

The Great Assam Earthquake of 1897

Today is the 119th anniversary of the Great Assam Earthquake that brought tremendous wreckage on Assam and parts of colonial Bengal, including Dhaka. It left hundreds of people dead, and great damage was done to properties and communication lines. In our present situation of unplanned urbanization, high density of population and poor earthquake preparedness, an earthquake of such intensity will be a complete disaster. The frequent tremors felt in our neighboring areas signal that we are not very far from the reality of facing a disastrous earthquake. Against this background, BSRM and The Daily Star have jointly taken the initiative to create mass awareness about the consequences of an earthquake and the measures that need to be taken to minimize the losses. -- Editor

The Great Assam Earthquake

The Great Assam earthquake occurred on June 12, 1897 in Assam, India and it was measured 8.3 on the Richter scale. It is considered to be one of the most violent earthquakes of the world. Considering the intensity of the earthquake, the mortality rate was not that high, with about 1,542 casualties, but property damage was enormous. Tremors from the event were felt across India, as far as Ahmedabad and Peshawar. In Dhaka, we felt an 8-intensity tremor. Almost all the masonry buildings of the town collapsed. The death toll in the East Bengal area was about 500.

If an earthquake with similar intensity recurs, the losses would be unthinkable. According to Comprehensive Disaster Management Programme, 88,000 people will be killed, 72,000 buildings (22 percent of total buildings) will collapse and 158,000 buildings (49 percent of total buildings) will be damaged in Dhaka, if an earthquake with 8 intensity hits the capital.



The Officers' Mess at Shillong after the earthquake on 12th June 1897

"Creating mass awareness about earthquake should be the priority"

Syed Humayun Akhter



Bangladesh's position adjacent to the very active Himalayan front in the north and Indo-Burma deformation front in the east exposes it to strong shaking from a variety of earthquake sources that can produce tremors of magnitude 8 or greater. There are active faults in and around Bangladesh so this is an earthquake prone area. Then there's the population density which is extremely high. There is lack of education, awareness and preventive measures. Urban planning is poor, there aren't open spaces to seek shelter in, and hospitals are ill equipped. We do not have adequate facilities and preparations to combat an earthquake disaster. All these factors combined heighten the risk. Dhaka is one of the riskiest cities for earthquakes in the world.

Dhaka is a megacity that continues to expand. It's extremely ill-planned. Before the Liberation era, the number of buildings was much less than now. When earthquakes took place then, there wasn't much damage. With time, buildings continued to be built starting from the Buriganga River expanding northward. These buildings were constructed on *lal mati* -- this one million year old red soil is compact and of very good quality. Most of the buildings made on this soil were brick masonry of one or two storeyed.

After liberation, however, Dhaka expanded very quickly due to its growing importance as the capital. Buildings were being built on the riverside humus soil in the east and west, in the low lying areas augmented by earth fill—a recipe for liquefaction. These attractive, multi-storey buildings were constructed keeping bottom floor open for parking space. They are called soft story buildings and have little shear strength. Due to earthquakes or even strong winds, the lateral deflection of the building top caused by the ensuing tremors cannot be resisted due to these large, unobstructed spaces on the bottom floor. These soft story tall buildings are vulnerable to long period seismic waves of distant earthquakes.

An overwhelming number of buildings have been built flouting

the Bangladesh National Building Code. The code didn't even exist prior to 1993. In many instances, the buildings made according to Rajuk's plan exceeded the number of floors than allowed -- largely to accommodate the growing number of people.

To put this into perspective, in the event of a recurrence of the 1897 Great Indian Earthquake, an earthquake of magnitude 6 beneath Dhaka city with its population of 15 million, widespread brick masonry, non-engineered and poorly constructed buildings would be hit worse than ever in the history of Dhaka. The catastrophic picture will be beyond our imagination and could even lead to abandonment of the city.

