Nepal Prepared for Imminent Earthquakes: A Hope for the Future

Dr. Narayan Prasad Marasini
Senior Manager
National Society for Earthquake Technology-Nepal (NSET)

Abstract

Scientific studies so far on the seismicity of the Nepal Himalaya show that the region has high seismic hazard, especially in terms of possible maximum intensity of ground shaking. Most of Nepal falls in MMI IX or above for a 475 year return period earthquake (exceedance probability of 10% in 50 years). According to the Seismic Hazard Assessment and Risk Assessment for Nepal produced by the Nepal National Building Code Development Project in 1994, peak ground acceleration (PGA) values are also high (UNDP/UN-Habitat, 1994).

The Himalayan region has high seismicity, and Nepal has a long history of damaging earthquakes. Two major earthquakes occurred in Nepal in the recent past are the best example to internalize the level of risk. A large earthquake occurred on August 26, 1833 with an epicenter to east of Kathmandu. Historic evidence and records describe extensive damage to the built environment in Kathmandu. A 1995 paper by Bilham mapped approximate Modified Mercali Intensities (MMI) from this earthquake with high intensity values of VIII and IX were experienced throughout most of Nepal (Bilham, 1995). Another major earthquake called the Great Nepal-Bihar Earthquake occurred on January 15, 1934. The epicenter of this Mw 8.1 earthquake was located in eastern region, 9.5 km south of Mount Everest (GEER, 2015, Chitrakar and Pandey, 1986). While the epicenter of this earthquake was about 200 km east from Kathmandu, the damage was severe in Kathmandu Valley. The earthquake is estimated to have caused around 10,600 fatalities (USGS, 2015a), though other reports estimate fatalities closer to 16,000 in the impacted region (with approximately 8,500 fatalities occurring within the borders of Nepal).

The main cause of earthquakes in the Himalayan region is due to the converging of Indian and the Eurasian plates at a relative rate of 40-50 mm per year, which results in a net uplift of Himalayan mountain ranges by approximately 18 mm per year (USGS, 2015a). The seismic activity in the Himalayan region is mainly due to the continental collision of these two plates (northward under thrusting of India beneath Eurasia).

The 25 April 2015 Gorkha Earthquake, and the hundreds of aftershocks that followed, including a Mw 6.8 on 12 May 2015, caused loss of 8,790 lives and more than 22,300 people were injured along with widespread damage to houses and infrastructure across 32 districts of Nepal. The Government of Nepal (GoN) categorized these districts as severely hit (7 districts), crisis hit (7 districts), hit with heavy losses (5 districts), hit (6 districts), and slightly affected (7 districts)

The Post Disaster Needs Assessment (PDNA), published by the GoN in June 2016, identified housing as the most affected sector with the per capita average cost of earthquake damage ranging from 255,860 NPRs in Dolakha to 43,800 NPRs in Makwanpur, at an average of 130,000 NPRs per person across the 14 most affected

districts. The PDNA also estimated that an additional 2.5% to 3.5% of the population, at least 700,000 people, would be pushed into poverty in the year following the quake as a result of the disaster.

Despite some weaknesses, emergency activities like search, rescue and relief conducted in post-earthquake during 2015 Gorkha Earthquake was well acknowledged. Similarly, efforts from the security forces and volunteer organizations were much appreciated during the emergency phase. Prompt response from the security forces showed that some level of preparedness was conducted against potential earthquakes. This was possible due to regular trainings on emergency search and rescue and knowledge dissemination of the health services as well as being well-equipped with emergency tools and materials within the security forces. Similarly, all the residential buildings that were constructed in compliance with National Building Code are safe and no significant damages observed during the post-earthquake damage assessment. Furthermore, school buildings retrofitted prior to the earthquake are also structurally intact and were used as emergency shelter by the community immediately after the earthquake.

This proves that with effective preparedness among the respective government bodies and general population, we can provide effective services to save lives and minimize damages on imminent earthquakes.

About the Speaker

Narayan Prasad Marasini is a Geotechnical Engineer by profession. He has been working with NSET in the Urban Disaster Risk Management (UDRM) Division since February 2006. He holds a doctoral degree in disaster mitigation and management with specialization on geodisaster from Graduate School of Science and Engineering, Ehime University, Japan. His research focuses on liquefaction potential analysis and its remedial measures. As National Technical Coordinator, he led a technical team under Housing Recovery and Reconstruction Platform (HRRP).