

Status of Seismic Hazard Assessment in Pakistan

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For the seismic hazard assessment, deterministic as well as probabilistic evaluation methods are applied. In Pakistan both of these methods are used depending upon the nature of the project for which it is applied. Unfortunately the main parameters required for hazard analysis are very poorly defined in Pakistan. The deterministic method requires accurate definition of active faults in terms of location, type, dip and strike and length and width (or subsurface extension). The probabilistic method requires definition of seismic sources, associated seismicity, slip rate and recurrence relationship.

The definition of active faults requires detailed neotectonic studies of the faults. Paleoseismological studies of the fault scarp can identify slip rate and recurrence period of large earthquakes. Regional GPS arrays can give an idea about the slip rates across the major tectonic units. Detailed and long term continuation of these studies is required in Pakistan to refine the seismic hazard assessment.

Another important data for seismic hazard analysis is the accurate earthquake parameters i.e., location, magnitude, depth and fault rupture mechanism. Prior to October 2005 earthquake, the accuracy of earthquake parameters is low due to low density of seismic stations in Pakistan. With the recent improvement of seismic networks in Pakistan by various agencies, it is hoped that accuracy of earthquake recording parameters will improve in future, resulting in better definition of seismic sources and their recurrence relationships.

Due to scarcity of strong-motion data, attenuation equations could not be developed for the South Asian region and equations developed in other regions with similar tectonic characteristics are used for seismic hazard analysis. More and more strong-motion instruments should be installed and maintained to collect a large volume of data so that local attenuation equations could be developed.

All these studies are very important in improving the reliability of seismic hazard assessment in Pakistan. The collective effort of a number of agencies responsible for these studies is required to refine the seismicity and neotectonic data required for a reliable hazard evaluation. Therefore, it is essential that efforts be made to enhance the scope of these studies for achieving seismically safe environment.