



Earth



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Years

WE BELIEVE

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How Can Proper Planning Lessen Impact of Catastrophes?

Source - <https://www.scmp.com/week-asia/society/article/2161271/kerala-floods-tragedy-gods-own-country-whose-god>

“Earthquakes don’t kill people, buildings do” was a famous quote after the 2001 Gujarat Earthquake.

This is a sad reality of India as well as many other developing nations where most people are living in areas which are exposed to various natural disasters viz. Cyclone, Earthquake, Floods, Tsunami etc.

All these countries are experiencing rapid urbanization and to cater to needs to people, proper and long-term planning is essential. However, short-sightedness of authorities has forced sidestep this vital aspect; thus, putting inhabitants at risk.

It is now common to see buildings being constructed in the flood plains and on sea-fronts, reclamation of water bodies, cutting of trees on hill-slopes etc. to name a few. Building codes either do not exist or they are out of date; if they exist, they are not implemented effectively. As a result, either an earthquake which is comparatively a rarer event or floods which have become an annual show, create considerable economic and insured loss of property and kill people.

Below examples highlight the impact of poor planning.

Kochi Airport, India

The airport, opened in 1999, was built after diverting a tributary of the Periyar river as shown in the map below.

When the airport was built, a creek, that served as a distributary from the river and three irrigation canals that provide water to nearby paddy fields were realigned to make space for the runway. The airport’s drainage system leads into the creek which in turn is connected to the Periyar river. In process of realignment, the creek was eventually narrowed.

Kochi: Before—January 1988



Source: USGS - Landsat

Kochi: After—February 2018



Source: USGS - Landsat

During the Kerala Floods in July -August 2018, the airport remained shut for two weeks. Its runway, taxi bay, duty free shops, solar plans used to generate electricity for the airport, and other areas of international and domestic terminals were submerged. Further, the 2.5-kilometer-long airport walls, which were constructed to stop water entering the airport, collapsed after the Periyar overflowed.

The airport suffered economic losses of more than US\$ 30 million.



Flooding at Kochi Airport, August 2018 | Source - *Kochi Airport PIB*

In 2013, when the gates of the Idamalayar dam on the Periyar were opened, the creek had overflowed forcing shut down of airport for two days.

