



Impact on people's lives and livelihoods in Gujarat due to Natural hazards

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ABSTRACT

Natural disasters are catastrophic, catastrophic events that harm society, the economy, and the environment. As India has faced the COVID19 pandemic this year, climate change causing natural disasters like floods, cyclones have also made the lives of Indians miserable and even sometimes deadly. Cyclone Tauktae hits Gujarat, India in 2021, flooding villages and forcing thousands of people from their homes. Cyclones accompanied by heavy rains have made landfall in coastal areas of Gujarat, the storm has displaced more than 200,000 people in Gujarat and left 174 dead and 80 still missing. There are a variety of natural events that often occur in Gujarat that may have devastating effects on the local economy, including as floods, cyclones, droughts, and landslides. As well as injury and property damage. This study aims to find out how natural disasters can affect people and minimize the risk of exposure. Therefore, the State of Gujarat should focus on prevention and mitigation, increase the importance of reducing disaster risk and improve disaster response capacity.

Key words: Climate change, Disaster management, Natural hazards.

1. INTRODUCTION

Disasters caused by catastrophic natural occurrences may result in the death and destruction of people, property, and economic activity. Even in remote parts of the globe, natural calamities like floods may strike. Tornadoes, on the other hand, may occur exclusively in certain regions. Tropical storms and volcanic eruptions, for example, need certain weather or structural conditions before they may be considered risks. "In the last decade, hurricanes, floods, and prolonged drought have hit the north western Indian state of Gujarat. On January 26(2001), a magnitude 7.7 massive earthquake occurred in the town of Bhuj in the Kutch province, in which killed more than 20,000 people and more than thousands were injured., This catastrophic event destroyed thousands of houses, buildings, infrastructure, livestock, the environment and left more than a thousand people homeless." [1]

Gujarat has been hit by some of the worst natural catastrophes in the country, which has not only caused massive damage but has also halted several development projects. Earthquakes and other natural catastrophes are a common occurrence in the state because of its unique geophysical system. Over the past decade, all or most of the state has experienced extreme weather conditions or extreme natural events. Gujarat has historically experienced most of the disasters of various sizes due to its geographical location, climatic and geological background. Due to lack of sufficient water over a long period of the year, most dry and semi-arid areas are prone to drought, while some areas have very high concentrated rainfall. The state has caused massive spills, causing serious floods and flood problems. The state's 1,600-kilometer coastline is often affected by storms emerging from the Arabian Sea due to plate tectonics movements on the Indian subcontinent. From Saurashtra and the Kathiawar Peninsula.

2. PREVIOUS WORK

Various studies are already undertaken in the field of natural disasters and disaster management. Katuri et al. (2002) [7] The Gujarat Earthquake: Mitigations Failure and future strategies. In which they explained the problems encountered in relief and recovery activities are the lack of a complete information system, the lack of a focal point to disseminate information on the type of relief needed, the lack of remote sensing data with high accuracy, suitable for the preparation and implementation of long-term reconstruction and restoration plan (development plan). Disaster management includes disaster preparedness planning, post-disaster damage assessment, search and rescue, and recovery and reconstruction activities. N.Bandyopadhyay et al. (2016) [3] explains the methods which use for terrestrial temperature and precipitation data, were used to assess the meteorological drought in Gujarat from 1981 to 2010. Analysis based on Geographic Information System (GIS) showed the relationship between insufficient rainfall and heat waves, as well as indirect effects of heat waves and extreme temperatures on the development and increase of drought. Research shows a relationship between climate extremes and climate change. N.Memon et.al (2020) [8] a case of Rel River flood and Integrated framework for flood relief package (FRP) by using RS and GIS methods to assess the flood

vulnerabilities of precipitation collection and determine the risk of flooding. This study has helped to clearly identify villages vulnerable to flood risk, and more methods should be allocated to promote flood insurance package. D.S. Mileti *et.al* (2005)^[9] provide an overview of sustainable development and hazards mitigation in US, the main theme of the research is that reducing losses from risk and losses of all kinds is a result of narrow and developmental patterns, cultural prerequisites, and attitudes towards the environment, science, and technology this study includes how Americans and agencies can take responsibility for disaster damage, reduce future losses from risk, and link risk mitigation with sustainable development.

