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Application of Geographical Information System for Mapping & Monitoring Seismological Hazards in Pakistan

The earth is divided into several large plates (tectonic plates) that have shifted in position and size over time. Earthquake, any sudden earth shaking caused by seismic waves moving through the rocks of earth. Seismic waves are created when some form of energy stored in the crust of earth is suddenly released, typically when masses of rock that strains against each other suddenly break and slip.

The Himalayan mountain range vividly reveals one of the most spectacular consequences of tectonic plate. Pakistan and its neighboring countries are in an earthquake zone of high frequency. Geographically Pakistan is located on the Eurasian and Indian tectonic plates.

Therefore, most of Pakistan's earthquakes occur in northern and western regions along the boundary of the Indian tectonic plate with the Iranian and Afghan micro-plate. Satellite remote sensing and GIS were used in

various parts of the world to monitor and understand the characteristics of the earthquake. The use and interpretation of both spatial (graphic) and non-spatial (non-graphic) data is one of GIS' most important features.

GIS software has been used in Pakistan to evaluate and understand regional scale tectonic movements, occurrences of earthquakes and seismic risk assessment. The main objective is to accurately locate and evaluate seismic events in Pakistan. All of Pakistan's major seismic events from 1947 to 2009 evaluated and developed a comprehensive GIS database for national analysis of seismic vulnerability.

For some time, earth scientists have warned in the Himalayas for possible future catastrophic earthquakes. The seismological, geological and topographical data sets combined using ARCGIS has produced the complete Pakistan's seismic tectonic maps. Globally, the main reason for the high number of victims in any earthquake-

related tragedy is the inadequate construction.

Today, the main focus is to define hazardous regions of the earthquake by taking into account the area's seismological, topographical and geological characteristics to help mitigate and adapt the country's strategies. Recent seismic instrumentation advancements combined with rapid advances in electronic telecommunications and computer networks cast a new perspective. Efficient methods to minimize the hazards of the earthquake are near real-time determination and distribution of earthquake positions and frequency of ground motions. GPS is valuable for calculating damages in surface measurements for building characteristics. GIS can provide significant information for search and rescue operations with the help of GPS. GIS can be used in the recovery phase to organize damage information, post disaster census information, reconstruction site selection.