we are definitely catching up," adds Zia.

According to Nirmalya Chatterjee, Head of Operations, Tekla India Pvt Ltd, various studies have been undertaken to understand the construction processes in the world that look at high safety standards, besides giving importance to quality control, reducing wastage of material and also the construction period. "In order to have quality improvement in construction, many technologies have now been introduced. Software like the building information modelling makes it easy to visualise and

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ARE WE PREPARED?

In a city like Mumbai that sits by the sea, there is a need of a standard code which governs the construction industry on the lines of foreign countries, says **RAJIV DOGRA**

understand the model and rectify the errors in design before any construction is done. This also increases the safety of the building and reduces the cost and time involved in reconstructing the structures. Accurate, model-based communication enables better construction through finding, reacting to and correcting possible design errors early before on-site construction," she says.

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ARE WE PREPARED?

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All these years, a more conventional method for building construction has been adopted in India using sand, bricks, and water largely.

However, experts agree that overall, this method has a negative effect on the environment. Says Hemant Khurana, Vice-President - Marketing and Sales, Saint Gobain Gyproc, "The top fertile soil of earth is used to make bricks, which are not environment friendly. Today, however, with the buildings going taller, light-weight building materials are helping in faster construction. They are easy to handle and install. Materials such as plasterboard, dry walls are getting popular instead of bricks. Being light weight, they are also seismic resistant which increases the safety aspects. Moreover, they are environment friendly and can be recycled."

Endorsing similar views, Jayant Gehi, Assistant Vice-President, Business Development and Sales, Supreme Universal, says "There exist many technologies that when used make the building nearly earthquake proof. Buildings will not suffer structural damage even in case of a major earthquake." These earthquake proof devices are called seismic dampers and they absorb the earthquake energy just like a shock absorber so that the building does not suffer damage. However, dampers increase the building cost by about Rs 150-200 per square foot, say experts.

In a city like Mumbai that sits by the sea, however, there is a need of a standard code which governs the construction industry on the lines of other foreign countries, agree experts. "It should prescribe the use of materials, automated construction as labour is a large component of any construction work, and use of sustainable products is still to be taken up extensively in India," says Khurana. Agrees Zia, "We may be nowhere closer to Japan in terms of construction technology, but there are certainly lessons to learn for us in the city."