

ABSTRACT

Earthquake is a natural disaster and it occurs periodically in a few areas of the world. It causes not only economical loss but also loss of human lives. As a result of the movement of the upper part of the earth's crust the earthquake happens. The hazard connected with the earthquake is known as seismic hazard; seismic hazard deals with the study of the impending earthquake ground motions on the earth. As a matter of fact, India holds tenth position among the countries which are repeatedly affected by the earthquake.

In respect of the death rate in the world, on an average 18000 lives are being died every year. Southern peninsular India was once considered as a stable land mass while compared to the northern parts of India. Tamil Nadu is not been seismically so active state because a few earthquakes at moderate level have happened in the past. The frequent occurrence of earthquake is low. Even though several faults have been identified in this region, it shows that movement of tremor happened during the Holocene period. Studies reveal that seismic activity in the recent past along borders of Andhra Pradesh, Karnataka and Kerala. It is evident that gradual instability of the earth in these regions.

National Disaster Management Authority (NDMA) has included Coimbatore in seismic risk areas falls under the zone III as per IS 1893:2002,

which has more than half million population region and therefore Coimbatore has been taken for the study of the seismic hazard analysis.

Coimbatore, being the Manchester of South India, is situated at the western part of Tamil Nadu. The study area lies between the longitude of $76^{\circ}54'00''$ to $77^{\circ}04'00''$ E and latitude of $10^{\circ}57'00''$ to $11^{\circ}05'00''$ N with an aerial extend of 105.6 km^2 . Elevation of study area ranges from 385 m to 445 m above mean sea level. An earthquake of magnitude of 6.0 on Richter scales occurred on 08.02.1900. Population of Coimbatore corporation is 10.59 lakhs as per 2011 senses.

Coimbatore is known for its automobile, pump, textile and other engineering industries. There are several information technology companies present in the city.

In order to assess the seismic hazard of the city, various thematic layers like geology, geomorphology, seismology, geotechnical, water table and rainfall, landuse/land cover and demography are used in GIS environment to assess the seismic hazard of the corporation.

In developing countries, the rapid growth of urbanization is often associated with the unplanned and unrestricted areal growth of the city. The vulnerability map of India shows that 65% of land area is liable to seismic hazard. PSG College of Technology, Pelamedu, Coimbatore is taken as center point and a circular area of radius 350km has been selected for the seismicity study as per regulatory guide 1.165(1997). 51 faults and 4 shear zones are

present within the study area. The earthquake events collected are about 288 with minimum moment magnitude of 2.9 and a maximum of 6.2 from the United States Geological Survey (USGS), Indian Metrological Department (IMD)-New Delhi, Geological Survey of India (GSI) and Amateur Seismic Centre (ASC). The sources identified from Seismotectonic Atlas of India (SEISAT,2000) and remote sensing studies are compiled and seismotectonic map of study area has been prepared using GIS. The seismotectonic map contains 51 numbers of faults spanning from 28 km to 329 km length. GIS based seismic hazard map is developed by using 173 borehole locations in the study area of Coimbatore Corporation. Deterministic seismic hazard assessment method is used to identify the Maximum Credible Earthquake (MCE) that will occur in the study area in future.

The subsurface soil properties are determined by using borehole log, geotechnical properties of soil and SPT 'N' values for soil and rock. GIS has been used in for the analysis of various thematic layers. The ANN is used to predict bed rock depth values of Coimbatore Corporation. Electrical resistivity survey is carried out to determine the subsurface layers. IPI2WIN software has been used to indentify various subsurface layers. A Standard documents such as International Building Code (IBC-2009), refers to classification of site based on borehole data or velocity profiling. Shear Wave Velocity is one of the most important input parameters to represent the stiffness of soil. For 30m average depth, shear wave velocity is written as V_s30 and it is accepted for site classification as per National Earthquake

Hazard Reduction Program (NEHRP) classifications and Uniform Building Code (UBC) in 1997.

Amplitude, frequency content and duration of the strong ground motion are influenced by the local site effects. Predominant frequency map of Coimbatore Corporation for 30m soil column has been used to build simple relationship between the shear wave velocity and the depth of subsurface formations. Amplification factor is calculated from the rock level PGA values. The ground level PGA is determined using the Amplification factor. Using the rock level PGA at zero time periods, the response spectrum is constructed for various site classes of the study area.

For seismic hazard delineation, the different themes like geomorphological and seismological such as geology, geomorphology, drainage, population, elevation, rock level PGA, Amplification factor, Predominant frequency and Shear wave velocity were integrated in GIS to generate Hazard Index (HI)map.

This research highlights impending seismic hazard and identifies seismic risk zones. This map shall be used for designing buildings on different part of study area with the view to insisting on preventive action of the earthquake.