

Vulnerability Of The State Of Mizoram, India To Various Natural Hazards

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Abstract: Vulnerability is a concept which describes factors or constraints of an economic, social, physical or geographic nature, which reduce the ability of a community to prepare for and cope with the impact of hazards. Hazard may be defined as phenomena that pose a threat to people, structures or economic assets and which may cause a disaster. A disaster occurs when hazard interacts with vulnerability and disasters affect population where there is physical, infrastructural, environmental or socio-economic vulnerability. Mizoram is one of the North Eastern States of India, located in 21°56' and 24°31' N latitude and 92°16' and 93 ° 26' E longitudes with the geographical area of 21,081 sq. km having population of 10,91,014. It is bounded by Bangladesh and Tripura state, India in the West and Myanmar in the East and South; Manipur and Assam state, India in the North. Owing to its geographic, geological and physical features, Mizoram is vulnerable to all-major natural hazards such as Cyclone, Earthquake, and Landslide etc. The State is also under constant threat of cloud burst and landslide disasters as more than 71% of the total area are in Very High to Moderate Hazard Zone. In addition, occurrence of biological disasters and other technological/human caused hazards such as transportation accidents, forest and urban fires, flash floods, animal disasters etc. are common in the State. The present study aims at identifying various natural hazards which can affect the state of Mizoram.

Introduction: Vulnerability is defines as “The extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the impact of a particular hazard, on account of their nature, construction and proximity to hazardous terrain or a disaster prone area”. It is a concept which describes factors or constraints of an economic, social, physical or geographic nature, which reduce the ability of a community to prepare for and cope with the impact of hazards. Hazards may be defined as “Phenomena that pose a threat to people, structures or economic assets and which may cause a disaster. They could be either man made or naturally occurring in our environment. It is also describe as

‘any phenomenon, substance or situation, which has the potential to cause disruption or damage to infrastructure and services, people, their property and their environment’. A disaster occurs when hazard interacts with vulnerability and disasters affect population where there is physical, infrastructural, environmental or socio-economic vulnerability.

Mizoram is one of the North Eastern States of India, located in 21°56' and 24°31' N latitude and 92°16' and 93 ° 26' E longitudes with the geographical area of 21,081 sq. km having population of 10,91,014. It is bounded by Bangladesh and Tripura state, India in the West and Myanmar in the East and South; Manipur and Assam state, India in the North. Owing to its geographic, geological and physical features, Mizoram is vulnerable to all-major natural hazards such as Cyclone, Earthquake, and Landslide etc. The present study aims at identifying various natural hazards which can affect the state of Mizoram.

1. VULNERABILITY TO EARTHQUAKE:

The State forms a part of the most severe seismic zone in the country, namely Zone V of Seismic Zone Map of India that is referred as Very High Damage Risk Zone. A large number of moderate to large magnitude earthquakes have occurred within the State boundary as well as within 100 kms distance around it.

Every year seismic observatories record about 200 earthquakes of varying intensities with epicenters in or around the North East India. Most of these quakes do not cause any damage and generally go unnoticed, although the cumulative effects of such a large number of shakes on the stability of the hilly slopes and soil erosion has escaped serious scientific investigations. On an average 1.3 earthquake every year are recorded 6+ in the Richter scale and each one of these could be potentially dangerous if this had shallow depths or located near human settlements.

With complex tectonic and geological set up of the region and intense continental convergence of the northward moving of Indian plate at the rate of 45 - 55mm/year (*i.e.* 4 – 5 cm/yr), mega earthquake of magnitudes 8 and above have occurred in the past (1897 and 1950) and are bound to occur again, although given the state of our knowledge it is difficult to predict when, where and how much force it will shake.

In recent years, Mizoram have experienced minor but significant earthquake as follows :

a). **29th January, 2014 (Wed)** 7.16 PM, 5.1 magnitude quake measured on the Richter Scale at a depth of 33 km with epicentre in 93.9 E Longitude and 23.9 N Latitude in Manipur along the international border with Myanmar jolted the Manipur-Myanmar border but there was no report of any damage or casualties. The tremor was felt in neighboring Mizoram, Meghalaya, Nagaland, Assam, Arunachal Pradesh and Tripura.

b) **20th November, 2014 (Thu)** 11.44pm, 5.4 magnitude at a depth of 12 kms, Myanmar- India Border Region, located at 23.48N latitude ; 93.49 E longitude which is 83 km E of Aizawl, the capital of Mizoram and 74 kms E of Serchhip only

c) **4th January, 2016 (Mon)**, 4:36 am, 6.7 magnitude at a depth of 39 kms, 24.93N latitude; 93.55E longitude in Tamenglong, a neighboring state of Manipur which kills 8peoples, injuring 110 persons and destroying property worth 20 crores in Indian currency. This tremors is strongly felt in the whole Mizoram State as well.

