

Prediction of massive earthquake by Earth Observatory, Singapore

†1993. SHRI MAHENDRA SINGH MAHRA: Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether Government is aware that "Earth Observatory, Singapore" has expressed apprehensions of a massive earthquake in North India, including the Himalayan region of Uttarakhand;

(b) if so, whether Government would take cognizance of the apprehension expressed by "Earth Observatory, Singapore"; and

(c) if so, the proposed facilities to be extended by Central Government to State Governments for dealing with such a disaster and if not, the reasons therefor?

THE MINISTER OF STATE IN THE MINISTRY OF EARTH SCIENCES (SHRI Y. S. CHOWDARY): (a) Yes Sir. For the Himalayan region of Uttarakhand, there are several research papers, including the papers from Earth Observatory Singapore, which have suggested that this region lies in the central seismic gap and no great earthquake has occurred in this region in past 500 years or so. Hence there is a possibility that this region may experience a great earthquake. However, no time frame of occurrence of such an earthquake has been specified in these studies.

(b) and (c) Yes Sir. Wadia Institute of Himalayan Geology, Dehradun has established an earthquake monitoring network and a Multi-parametric Geophysical Observatory in the region.

A pilot project on Earthquake Early Warning (EEW) system is on implementation for northern India (Uttarakhand) by Indian Institute of Technology (IIT) Roorkee. The system is under testing by IIT Roorkee. Such type of system gives some lead time for issue of warning on occurrence of an earthquake, so that some remedial actions regarding vacating building, shutting down critical operations etc. may be taken up.

A National Disaster Response Force (NDRF) is also functional under the general superintendence, direction and control of the National Disaster Management Authority (NDMA) for the purpose of specialized response to natural and man-made disasters.

Ministry of Earth Sciences (MoES) has funded several research programs to the academic and research institutes which are either located or working in the

†Original notice of the question was received in Hindi.

Uttarakhand region. It has also supported outreach and earthquake education programs in the region.

**Prediction of a giant earthquake beneath
Bangladesh and Eastern India**

1994. SHRIMATI WANSUK SYIEM: Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether a study by a renowned geophysicist at Columbia University in USA published in the journal Nature (Geoscience predicts a giant earthquake with its epicenter beneath Bangladesh and Eastern India that could endanger as many as 149 million people;

(b) whether the study asserts that the earthquake though not imminent, is inevitable as sections of earth's crust press against one another; and

(c) whether some 140 million people live within 100 km of the potential epicenter in Eastern India-Bangladesh border?

THE MINISTER OF STATE IN THE MINISTRY OF EARTH SCIENCES (SHRI Y. S. CHOWDARY): (a) Yes Sir. There is a research paper by Michael S. Steckler, Dhiman, Ranjan, Mondal, Syed Humayun Akhter, Leonardo Seeber, Lujia Feng, Jonathan Gale, Emma M. Hill and Michael Howe titled as "Locked and loading megathrust linked to active subduction beneath the Indo-Burman Ranges, Nature Geoscience, DOI: 10.1038/NGEO2760" published in Nature Geoscience (2016), which predicts a giant earthquake with its epicenter beneath Bangladesh and Eastern India.

(b) The said study has suggested that since strain accumulation is underway for at least past 400 years, such an earthquake can have a major magnitude. However, no time frame of occurrence of such an earthquake has been specified.

The study uses GPS measurements from Bangladesh, India and Myanmar to suggest that the detachment fault under the part of Bangladesh, and NE India (Tripura, Lower Assam, Mizoram, western Manipur) is locked and is accumulating strain for future great earthquake in the region, which could impact this most densely populated region of the world.

Further, the whole of northeast India is part of Indian plate boundary, colliding and subducting beneath Burmese plate, resulting in strain accumulation in the plate boundary region. This causes occurrence earthquakes in the region.