In the last few years, we saw some risk reduction initiatives such as the Comprehensive Disaster Management Programme. The objective of the programme was to strengthen national capacity to manage such risks and the ensuing response and recovery efforts. About 62,000 volunteers were supposed to be trained but so far only 32,000 have been trained. This is beyond insufficient for earthquake management.

I personally believe the first step should be about spreading awareness and information on basic preparedness on individual, household and community levels. In the recent past, we saw people running out of buildings in a state of panic and chaos because of which some people died. Few years ago, I watched a BTV programme where a government organization suggested to people that they should exit the buildings they were in. That's just wrong. People should instead be told about the quick steps to take in such instances. Government should take 2 to 3 months program to train and educate people on earthquake response and preparedness through animated cartoon and earthquake drill programmes. This will reduce the loss of life and property.

The commentator is Professor and Chairman of Department of Geology at University of Dhaka.

"We need to emphasise more on retreat actions than response activities"

Mohammad Abu Sadeque



As Bangladesh is situated in an earthquake prone zone, there is every possibility of recurrence of an earthquake like the Great Indian Earthquake of 1897. An 8-intensity earthquake in or close to Bangladesh territory would result in the collapse of or severe damage to more than 72,000 buildings in Dhaka city, including critical structures such as hospital, schools and government buildings. If hospitals get damaged, where would you take the injured? It will thus lead to more casualties. Housing and urban development made on soft soil by filling marsh lands are most vulnerable to a major earthquake. Such marsh lands had been filled up without any scientific soil improvement method, and the rest of the soft soil used for erecting structures. Again, buildings are being constructed without compliance with the Bangladesh National Building Code (BNBC), leaving those extremely vulnerable to earthquakes. Sometimes we find that the design is OK but developers do not follow the design during construction of the building. This is a dangerous practice. We should strictly follow the design. There is a big gap in our regulation process. We need a regulatory authority to monitor proper implementation of the BNBC. It will not be a separate organisation, rather it will use human resources of various regulatory bodies such as RAJUK and PWD.

We need to emphasise more on retreat

actions than response activities. Retreat actions include retrofitting of old structures and construction of earthquake resilient buildings. If you can make all our buildings earthquake resilient, there would be minimum casualties. If you spend Tk 1 for retreat actions it will save Tk 10 for response. We need to do seismic analysis of the vulnerable buildings and take necessary actions to make them seismic resilient. In this effort we should prioritise the critical structures such as hospitals, schools and so on. In the new BNBC there is a separate chapter on retrofitting which will guide our retreat actions. In our institute we have technologies that can be effectively used to make the new buildings earthquake resilient within an affordable cost. We need to make people aware about these available solutions. We need to prepare national earthquake management plan. It will include both retreat action and response activities. Some organisations have developed response plans but they do not have any retreat action plan.

We also need to introduce auto-trip devices to shutdown gas, water and electricity supply lines automatically in the event of an earthquake to reduce the impact of the disaster and the number of casualties.

The commentator is Director, House Building and Research Institute (HBRI) and General Secretary of Bangladesh Earthquake Society.

"If we neglect earthquake, Bangladesh will be another Haiti"

ASM Maksud Kamal



On the fateful day of June 12, 1897 an earthquake occurred on Oldham fault of Shillong. It caused the death of about 1542 people. In Dhaka, we felt an 8-intensity shaking. Though the death toll was minimum, three to four, almost all the masonry buildings of the town broke down. Now after 119 years, if an earthquake of similar intensity recurs the loss will be unthinkable due to unplanned urbanization of the city, high concentration of population and poor status of earthquake preparedness.

In Dhaka, early settlement happened in red soil areas which is relatively stronger than the low lying, flood plain areas. But in such areas most of the buildings are old and masonry buildings that are vulnerable to earthquake. According to our estimation, there are 1,40,000 masonry buildings in the city that will be destroyed by an 8-intensity earthquake.