2. VULNERABILITY TO LANDSLIDE :

Mizoram, being a hilly terrain is prone to landslides. Every year a number of landslides have been reported from various localities. This causes a lot of misery to the public resulting in loss of life and property, disruption of communication network and also economic burden on the society. This is primarily attributed to high slope and relief, immature geology, neo-tectonic activity, heavy rainfall and unplanned and improper land use practice in the state. In 1992, 9th August, landslide involving complete collapse of a stone quarry of 300m length and 250m thick at South Hlimen locality claimed 66 lives and 17 houses were destroyed. In 1993, Aizawl Venglai, Ramthar and Armed Veng localities were sinking, that caused severe damage to 65 houses. Since 1991, there was a long-line crack at Hunthar locality alongside Aizawl to Sairang road (National Highway 54), this road subsidence is recurrent in nature disturbing the main lifeline of the state

capital Aizawl and the whole state till date. In May, 2011, massive “Ngaizel Landslide” stranded the national highway for many days.

On 11 May 2013 (Saturday) early morning around 3.24 A.M, a rockslide occurred at the confluence of Laipuitlang and Ramhlun Venglai locality located between $23^{\circ}44'60''$ N & $92^{\circ}43'16''$ S i.e at the eastern side of Aizawl, Mizoram at 1120 m above mean sea level. 17 persons were died and 8 persons were rescued by the State Disaster Response Force. The rockslide completely destroyed 15 houses (7 RCC buildings and 8 Assam type buildings) including community hall and an evacuated 4 storeyed RCC building of Public Works Department (PWD) of Mizoram. Seventeen vehicles, including eight four-wheelers, have been buried under the debris.

3. VULNERABILITY TO CYCLONES/WINDSTORM:

The speed of windstorm in the whole State is 55m/s (198 km/h) which is the highest value specified in the country. In such events weakly built homes of wood, bamboo, thatched etc, as in Category X in *Vulnerability Atlas of India, 1997 Mizoram* and sloping roofs such as thatched and tiles and those of AC sheet and Corrugated Galvanised Iron (CGI) sheet roofs which are not fully anchored and integrated suffer much damage. The damages which occur in such high winds usually are of localised nature.

During the summer, the Sub-tropical high pressure belt and the thermal equator are displaced northward in response to the changing pattern of heating of the earth. From the ocean, particularly from the north Indian Ocean or Bay of Bengal, they move towards the land mass and blow over the Asian continent. These are called South-West monsoon and they usually reach Mizoram between May and October. The summer monsoon is characterised by highly variable weather with frequent spells of drought and heavy rains. Besides this, the winter monsoon also prevails, which is a gentle drift of air in which the winds generally blow from the north east. This retreating monsoon causes sporadic rainfall especially in Mizoram and other north eastern States, sometimes producing heavy cyclonic rains. Mizoram is vulnerable to the impact of tropical cyclone which develops in the North Indian Ocean (Bay of Bengal) and the cyclones of the post

monsoon season (October to December) are more intense than those of pre monsoon season (April & May). Cyclones are associated with strong winds, torrential rains and storms. The impact of cyclone/windstorm and hailstorm has often led to damage houses, power line cut-off, blockage of road, damage to crops and plantation, loss of live stocks, etc.