3. ANALYSE THREATS, VULNERABILITIES AND RISKS OF NATURAL HAZARD

3.1 Earthquake

The entire state of Gujarat is assigned to Zones III to V in India's seismic zone map, so there are varying levels of seismic hazards, from medium to high levels. The Gujarat area is classified into three seismic zones on India's seismic zone map. An earthquake of magnitude 8 is expected to hit the Kutch region, which is around 300 km x 300 km. The approximately 6070 km wide zone around this zone, which covers the area of Northern Saurashtra and the area adjacent to the eastern part of Kutch, is mainly due to the Kutch earthquake and some local earthquakes along the Northern Kathiawar fault. Is assigned to Zone IV. Northern Saurashtra is expected. The majority of Gujarat is located in Zone III, which is prone to moderate to powerful Kutch earthquakes with an intensity of VII. ^[2]It is shown in Figure 1.1. The entire Kutch, almost the entire coast of northern Saurashtra, a small area of the Patan region adjacent to Kutch is subject to very strong tensions. Ahmedabad and Bharuch are in the sever zone, Rajkot is in the moderate zone, while Bhavnagar and Jamnagar are in the extremely high intensity zone at this time. ^[2]

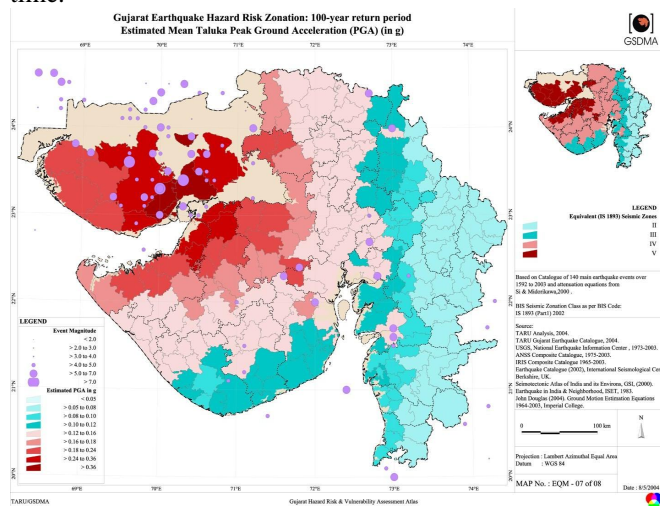


Figure 1.1: Gujarat Earthquake Hazard Risk Zonation Map
Source: Gujarat state disaster management plan

3.2 Flood:

“The climatology of Gujarat is influenced by the Arabian Sea in the West and three hill ranges along its Eastern border. A long coastline makes parts of arid Saurashtra and Kutch occasionally experience very high rainfall.” ^[2]

Most of Gujarat is at risk for floods, no matter how large the drainage basins are (Figure 1.2). Several villages in North Gujarat are at risk of flooding. The hazard of flooding in the southern plains of Gujarat is very high. The danger of floods in southern Gujarat is highlighted by the presence of watershed hills in the upper section of the area.

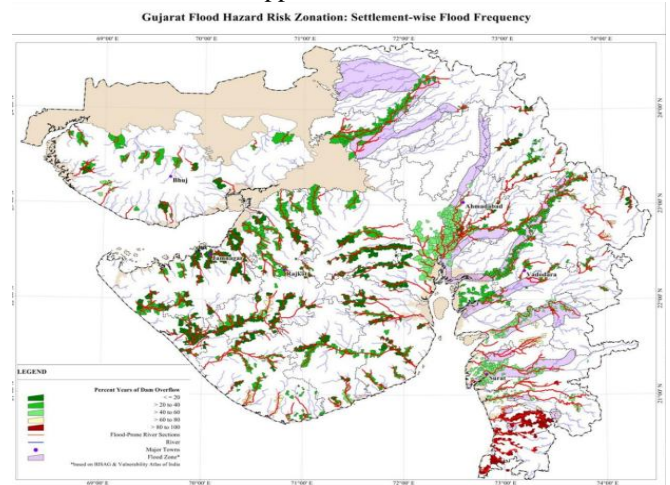


Figure 1.2: Gujarat Flood Hazard Risk Zonation
Source: Gujarat state disaster management plan

3.3 Cyclone:

Despite Gujarat's location in the western reaches of India, the state experiences wide temperature variations. Gujarat is along the coast of the Arabian Sea. The Arabian Sea is one of the sources of tropical cyclones. The movement of the cyclone is heading northeast, hitting the western and southern coasts of Gujarat. Figure 1.3 shows the area of Gujarat which affected mostly by cyclone.

