

Earthquake Disaster Management in India

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Abstract: The fact is that natural disasters are always unexpected events which affect human life as well as nature itself. Earthquakes are one of the natural disasters on this planet which have adversely brought heavy toll on human life and infrastructure. Therefore, mitigation of the devastating damage caused by earthquake is the prime requirement in the life of all human beings. Moreover, earthquakes are always unpredictable, the only option before us is to design and build structures with earthquake resistant which can reduce the loss of property and humans on such occasions. Most of the scholars are agree with the fact that unsafe buildings kill more people than earthquakes in developing countries like India. Now it has become a worldwide problem to take precautions before this natural happening like earthquake in any part of the earth. That is why; earthquake disaster management has become a topic for debate among scholars. Keeping the fact in view, the researcher has highlighted the earthquake disaster management techniques in the present research paper including the scenario of some major earthquake in India.

Keywords: Earthquake, Disaster Management, Epicenter, Devastating, Mitigation, Human Loss, Resistant Construction.

Introduction: Earthquakes as natural disasters and their management is related to the planning and preparing the strategy to tackle and mitigate them in a responsible and effective manner. However, earthquakes as natural disasters induce turmoil and disturbances for a prolonged life

threatening environment for a region, therefore, here it is an urgent need to reduce the effects of earthquakes by constructive approach to tackle the problem in future. According to World Development Report, 2001, in the decade (1991-2000), natural disasters killed 66,59,598 people, accounting for

eighty eight percent of all deaths due to disasters in India. Therefore, India as a developing country needs to evolve its own strategies for seismic hazard evaluation. Likewise, India also needs to come with update of some effective initiatives and programmes to reduce the risk of earthquakes disaster in future. The main focus of these precautions requires the disaster management techniques to be adopted in the construction of buildings. In other words, if we build any infrastructure, it should be well equipped with earthquake resistant techniques. Moreover, awareness programme should be initiated by NGO's and government from time to time to create awareness about natural disasters among the masses who reside in remote areas.

Research Methodology: The present research paper is exploratory in nature and most of data for research has been taken from the reputed journals. Moreover, the research paper is based on the secondary sources of data collection. To pace the study, the

research has also used some observational facts about earthquakes as natural disaster.

Objectives of the Study: The present research paper has the following research objectives:

- To know about the concept of earthquake disaster management.
- To highlight the effect of earthquake on human life.
- To explore the disaster management techniques to be adopted in the construction of buildings.

▪ **What is a Earthquake?**

▪ Earthquakes are tragic events which cause a great loss of GDP in the country. An earthquake is a sudden rapid shaking of the earth causes by the breaking and shifting of racks beneath the earth's surface. Occasionally stress is released which results in the sudden, and sometimes disastrous shaking is called earthquakes. Earthquakes are among the most deadly natural disasters and most of the Earth's earthquake zones coincide with areas of high population

density in India. Consequently an earthquake damages the life, economy and buildings. Therefore disaster management can minimize its loss by the construction of earthquake resistant buildings which can tolerate the high magnitude of the earthquake. Here it is to say that the earthquake on the reactor scale does not mean that there will be more destruction and damage. It depends how much aware we are and how much money we spend to build buildings, bridges, pipes etc. The earthquake caused by the rupture of rock zones is called as faults, which is a thin zone of crushed rock between two blocks of rock, and it can be any length from centimeter to thousands of kilometer. Moreover, when an earthquake occurs on one of this fault, the sock on one side of the fault slips with respect to other. The fault surface can be vertical, horizontal, or at some angle to the surface of the earth. This movement transmitted the seismic waves from the bed rocks which cause rupture and movement of tectonic plates.

▪ Thus, earthquake can be defined as a sudden ground shaking caused by the release of huge stored strain energy at the interface of the tectonic plates beneath the earth. All earthquakes have their own epicenter and focus. Epicenter is the point on the free rupture of the earth vertically above the place of origin of an earthquake. Focus is the print within the earth from where the seismic waves originate. Earthquake occurs due to movements along faults that have evolved through geologic and tectonic processes. Among all the natural hazards, earthquake is the most disastrous since its impacts are larger causing death injuries and destruction on a massive scale. The extent of the impact depends on its magnitude, location and time of occurrence of this calamity.

