

## THE GREAT GUJARAT EARTHQUAKE 2001 - LESSONS LEARNT

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**Abstract:-** A powerful earthquake of magnitude 7.9 on Richter Scale struck western Gujarat at 8:46 am on January 26, 2001 when the people of India were preparing to celebrate their 52<sup>nd</sup> Republic Day celebration. The attempt to recovery and reconstruction process should have strong emphasis on proper understanding and awareness of the risk among different stakeholders, sufficient level of training and confidence building among the professionals and the masons and preparing appropriate planning and mitigation strategies for useful implementation.

The Gujarat earthquake has given a sort of 'National wake up call' to look within and introspect again on the state of disaster preparedness of the country. There should be a national learning to take appropriate or specific steps for disaster reduction, mitigation, prevention and preparedness. This earthquake can be regarded as an opportunity to learn from this disaster and to work to never let it happen. **In this paper an attempt has been made to highlight the lessons learnt from recent devastating Gujarat earthquake.** There is a need to learn lessons from this event and a plan must be designed for the areas located in the high earthquake risk zones to mitigate the impacts of future earthquakes. Development and disaster should go hand in hand. Development models must have in-built components of disaster reduction, mitigation and preparedness.

### INTRODUCTION

It is a well known fact that natural disasters strikes countries, both developed and developing, causing enormous destruction and creating human sufferings and producing negative impacts on national economies. Due to diverse geo-climatic conditions prevalent in different parts of the globe, different types of natural disasters like floods, droughts, earthquakes, cyclones, landslides, and volcanoes, etc. strikes according to the vulnerability of the area. India is considered as the world's most disaster prone country. It has witnessed devastating natural disasters in recent past like droughts, floods, cyclones, earthquakes, landslides, etc. India has a very long history of earthquake occurrence. It has experienced some of the most devastating earthquakes in past with magnitude as high as 8.7 on Richter scale.

### THE JANUARY 26, 2001 EARTHQUAKE

A powerful earthquake of magnitude 7.9 on Richter Scale struck western Gujarat at 8:46 am on January 26, 2001 when the people of India were preparing to celebrate their 52<sup>nd</sup> Republic Day celebration. The epicenter was at Bhuj. It caused extensive loss of life and property. Over 20,000 persons are reported dead and about 1.7 lakhs injured. Its depth of focus was relatively shallow, just 15km below the earth surface. The quake generated intense shaking which was felt in 70% region of India. The tremors even felt in the neighboring Pakistan and Nepal.

### Area Affected

This earthquake was most devastating in its scale and suffering as compared to the last four earthquakes that occurred in the last decade (i.e. Uttarkashi in 1991, Latur in 1993, Jabalpur in 1997 and Chamoli in 1999). More than 600 aftershocks of magnitude ranging between 2.8 to 5.9 have occurred so far.

Twenty-two of the twenty-five districts of the state have been affected. The damaged areas are spread over 300km far from the epicenter. The effect was particularly severe in the Kutch district. Its four major urban areas – Bhuj, Anjar, Bachau and Rapar suffered near total destruction. The rural areas in the region are also very badly affected with over 229 villages almost totally destroyed. Other Urban areas have also suffered damage to major structures, infrastructure and industrial facilities. It has even caused considerable damage in Ahmedabad located over 300km from the epicenter. The city has suffered severe damage to urban property after Bhuj.



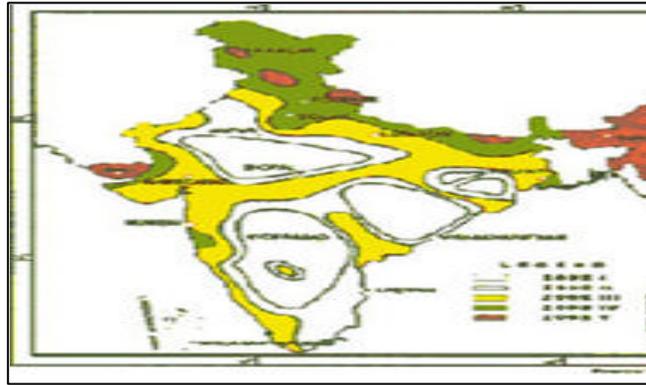
**Fig. 1 Districts Affected by Earthquake**

