

Vulnerability Assessment of Building and Population Related to Earthquake Hazard in Dehra Dun City using Remote Sensing and Geoinformation Techniques.

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Abstract

It is well known fact that natural disaster like earthquakes, cyclones, landslides strikes countries, developed and developing, causing enormous destruction and creating human sufferings and producing negative impacts on national economies. India is considered as the world's most disaster prone country and it has experienced several devastating earthquake in the past resulting in a large number of deaths and severe property damage. The frequent occurrence of damaging earthquakes clearly demonstrates the high seismic hazard in India and highlights the need for a comprehensive earthquake disaster risk management policy. To effectively reduce the impact of very disaster, governments prepare a complete strategy, called disaster management. In the process of decision-making availability of various kind of data e.g. buildings, lifeline systems, roads, hospitals plays a crucial role. The majority of this data is spatial and can be mapped. With the development and maturity of GIS technology, many of these limitations have been overcome and dynamic loss studies that present in a more usable format can now be performed. So Geographical Information System has become a powerful tool for collecting, storing, analyzing, modeling and displaying large amount of data. This way the implementation of integrated GIS technology provides an approach, which permits rapid evaluation of complex inventory databases under a variety of earthquake scenario and allows the user to interactively view results almost immediately.

The urban areas have experienced very rapid population growth during the last few decades due to economic factors such as decrease in economic opportunities in rural areas and consequent migration to the urban areas. So, there is an urgent need to assess the seismic vulnerability of buildings in urban areas of India as an essential component of a comprehensive earthquakes disaster risk management policy. Detailed seismic vulnerability evaluation is a technically complex and expensive procedure and can be applied on very few numbers of buildings. Therefore, it is very important to use relatively simple procedures (e.g. Rapid Visual Screening) that can help to rapidly evaluate the vulnerability profile of different types of buildings, so that more complex procedures can be applied to the most critical buildings.

In this paper, the seismic vulnerability assessment of buildings and population of Dehradun city is carried out and a building damage assessment model is prepared. The state of Uttarakhand is among the most seismically active parts of India. Dehradun City is in zone 4 of the seismic region and most importantly is not far off from seismically active Himalayan ranges. The recent declaration of the state of Uttarakhand and the recognition of Dehradun as its capital is

anticipated to bring rapid urban development and huge population influx in the area, Therefore, vulnerability assessment of building and population related to earthquake in Dehradun city is of prime importance. For the purpose of vulnerability assessment related to earthquake, three diverse representative municipal wards of Dehradun were taken. Parameters taken for the generation of compatible building type classifications are number of stories, building use, roof type, structures, presence of cracks, maintenance, building shape, year of construction etc. Looking at the Indian condition a final damage probability matrix (DPM) is created. Under social vulnerability parameters utilities, facilities, day and night time population, various age groups are taken. Finally, amount of vulnerability related to various building are calculated and its impact on population is shown.