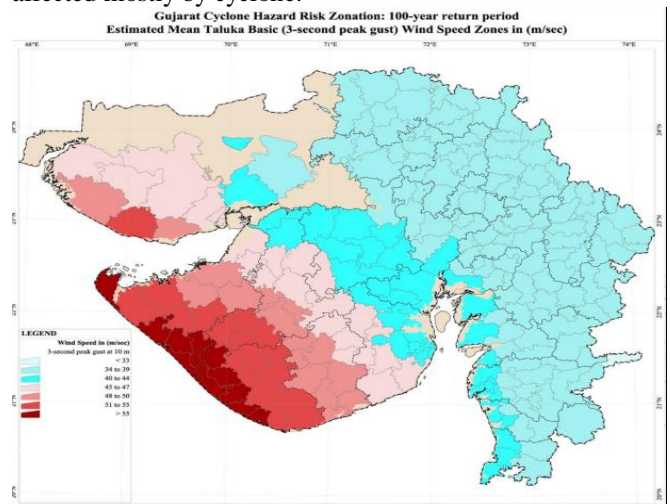


Figure 1.3: Gujarat Cyclone Hazard Risk Zonation Map
Source: Gujarat state disaster management plan

3.4 Drought:

“Large parts of northwest India including the state of Gujarat fall under hyper-arid, arid and semi-arid regions. It is a major drought-prone area, which witnesses droughts every three-four year. Gujarat possesses an arid to semi-arid climate, and frequently suffers from drought due to failure of monsoon and occurrence of heat waves”^[3]

The vast majority of the state is arid or semi-arid in nature. Some areas in northern Gujarat and Saurashtra have no other options for irrigation. Drought may be exacerbated by groundwater extraction. There is an increasing strain on agriculture and water resources due to lower water levels.

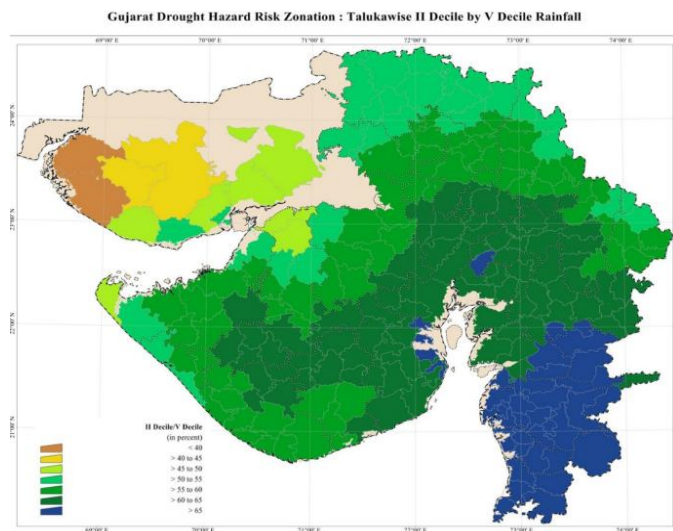


Figure 1.4: Gujarat Drought Hazard Risk Zonation Map
Source: Gujarat state disaster management plan

4. IMPACT ON LIFE AND LIVELIHOOD:

On January 26, 2001, a 6.9-magnitude earthquake struck Gujarat, India's north western state, devastating a large drought-affected area. More than 166,000 people were injured, including 20,717 with "severe" injuries, in the earthquake that is well-documented. A total of 370,000 houses were destroyed and another 922,000 were damaged.^[4]

In September 2021, major flooding is expected in the western Indian state of Gujarat, which is expected to impact more than 1.6 million people. More than 500 millimeters of rain fell in 24 hours in some parts of the state. The National Interior Ministry's Disaster Management Department said 1,660,254 people had been affected by flooding in the past few days in 44 villages in Rajkot, Jamnagar region. Porbandar, Valsad, and Junagadh.