▪ **Earthquake Disasters in India:** Actually, a large part of our country is liable to a wide range of probable maximum seismic intensities, where shallow earthquakes of magnitudes of 5.0 or more the reactor scale are known to have occurred in the past

hundred years. There is a catalogue prepared by meteorological department which gives information about more than 1200 earthquakes in India. According to the record, there are 8 earthquakes of magnitude 8.00, 43 of magnitude 7.0-7.9, 312 of magnitude 6.0-6.9, the rest of

magnitude 5.00-5.9. The largest earthquake in India occurred in 1897 in the Shillong Pleateau with magnitude of 8.7. In the year of 1950, there was an earthquake of magnitude 8.6 in Sadiya region. A detailed account of some major earthquakes and human loss caused by them in given as under:

▪ **Table: Major Earthquakes in India**

Sr. No	Year	Area	Magnitude	Human Loss
1	1897	Shillong	8.7	1600
2	1905	Kangra	8.0	20,000
3	1934	Bihar	8.3	14,000
4	1950	Assam	8.6	1500
5	1988	Bihar	6.6	1003
6	1993	Maharashtra	6.3	7928
7	2001	Gujarat	7.9	20,800

The Earthquake Disaster

Management: Earthquake disaster management is a dynamic process which comprises the traditional management functions of planning, organizing, staffing, leading and controlling in case of earthquake occurrence before or after. As a modern technique and prolonged strategy it also includes the

management technique to prevent, mitigate, recovery, response, preparedness, awareness to tackle the problem of earthquakes disaster. Here it is noteworthy to say that India is the world's most disaster prone country which is plagued by various kinds of natural disaster and earthquakes are one of them. If earthquakes disasters happen, than a

huge amount of resources is mobilized for rescue, relief and rehabilitation works, therefore, earthquake disaster management is very urgently required by India. Today India needs to chalk out a multi-pronged strategy for earthquake disaster management comprising prevention, preparedness, response and recovery on the one hand and initiate development efforts aimed towards risk reduction and mitigation on the other.

Furthermore, earthquakes are known as major natural disasters which badly affect most of the parts of India. These disasters bring huge damage to human life and property at national as well as regional level where this calamity occurs. India poses significant threat earthquakes vulnerable zones of falling by almost 59 percent of the total geographical area-likewise, severe damage and loss of human life and infrastructure including buildings during an earthquake is a matter of great concern. In this perspective, disaster

management is an approach which minimizes the adverse effects of earthquakes on life and property.

Earthquake Risk Resolutions: It is an assumed fact that most of the human loss is due to failure or collapse of man-made infrastructure. Therefore, here it is an urgent need that all the buildings and construction works should come under a well-planned strategy so that we could reduce the risk or hazard of this calamity. Some of the risk reduction steps may be as under:

- Hazard evaluation and risk assessment.
- Mapping and quantification of earthquake hazard.
- Emphasis on the study of vulnerability ability of buildings and structures.
- Disaster preparedness and prevention.
- Research and development, education and training as a part of earthquake disaster management technique.

- To adopt disaster management technique.
- Awareness among masses residing in remote areas of the country.
- To construct building under earthquake resistant technique.
- To follow the qualitative for disaster resistant construction and technology transfer.
- To strengthen the information technology.
- To upgrade and strengthen the seismological instrumentation network.
- To initiate human resource development programmes.
- Standardization of disaster related techniques.
- Awareness and information dissemination.

Earthquake Resistant Construction: It is said that it is not the earthquake that kills the people; but it is the unsafe buildings which are responsible for devastation. If buildings are built earthquake resistant, we can avoid a huge amount of hazard due to this calamity. In this perspective, the main

earthquake design code 1893 pointed out some guidelines for earthquake resistant construction as under:

- Horizontal bands should be provided at plinth, lintel and roof level.
- Vertical reinforcement at some important points such as corners, internal and external wall junctions should be provided.
- Grade of mortar should be as per codes specified for different earthquake zones.
- Irregular shakes should be avoided both in plain and vertical configuration.
- Quality and proper workmanship must be ensured at any cost in RCC framed structure. The spacing of lateral ties should be kept closer.
- The hook in the tiles should be at 135 degree and the arrangement of lateral ties in the column should be as per code.
- Stirrups for beam should be at closer spacing as per code.

Suggestions: To reduce the disastrous impacts of earthquake as natural calamity the following steps may be included:

- To boost the earthquake resistant technology.
- To enhance the scientific content of prediction methodologies and reliability of forecast.
- To map the earthquake hazards on a large scale.
- To implement the well-planned strategy for risk reduction.
- To aware the masses through NGOs program and Governmental institution about earthquake hazard.
- To foster a closer partnership between NGOs and Governmental institutions.
- To assimilate disaster preparedness, mitigation and prevention for better results.
- To initiate human resource development programmes.

Conclusion: To conclude, we can say that earthquake is a natural calamity which brings a huge amount of

destruction for all human beings. Today rapid urbanization is one of the main causes of earthquake which weakens the capacity of earth and ruptures the faults by which seismic plates move and cause earthquake. It is a proven fact that when an earthquake occurs, most of the damages occur in urban areas with multi-story buildings. Therefore, here it is an urgent need to spread awareness among the people. That they should use earthquake resistant techniques in the construction works. In this perspective all the people should follow the guidelines suggested by Bureau of Indian Standards for all masonry structure. Moreover, there should be a linkage of disaster mitigation with all development plans. NGOs can play a vital role in this regard.

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