## Earthquake Triggered Landslide in Indian Scenario – Causes and Measures

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## Abstract

Landslides occurring due to earthquake is one of the most prevalent seismic hazard, which claims hundreds of lives in the Himalayan mountainous terrain of India. This region has been rocked by a number of major earthquakes. Available oldest record of 8.1 M, 1897 Assam earthquake shows at least 27 numbers of earthquake triggered landslides upto a distance of 450 km from the epicentre. Most of the slides occurred in the Shillong plateau with a number of casualties. The great Assam earthquake of 1950 (8.6 M) has triggered over 100,000 landslides, dislodging 47 billion m<sup>3</sup> disaggregated sediments from steep slopes. The 7.1 M, Uttarkashi earthquake of 1991 has shown localised 23 numbers of earthquake triggered landslides within areas between Bhagirathi and Alakananda valleys. The Chamoli earthquake of 6.6 M, 1999 triggered about 56 number of landslides and dislodged about 0.02 million m<sup>3</sup> of debris materials. More recent, 2005 Kashmir earthquake of 7.6 M has triggered several thousand landslides including one struzstorm (deris avalanche) which has buried four villages and created two lakes. The 2011, 6.8 M Sikkim earthquake created 196 new slides and reactivated several older slides.

Causative factors used to define relative levels of shaking that trigger landslides in susceptible materials due to earthquake are increase in shear stress by horizontal ground acceleration, decrease in soil strength, earthquake magnitude, distance from epicentre, topographic effects and shaking intensity.

To assess the landslide damage due to earthquake triggering and its subsequent management, the first step is to prepare landslide inventory map. This is followed by landslide susceptibility map in second stage and production of landslide hazard map in the third step. Finally landslide risk map is prepared to describe the expected annual cost of landslide damage throughout the affected area.

The study of earthquake triggered landslides provide useful information on hazard mitigation through appropriate measures of slope stability which ultimately minimizes the impact of earthquake for land sliding and efficient planning for evacuation during the disaster.