Evacuations were carried out and 72 shelters were built to house nearly 7,000 displaced residents. 2,553 people were displaced from Rajkot district, 3,966 people from Jamnagar district, 224 people from Porbandar district and 5 people from Junagadh district. Also, droughts are increasing in one area of

Gujarat and floods occur at the same time of the year in another area. Traditionally drought-prone areas such as Jamnagar, Rajkot, Surat and Valsad have seen a shift towards extreme flooding and storm surges over the past decade. During 2016, 1115 villages in six districts (Banaskanta, Dwarka, Kutch, Jamnagar, Porbandar, and Rajkot) were hard hit by drought, resulting to damage claims. These patterns of change are driven by climate change driven, “we can see the effect of climate change on land or soil. Due to rise average temperature there are more droughts, excess flooding in coastal regions, forest fires, powerful cyclones will affect the agriculture productivity”^[5] Their unpredictability makes disaster management difficult and places a serious strain on the national economy.



Figure 2.1: DISASTER MANAGEMENT CYCLE

Disasters cannot be completely avoided, their impacts can be minimized by implementing known structural and non-structural mitigation measures, such as developing Appropriate, sensitive early warning at all levels in the communities involved, reforestation along the coast, construction of shelters, embankments, etc. through mitigation measures, better preparedness and improved response mechanisms.

- Regular seismic activity monitoring
- Providing or providing maps of earthquake zones and vulnerability and risk assessment
- Establishing earthquake tracking facilities (seismological facilities) for everyday tracking and rapid broadcasting of facts the various people withinside the prone regions.
- The use of a Geographical Positioning System (GPS) may be of extraordinary assist in tracking the motion of tectonic plates.
- Seismic design development features of residential construction structure.
- Earthquake Safety Rules Campaign

- Constructing earthquake-resistant designs and use mild substances in withinside the prone regions.
- lift irrigation and dam construction
- Surface Irrigation using Tube Wells and Channels
- Build infrastructure for drought warnings and dissemination of information.

reduce the negative impact of natural disasters. Governments should also initiate a significant portion of their budget to mitigation and prevention.

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Vulnerability	Effects
Social Vulnerability	More over 8.917,174 of Gujarat's 60,439,692 inhabitants are Scheduled Tribes (STs), making about 14.75 percent of the state's total population in 2011. ^[6] Some of these tribal groups were identified as particularly vulnerable Tribes.
Structural Vulnerability	Wood, stone, fired bricks, concrete, and grass/thatch/bamboo are some of the most common materials used for roofs and walls, respectively, according to the 2011 census. As a consequence, if construction rules and other safety criteria are not adhered to, the structural vulnerability of housing materials will rise. In the event of an earthquake, tornado, flood, or any other natural disaster, this will cause more damage and loss. ^[2]
Environmental Vulnerability	The state of Gujarat is one of the fastest growing urban areas in the country, with 42% of the population living in cities. Urbanization leads to deforestation, pollution of rivers and air by chemical and pharmaceutical companies, loss of biodiversity, and destruction of mangroves and coastlines. ^[2]
Economical Vulnerability	Natural catastrophes may have a devastating effect on economically disadvantaged people, who are unable to recover their losses. Infrastructure damage could lead to a severe economic downturn in the state and its development could be delayed for years. As a result, related industries or parts of the supply chain can be damaged. It has a huge impact on the national economy. ^[2]

5. CONCLUSION

Natural disasters are very unpredictable, but not uncommon. Droughts, earthquakes, floods, cyclones, volcanic eruptions, and landslides are natural phenomena that occasionally occur. This paper deals with the impact of natural disasters on people's lives and livelihoods at the coast of Gujarat. The study concluded that catastrophic events that put people's lives at risk affect infrastructure, destroying the economy as well. As we know, we cannot prevent risks, but by using beneficial practices we can prevent their impact on people, animals, the environment, and livelihoods. This study also demonstrates that government initiatives is an important tool that, if used wisely and prudently, can reduce losses and