**Seismicity of the Affected Area**

India has a very long history of earthquake occurrence. It has experienced some of the most devastating earthquakes in history with magnitudes as high as 8.7 on Richter scale. The entire country can be divided into seven seismic regions depending on their degree of seismicity. They are – Kashmir and Western Himalayas, Central Himalayas, Northeast India, Indo-Gangetic Basin and Rajasthan, Cambay and Rann of Kutch, the Peninsular India including Lakshwadeep and the Andaman & Nicobar Islands. The Himalayan mountain ranges constitute one of the most seismically active regions in the world. The highly sensitive Cambay and Rann of Kutch region falls in the state of Gujarat. The area around Bhuj on the western border of India is one of the known regions of high incidence of earthquakes of recent times and in historical past. This area is fall under highest seismically active zone –V. The Kutch region is tectonically an active area and in future also earthquakes will remain an important geological activity. Some major earthquakes that struck the affected region are:

**Table-1  
Major Earthquakes**

Major Earthquakes	Epicenter	Magnitude
January 16, 1819	Kutch	8.0
June 19, 1845		6.3
June 16, 1903		6.0
July 21, 1956	Anjar	7.0
March 23, 1970	Borouch	5.7
January 26, 2001	Bhuj	6.9



**Fig. 2 Seismic Hazard Map of India**

**IMPACT OF THE EARTHQUAKE**

The impact of the earthquake can be divided into three categories. This is shown in Table-2.

**Table-2  
Impact of Earthquake**

DIRECT	INDIRECT	TERTIARY
<ul style="list-style-type: none"> <li>•Human lives</li> <li>•Livestock, other animals</li> <li>•Private property</li> <li>•Municipal infrastructure</li> <li>•Power/telecommunication, infrastructure</li> <li>•Health/education assets</li> </ul>	<ul style="list-style-type: none"> <li>•Export/import</li> <li>•Agricultural output</li> <li>•Industry/services output</li> <li>•Remittance income</li> <li>•Fall in earning potential (due to disability, trauma etc.)</li> <li>•Unemployment</li> </ul>	<ul style="list-style-type: none"> <li>•Health hazards</li> <li>•Long-term development</li> <li>•Overall investment climate</li> <li>•Funds reallocation</li> <li>•Community migration /relocation</li> </ul>

**NEED FOR PREPAREDNESS MEASURES**

In order to reduce the impact of earthquake some preparedness measures are required. These are as follows:

- Focus on mitigation and integrate DM efforts into development planning
- Focus on vulnerability reduction
- Ensuring speed of response through preparedness
- Integration of DM into development planning efforts
- Creating awareness and stakeholder participation
- Institutionalizing mechanisms for learning from other experiences
- Developing an enabling statutory framework, specifying powers and duties
- Capitalizing on existing resources, networks and experience
- Community participation and involvement
- Building capabilities & expertise
- Need to focus on long-term sustainability to achieve its desired objectives

**POST-DISASTER MEASURES**

The post disaster measures can be divided into three categories. They are:-

**I Immediate Measures**

- Evacuation to safer places
- Emergency shelter
- Search and rescue

- Provision of food and water
- Military assistance
- Restoring communication
- Medical assistance
- Relief disbursement
- Epidemiological surveillance
- Debris clearance

## ***II Short term Measures***

- Damage Assessment
- Re-establishment of communities network and contact with remote areas
- Financial assistance to the damage and loss caused

## ***III Long Term Measures***

- Effective warning signals
- Precautionary measures
- Construction of safe structured buildings
- Follow building regulations
- Public education and awareness

## **LEASONS LEARNT**

Natural disasters like earthquake can't be predicted. The foremost requirement is construction of seismically safe structures at proper locations in the earthquake prone areas. A large population of the country live in the highly seismically active regions. To better deal with the hazard the art of living with earthquakes has to be learnt.

The attempt to recovery and reconstruction process should have strong emphasis on proper understanding and awareness of the risk among different stakeholders, sufficient level of training and confidence building among the professionals and the masons and preparing appropriate planning and mitigation strategies for useful implementation.

The Gujarat earthquake has given a sort of 'National wake up call' to look within and introspect again on the state of disaster preparedness of the country. There should be a national learning to take appropriate or specific steps for disaster reduction, mitigation, prevention and preparedness. This earthquake can be regarded as an opportunity to learn from this disaster and to work to never let it happen.

Therefore, there is a need to learn lessons from this event and a plan must be designed for the areas located in the high earthquake risk zones to mitigate the impacts of future earthquakes. Development and disaster should go hand in hand. Development models must have in-built components of disaster reduction, mitigation and preparedness.