Editorial

Earthquake Disaster in the North East India: Preparedness as the key for Mitigation

Wedged between the collision boundaries of the Himalayan plate in the north and the Indo-Burmese plate in the east, the North Eastern region of India is one of the seismically most active regions of the world. Based on the geotectonic features, history of past seismic events and potential hazards from earthquakes, the region has been categorized as zone V in the seismic hazard zone map of the Indian subcontinent (IS1893:2002). According to a hazard map produced by the Global Seismic Hazard Assessment Programme, the North East India can expect to have peak ground acceleration (PGA) of 0.24g to 0.48g. Since 1897, 18 large earthquakes ($M \geq 7.0$) including the two great earthquakes of 1897 and 1950 ($M > 8.0$), occurred in this region, which caused a large-scale damage to the densely inhabited areas of the northeast India. The major Earthquakes in the history of this region were occurred in the year(s) - 1869 (M=7.5), 1897 (M=8.7), 1918 (M=7.6), 1930 (M=7.1), 1947 (M=7.75), 1950 (M=8.6) and 1951 (M= 8.0).

The Great Assam Earthquake of 12th June, 1897 (the most severe earthquake occurred in the Indian Sub-continent) rocked entire Northeastern region of India, Bangladesh, West Bengal, Bihar and parts of Mynamar and Nepal (M = 8.7) was one of the largest known earthquake anywhere in the world. The quake wrecked havoc across south-west of the present states of Assam, Meghalaya and Bangladesh. About 1542 people were killed and hundreds more injured. The Great Assam Earthquake of 15th August 1950 (M = 8.6) was the second strongest earthquake among all the Indian great earthquakes. This is located in the Indo-China border (Seeber and Armbruster, 1981; Dasgupta, 1993). Six earthquakes of 1869, 1897 (great earthquake), 1918, 1923, 1930 and 1943 locate from within the Mikir Hills massif (MHM) of the Shillong plateau. It means that a frequent and major earthquake, in the long term basis prediction, is likely to occur in this region. Seismotectonic analysis of the eastern Himalayan zone has clearly indicated that many of the transverse strike-slip faults are active producing most of the earthquake events in this zone (Dasgupta *et al*., 1987; Nandy, 2001).

Of the many natural disasters, earthquakes are the most difficult to predict. The best of earthquake warning systems, such as the ones installed in Japan, are only capable of warning regional centres about the possible impact of ongoing earthquakes. The modern Geoinformatics tools such as "HAZUS", a software program developed by Federal Emergency Management Agency (FEMA) and "SELENA", a software developed by NORSAR of Norway, could be applied for estimation of loss using primary as well as secondary data on building stock, utility services ,demographic, social, economic information ,geological , geotechnical ,transportation data, etc. The real advancement that has been made recently in India is, for instance, the "setting up of many seismological stations", especially after the Bhuj earthquake of 2001. Measurements from these stations and global positioning system data now tell us the Indian plate is moving north at a speed of 5 centimeter per year. This would contribute to stress accumulation and to more seismic activity in coming years.

There are different ways of mitigating earthquake related disasters — building structures that are relatively quake-resistant, preparing for evacuation by constructing centres specifically for the purpose, and sensitising the public about quakes and their devastating impact. Earthquake disaster mitigation components are: pre-earthquake phase of preventive and preparedness activities, phase of precursory phenomenon and earthquake occurrence, post earthquake emergency phase, post earthquake reconstruction and rehabilitation phase. Pre-disaster preventive and preparedness activities are: hazard zoning, earthquake prediction and warning, earthquake codes, laws, bye laws, retrofitting of existing structures, educational training, and emergency preparedness. Post disaster activities are of two types: short range activities *viz.* seismological and geophysical studies, engineering and technological studies. Long range activities are repair ,restoration and seismic strengthening ofdamaged buildings, pulling down unsafe, unrepeatable structures and removal of debris, reconstruction of new buildings at old sites, relocation of whole villages or township with new planning and designing, creation of job opportunities for the affected people and their economic rehabilitation. Japan, which is a country prone to regular earthquakes, has shown the way on disaster mitigation and preparedness. For mitigation of earthquake hazard all seismogenic faults in the area should be properly identified and mapped in 3D. This is also required for future development planning and construction of life line structures (Kayal *et al.*, 2006).

The devastating impact of the earthquakes may be mitigated with awareness and some preparedness. Besides the structural vulnerability, the disaster can be made much worse due to the vulnerability of the community itself. The factors that make a community more vulnerable to disasters are economic backwardness or poverty, ignorance and illiteracy, the social fabric and living habits etc., since these conditions lead to poorer constructions with little or no maintenance, very low level of awareness about natural disasters and practically no mental or physical preparedness to meet them when they occur. Therefore, appropriate preparedness and mitigation strategies should be adopted to reduce the impact of natural disaster. It is important to prepare for earthquakes and other types of emergencies. Being prepared for a major quake is not only prudent, it's proactive. Being a part of awareness mock drills should be arranged emphasizing how to react when an earthquake strikes and what to do when the ground stops shaking. Earthquake mock drills helps to prepare communities, school children, teachers, office workers and rescue teams for what must be done in a regular quake. There should be systematic resort to "disaster drills" to educate the public on what to do during an earthquake. Preparedness is the key to managing any more such disasters

REFERENCES

Das Gupta, S., Mukhopadhyay, M. and Nandy, D. R. (1987) Active tectonic features in the central part of the Himalaya: Tectonophysics, vol. 136, pp 255-264.

Dasgupta, Sujit (1993) Bihar- Nepal Earthquake, August 20, 1988. Geological Survey of India Special Publication 31, 61-81.

Kayal, J.R., Arefiev, S.S., Baruah, S., Hazarika, D., Gogoi, N., Kumar, A., Chowdhury, S.N. and Kalita, S. (2006) Shillong Plateau earthquakes in northeast India region:complex tectonic model. Current Science, 91, pp. 109–114.

Nandy, D.R. (2001) Geodynamics of Northeastern India and the Adjoining Region (Kolkata,India: ACB Publisher).

Seeber, l., Armbruster, J.G. and Quittmeyer, R. (1981) Seismicity and continental subduction in the Himalayan Arc. In Zagros, Hindu Kush, Himalaya Geodynamic Evolution,H.K. Gupta and F.M. Delany (Eds), Geodynamics Series, vol. 4, pp. 215–242 (Washington, DC: American Geographical Union).

Dr. Joysankar Hazarika
Editor in chief, NeJCR
& Principal, Darrang College, Tezpur