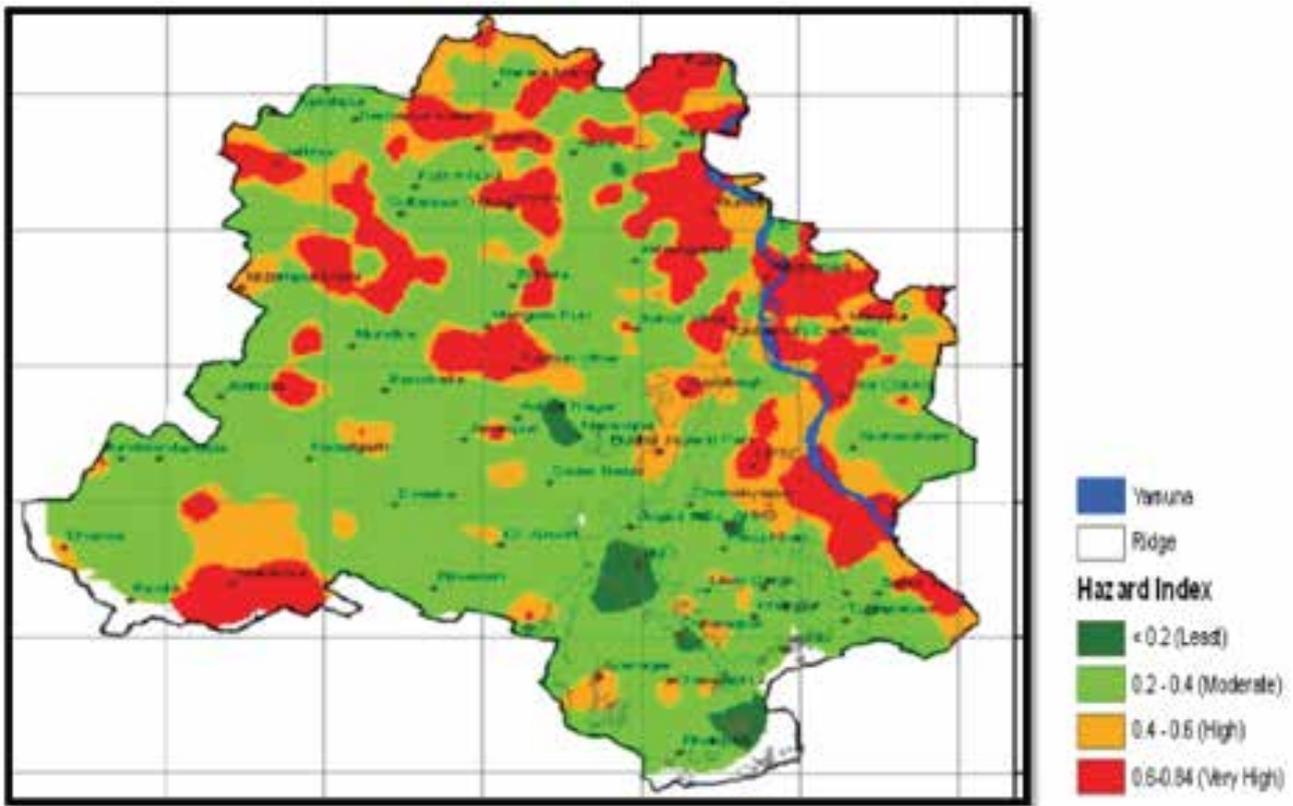
Earthquake Risk in New Delhi

The National Capital Territory (NCT) Delhi is located in seismically vulnerable domain and lying in Seismic zone IV of the macro seismic zoning map of the country.

The region has experienced various earthquakes in the past. Most notable among those are Uttarakashi earthquake ($M_L = 6.4$, 20 October 1991), Chamoli earthquake ($M_L = 6.8$, 29 March 1999), Delhi (M: 6.5, 1720), Mathura earthquake (M: 6.8, 1803), Bulandshahar earthquake (M: 6.7, 1956); and Faridabad earthquake (M: 6.0, 1960).

Damage to the life and property that is caused by an earthquake, can greatly be reduced by proper land use planning, engineering approaches, strengthening of existing structures etc.

Presently, the codal guidelines provided in Indian Standard: 1893 (Part I) - 2002 are followed for primary structure design. These guidelines are based on the seismic zoning maps, which are prepared on the basis of seismotectonic provinces and premise that the earthquakes would re-occur in the same tectonic provinces where they have occurred in the past.



Seismic Hazard Microzonation Map of New Delhi | Source - *Ministry of Earth Sciences, Government of India*

High hazard zone includes areas along river Yamuna. These areas are densely populated and have major commercial centers.

Studies have found that the waters of the Yamuna ran through the city, along its waterways and many marshy areas. The old and historic structures were on rocky outcroppings, which allowed the state to defend itself from the river.

Over time these marshy areas have been built over, and buildings have come up as Delhi expanded. Due to a process called liquefaction, in which sandy soil starts behaving like thick liquid due to earthquake induced shaking and thus causing collapse of building constructed over it, structures located in the High Hazard areas shown in the map above.

Professional engineers can advise suitable techniques according to one's requirements to build an earthquake resistant structure. The local administration should approve construction of only those building which comply the laws.

During an earthquake, these un-engineered buildings can damage / collapse and cause huge losses to insurance companies, if insured, and owners. Considering the high and even increasing exposure in areas in New Delhi and neighboring areas, insurers should be vigilant to write business in High Hazard areas.

In addition to above, there are many other cities and sites in different countries where codes are not followed; and when a natural disaster strikes, industry and society suffer. For example, Kenya has seismic design code which has never been updated since its issuance in 1973 whereas the knowledge of earthquake engineering has shown significant strides ever since. Besides quality control in the construction industry is not well practiced and regulated.

Reference: Ministry of Earth Sciences, Government of India, Times of India, The Economist, various research papers

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