In the marshy land and wetland areas urbanization happened later and in an unplanned way. In these areas the soil is soft and the intensity is felt more and the time extent of an earthquake is relatively high. So an earth of same intensity will be more threatening to the structures of these areas. Another important factor is that most of the new structures are soft-storeyed buildings which mean that they have car parking space on the ground floor with no walls around it. It is estimated that the number of these buildings is more than 80,000. This type of building is particularly vulnerable to earthquake. There are also heavy overhang buildings and short column buildings where the residential building is used for commercial purposes such as garment factory, food court, market. The total number of these buildings is about 1,10,000. These buildings are also vulnerable to earthquake. In the small towns

the situation is worse. Most of the buildings are masonry buildings.

We have been repeatedly urging the government to retrofit the old buildings and enforce BNBC for construction of new buildings. But we do not see any satisfactory development in this regard.

Bangladesh is a moderate earthquake intensity country which means earthquake revisits here after a long gap. As we do not have immediate experience of the disaster we downplay its dangers. A similar attitude of non-chalance was visible in Haiti, and they had to pay heavy price for their ignorance. That's why we need massive awareness campaigns on earthquake vulnerabilities. Here people have a tendency to come out of the building during the tremor which is very risky. It will cause more casualties.

Following our suggestion, the Fire Service and Civil Defence (FSCD) initiated a plan to train volunteers who can play a critical role in rescuing people during a disaster. But there is very little monitoring and coordination efforts to retain the human resource. Many of the trained volunteers are going off track, as they know that the organisations do not own them. We need to prepare an organogram to effectively utilize these volunteers.

Our major responding institutions suffer from inadequate manpower and equipment. For example, the FSCD has only 300 personnel trained in collapse structure search and rescue operations. We also do not have any incident command system (ICS). In the case of Rana Plaza disaster it took almost 34 hours to decide who will lead as incident commander. We should immediately address these gaps. Otherwise any recurrence of a violent earthquake will create havoc in the country.

The commentator is Chairman of the Department of Disaster Science and Management, Dhaka University.

"Coordination among the responding institutions is the key"

Brigadier General Ali Ahmed Khan, psc



Due to the geographical location, unplanned urbanization, climate change and overpopulation, Bangladesh is vulnerable to earthquake. We have already witnessed tremors in our neighbouring areas such as Nepal, India and Myanmar. Dhaka is one of the twenty most risky cities in the world. Due to unplanned development of the city the roads are narrow making it difficult to conduct any rescue operation during an earthquake. A large number of buildings in the city were built without following the building code. These factors make the city more vulnerable.

As we cannot predict an earthquake we can at least minimize the loss by taking adequate preparation. Fire Brigade is one of the responsible institutions for creating awareness and rescuing people in the time of a disaster. JICA is supporting our efforts to make the existing structures more earthquake resilient. The government has procured equipment worth of Tk 250 crore for the armed forces division and fire brigade. Under the Urban Earthquake Resilience Project supported by the World Bank another initiative has been taken to procure equipment that will be deployed in vulnerable areas in a decentralized way so that we can easily reach the damaged areas quickly. We have developed 32,000 volunteers, and we have a plan to develop 60,000 more. We have trained 12

teams of fire brigades and they are deployed in different areas of the capital.

In most cases, casualties are a result of collapse of buildings. That's why we need to strictly enforce Bangladesh National Building Code. Unfortunately, we do not have any regulatory body for this purpose. We also need to create awareness among the general people. We do not have adequate shelter centres where people can take shelter during an earthquake. We are developing our schools and hospitals so that those can be used as shelter houses. During an earthquake, disruption of communication systems will make things worse. In Nepal, we have seen that disruption of communication lines caused more casualties. In Bangladesh, it is yet to be officially declared how the search and rescue operations of different government agencies will be coordinated during an earthquake. That's why we have proposed for a National Emergency Operation Centre (NEOC). The government has accepted our proposal. In the meantime, we need to form an adhoc body to engage all the stakeholders. We need to know the capacity of all the departments related with disaster management and local government bodies. There should be a combined plan of action to respond quickly in a crisis situation.

The commentator is DG, Bangladesh Fire Service and Civil Defence.