Paper Number: 1054

Seismicity, neo-tectonics and landslide initiation in the Trans-Himalayas of North East India - Studies from Tezu- Hayuliang- Chaglogam corridor of Arunachal Pradesh

Theophilus, P.K[1]. Chasie, M [2] and Sarkar, N K[3]

[1] Geological Survey of India, NER, Shillong-793003, India

[1] Geological Survey of India, NER, Shillong-793003, India

[3]Geological Survey of India, CHQ, Kolkata- 700 016, India. Email: niroj4@gmail.com

---

Perspective slope stability assessment, landslide susceptibility mapping and landslide inventory by the authors in parts of Tezu-Hayuliang-Chaglogam communication corridor within the Trans Himalayan region of NE India are used to characterize the landslides and landslide initiation process. The NW-SE trending Mishmi thrusts, Tidding suture, Lohit thrust and Po Chu fault along with transverse fault system in the studied domain are the identified seismic sources. A number of significant earthquake events occurred in the region since last century. The Great Assam Earthquake (8.6Mw), of August 15, 1950 is the largest known earthquake of the Himalaya intensely affected the NE India including the area under study. The isoseismal map of this earthquake indicates that the study area falls within the zone of maximum intensity (Zone X). The earthquake had initiated large number of co-seismic landslides in the steep mountain peak, ridge axis, signature of the same has been observed in the form of stripped mountain face, relict scars and huge volume of released mass variably disposed at different level of the steep mountain slope. It is interpreted that the area might have experienced similar large magnitude earthquake in the entire Holocene period and consequently displaced large wasted mass in the slope. Neo-tectonic movement documented through qualitative geomorprphic observations and quantitative DGPS studies could account for very high erosion rate in the area. The same is evident from the presence of huge boulder laden sediment load and near absence of finer fractions carried by the Trunk Rivers, major tributaries and mountain streams indicating recurrent rejuvenation of the slope. The large observed debouched area of the trunk river Lohit corroborated the above contention. In the studied road corridor, 137 nos. of landslides was documented of which 84 are old, 6 are reactivated, 22 suspended and 25 are presumably active. Weathered bedrock (and thin top soil) and older debris are the slope forming material for 55% and 31% of the total landslides. Types of movements documented are mostly slide (75%), rock falls (11%), debris flows (7%) and debris topple (7%) are the other type of identified movements. In terms of the activity, suspended landslides are the dominant type (51%) while rapid to moderate (35%) are the dominant category in terms of rate of movement. In terms of style of landslide activity, multiple failure accounts for more than half (54%) of the total observed landslide. Perspective assessment of the steep natural slope in and around the studied sector reveals characteristics signature of large rock slides in natural slope. Both recent scars as well as a large number of old rock slide scar observed dotted the upper slope. The large volume of released mass from the upper reaches is found variably settled at different level down to the valley bottom drainage. The

identified confined /unconfined debris flows of long run out and identification of preparatory factors for initiation of future debris flow is directly related to the variably settled debris mass. Predisposing factors responsible for landslide initiation in the area are regional thrusts, structural fabric, surficial geology and higher relative relief. The triggering factors for landslide initiation are high anomalous rainfall and large magnitude earthquake. The study result will form the basis for selection of appropriate methodologies for multi-scale landslide susceptibility, hazard and risk assessment for this kind of geo-environmental domain.