

# EARTHQUAKES AND OUR PREPAREDNESS

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**I**N the recent past, Bangladesh has not suffered any damaging large earthquakes, but in the past few hundred years, several large catastrophic earthquakes struck this area. So far, all the major recent earthquakes have occurred away from major cities, and have affected relatively sparsely populated areas. This has limited the human casualty and the economic losses. However, the 1993 Killari, 2001 Gujarat and 2005 Kashmir earthquakes in India and Pakistan has amply demon-

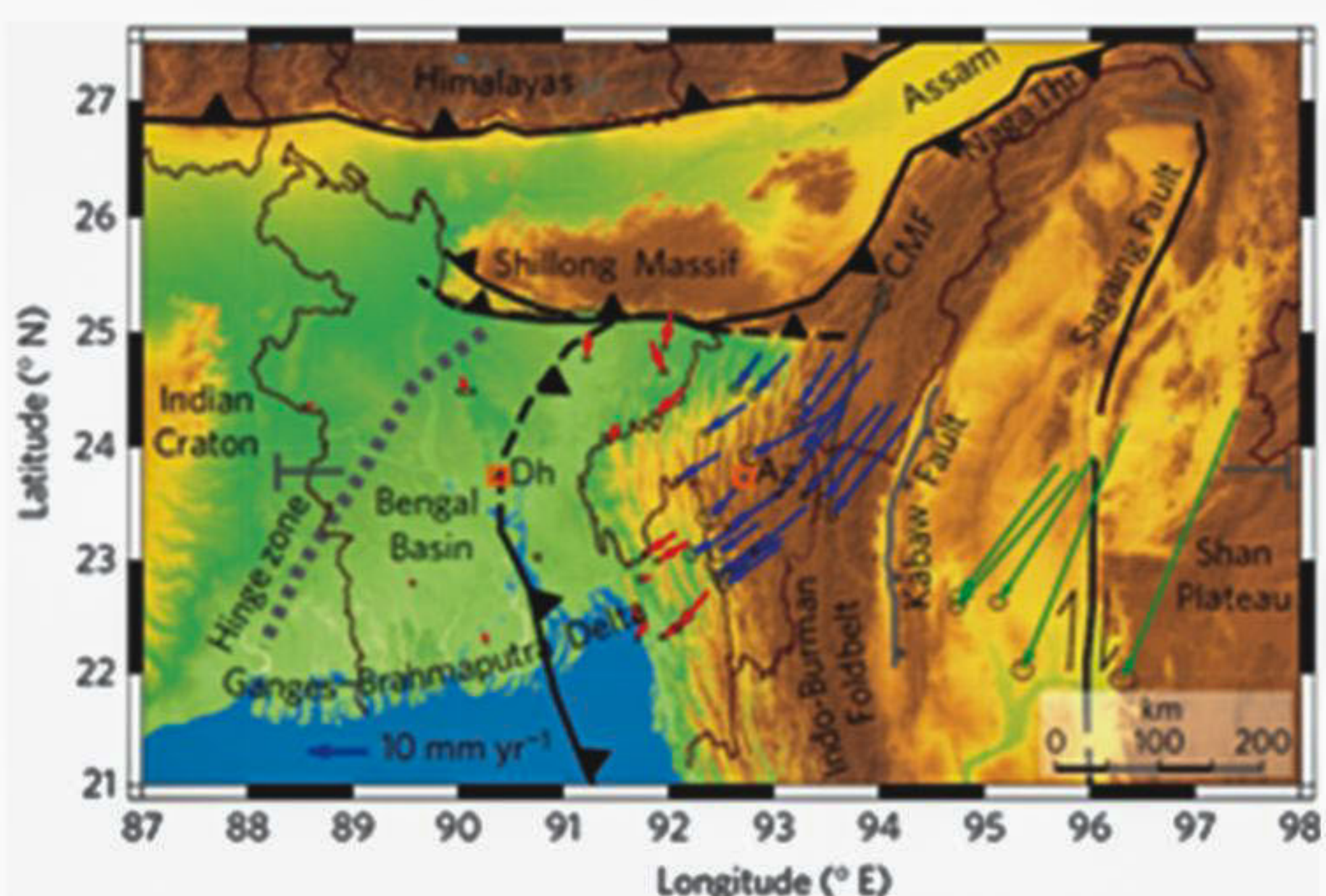
strated that inappropriate construction technology may lead to high casualty levels even for moderate earthquakes.

In 1897, an earthquake of magnitude 8.7 caused serious damages to buildings in the northeastern part of India (including Bangladesh) and 1542 people were killed. Recently, Berryman et al. (2014) pointed out that there is high possibility that a huge earthquake will occur around the Himalayan region based on the difference between energy accumulation in this region and historical earthquake occurrence (see Figure 1). More recently, Steckler et al. (2016) suggested that the presence of a locked mega thrust



plate boundary under the Indo-Burman ranges represents an underappreciated hazard in one of the most densely populated regions of the world (see Figure 2). The population increase around this region is at least 50 times than the population of 1897 and cities like Dhaka, Chittagong, Kathmandu, Guwahati, Thimpu have population exceeding several millions. It is a cause for great concern that the next great earthquake may occur in this region at any time.