4. VULNERABILITY TO CLOUDBURST:

Cloudburst may be defined as an extreme form of rainfall, sometimes mixed with hail and thunder. Rain from a cloudburst is usually of the shower type with a fall rate $\geq 100\text{mm}$ (3.94inches)/hour. The rainfall may be less than this rate but if it rained continuously for a longer duration, it can have serious consequences. This kind of phenomena was recorded in 1929 – where it rained continuously from 1 – 10 June, 1929 resulting in large no. of Landslide all over Mizoram, thus the year 1929 was known as Minpui Kum (Year of Landslide). In 1995, in Saiha and Lawngtlai District, extensive rain was recorded for 7 days, commencing from 11th May with maximum rainfall recorded on 16th and 17th May which cause landslide as the soil get saturated. This caused large scale destruction of houses and blockade of roads to both Saiha and Lawngtlai towns. 150 houses were totally damaged and 20 people lost their lives in Saiha town alone. In Lawngtlai town, 72 houses were totally damaged and 14 people lost their lives. Heavy landslide totally disrupted internal town communication in Saiha and Lawngtlai. No vehicle could initially move including light vehicles. As such, Saiha and Lawngtlai towns were cut off from the rest of the State for more than a week. Apart from destruction to properties/assets, the incessant rains and soil erosion has caused heavy loss to standing crops and also damage to permanent cultivable land including terrace/WRC and horticulture crops. The extensive damages within a short span of time might have been triggered by heavy continuous downpour with magnitude 5.8 richter scale earthquake having epicenter in nearby Myanmar in the early hours of 17th May, 1995.

5. VULNERABILITY TO BIOLOGICAL HAZARDS:

Bamboo Flowering : Bamboo flowering is the main biological hazard causing famine in Mizoram which occurs in a cycle of about 48 years interval. Mizoram has a large expanse of bamboo forest which covers about 6446 sq.kms. This area represents about 31% of the total geographical area of the state. About 26 bamboo species are found in Mizoram. Among these, *Melocanna baccifera* (*Mautak*) accounts for about 90% of the bamboo found. According to history, Mizoram has experienced gregarious flowering of *Melocanna baccifera* and *Bambusa tulda* at a cycle of 48 years interval. The incidence of flowering of bamboo in Mizoram has been accompanied by severe famine which is called *Mautam* in Mizo due to flowering of *Melocanna baccifera* in a cycle of about 30 years and *Thingtam* due to flowering of *Bambusa tulda* in a cycle of about 18 years after *Mautam*. Documents regarding bamboo flowering and accompanying famine are scanty. Records from the British Raj indicate that Mizoram suffered famine in 1862 and again in 1911, after the region witnessed similar bamboo flowerings. In each case, the records suggest that the flowering of the bamboo leads to a dramatic increase in the local rat population. The increase led to raids on granaries and the destruction of paddy fields, and subsequently to a year-long famine. As already experienced in the last *Mautam* in 1958-59, in the latter part of 2005, bamboo started flowering and the increase in rat population had been occurred in the month of August 2006, where early maturing variety of paddy was destroyed by the rats covering the whole bamboo growing areas of the state by late 2007. In many instances, farmers were shocked to find their total harvest devoured by rats overnight. It has been estimated that in 2006, 56.85% of the expected harvest was lost due to rodents. The rodent outbreak affected 91,892 families in 769 villages; due to this reason the villages in the rural areas have been facing acute shortage of food supply. Rats not only attacked paddy crops, but also cash crops like ginger, turmeric, sugarcane, chilies, etc. The sericulture industry has also been affected as rats did not miss the silk worms.

According to the Govt. records in early 2008, for annual crops, perennial crops and sericulture combined, there have been 1.4 lakh families affected due to *Mautam* and their calculated monetary losses have been recorded at 63,641.35 lakhs. Among the eight districts of Mizoram, Mamit district has recorded the highest percentage of loss at 99.34% for paddy and annual crops. Aizawl District being the lowest is at 49.73%. For perennial crops, Kolasib recorded 100% loss while lowest percentage of loss is Aizawl district with 46.39%.The sericulture

industry has also recorded an average percentage of loss for all districts at 71.84%. Thus we can see that the whole state has been affected by *Mautam 2007*. It can be assume that *Bambusa tulda* will flower again in 2023 – 24.

CONCLUSION :

Thus, it may be concluded that the state of Mizoram is vulnerable to various natural hazards. Knowing these, the state government takes various mitigation, prevention and preparedness measure and also undertakes different response and rehabilitation activities. Capacity building activities and mass awareness activities were also taken up. But with limited man and material resources, lack of coordination among various agencies, economy and ignorance of the people like anthropogenic activities resulting in landslide, use of substandard building materials, settlement in vulnerable areas etc., satisfactory achievement is impracticable. There are long ways to achieved disaster resilient Mizoram state.

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