A strong earthquake affecting major urban centres like Dhaka, Chittagong, Sylhet may result in damage and destruction of massive proportions and may have very severe long-term consequences for the entire country. After the 1971 independence, most major urban centres of Bangladesh have grown tremendously due to unabated migration from the smaller towns and rural areas. As a result, the cities have developed in haphazard fashion with little consideration for proper town-planning norms. There is, consequently, a need to be prepared against all possible natural and man-made disasters that are likely to occur in Bangladesh. For this purpose, it is essential



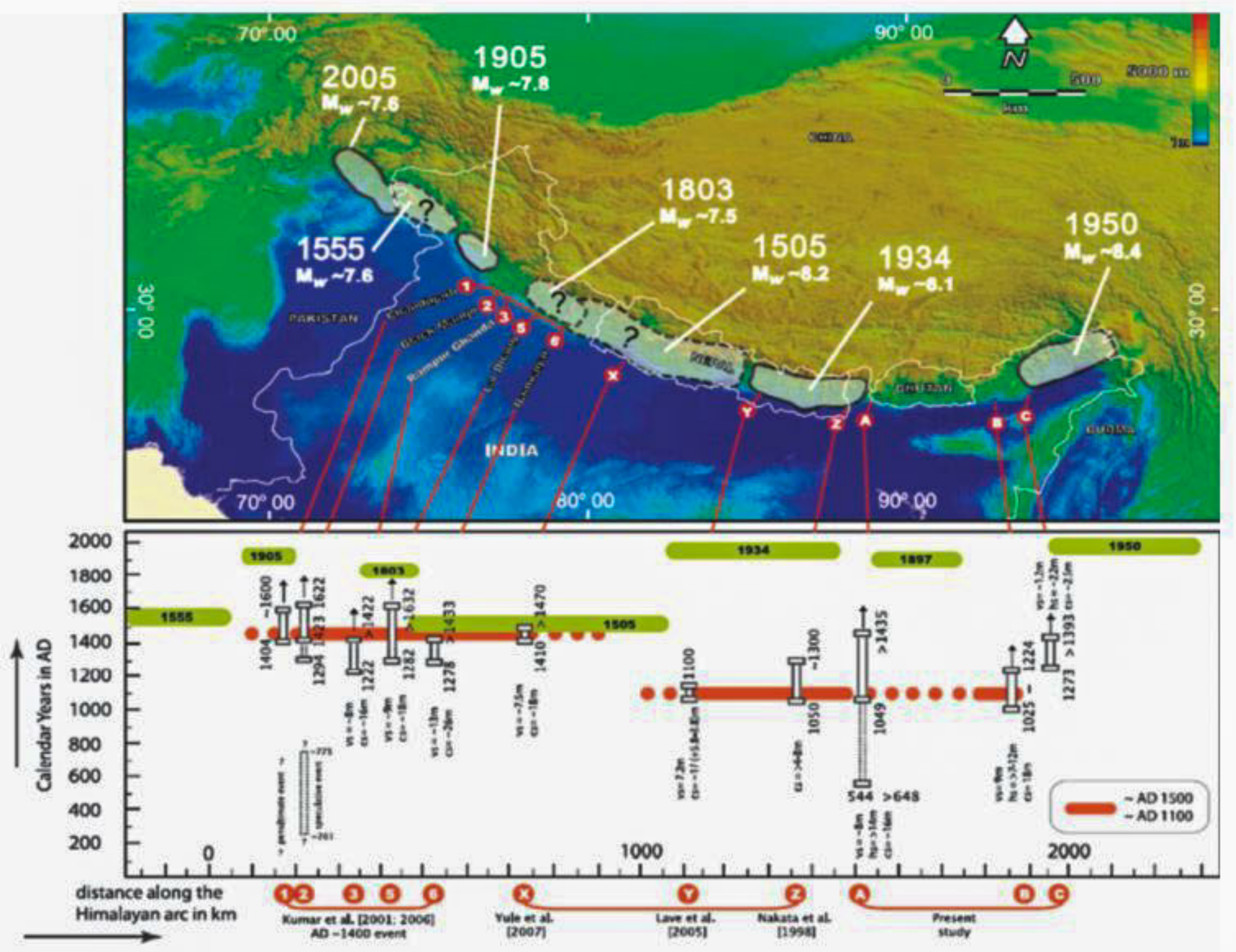
**Figure 2: Topographic map of the Ganges-Brahmaputra Delta and Indo-Burman Fold belt showing GPS velocities (after Steckler et al., 2016)**

to have realistic understanding of the consequences of likely damage in major cities due to different disasters. This will permit rational planning of mitigation efforts in order to minimise effects of these disasters.

The extent of damage to structures and casualty level due to an earthquake in the future can be reduced by the introduction of suitable mitigation measures. These mitigation measures can be categorized as structural and/or non-structural. The structural measures are those that directly influence the performance of building stock through strengthening of code provisions and the prevalent construction practice. Incorporating the appropriate structural mitigation measures can reduce the vulnerability of any building type. The non-structural mitigation measures include improvement in the state of awareness and preparedness before a disaster, land-use

control and other government policies, and the infrastructure related to response following a disaster. The non-structural measures help to reduce the severity of casualty levels following an earthquake. In order to reduce the consequences of a major earthquake in the cities of Bangladesh, it is necessary that appropriate structural as well as non-structural measures be undertaken.

*Berryman, K., W. Ries, N. Litchfield, 2014. The Himalayan Frontal Thrust: Attributes for seismic hazard, Report produced in the context of the GEM Faulted Earth Project. Steckler, M., Dhiman Ranjan Mondal, Syed Humayun Akhter, Leonardo Seeber, Lujia Feng, Jonathan Gale, Emma M. Hill and Michael Howe 2016. Locked and loading mega thrust linked to active subduction beneath the Indo-Burman Ranges, Nature Geoscience July 2016.*



**Figure 1: Synopsis of historical and paleoseismic history along the Himalayan Frontal Thrust (HFT) [after Berryman et al., 2014]**

## EARTHQUAKES ARE NOT PREVENTABLE, CASUALTIES ARE

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