

VULNERABILITY OF MIZORAM UNDER CURRENT CLIMATE CONDITION

Climate change has become one of the most talked and debated topic of the century. This is due to the increasing rise in the level of greenhouse gases (GHG) in the atmosphere which warms the earth's temperature significantly since the Industrial revolution. In order to combat against climate change, two options arises *viz.*, Mitigation and adaptation. *Mitigation* implies reduction of GHG emission at source point while *adaptation* deals with coping up and adjusting our ways of living with the changing climatic conditions.

In order to deal with the changing climatic condition, the best option is to be prepared and adjust ourselves to adapt to such change. However, in order to adapt to such change(s) the concept of vulnerability is the crux for successful implementation of the programme. Climate Change 2014: Impacts, Adaptation and Vulnerability - has been prepared by the Working Group II of the Intergovernmental Panel on Climate Change (IPCC) which detail the impacts of climate change that have already occurred, the future risks from a changing climate, and scope of reducing these risks. The report conceptualizes *Vulnerability* as the propensity or predisposition of a system to be adversely affected¹.

Assessing these vulnerability enables practitioners and decision makers to identify the most vulnerable areas, sectors, social groups and to develop targeted climate change adaptation options for specific context.

The Himalayas are highly vulnerable to climate change impacts. This high vulnerability stems from the peculiar high mountain topography and from the higher than global average warming in the mountains including in the Himalayas. At the same time the Himalayas are the store house of the third highest amount of frozen water on earth and are therefore critical for the water security of the region. Realizing the high vulnerability of the Himalayan region, the Government of India launched the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) coordinated by Department of Science & Technology, New Delhi, Government of India. Under this mission State Climate Change Cell has been established in the Twelve States of the Indian Himalayan Region (Jammu & Kashmir, Uttarakhand, Himachal Pradesh, West Bengal, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura).

For this assessment studies, Methodology comprising of a common framework encompassing all these 12 States has been developed by Department of Science & Technology, in collaboration with Swiss Agency for Development and Cooperation (SDC), Indian Himalayas Climate Adaptation Programme (IHCAP), Indian Institute of Technology (IIT) Mandi, Indian Institute of Technology (IIT) Guwahati and Indian Institute of Science (IISc) Bangalore. Based on this methodology developed, the current Vulnerability Assessment was carried out using various Biophysical and Socio-economic parameters as indicators for vulnerability.

The Vulnerability Assessment Methodology is carried out by selecting four major indicators which by themselves contains sub-indicators along with their individual assigned Weights based on which the twelve Himalayan States are compared with each other (*detail methodology available here*)².

Table 1. List of Indicators and Sub-indicators

INDICATORS	SUB-INDICATORS
Socio-economic, demographic status and health	Population Density
	Percentage marginal farmers
	Livestock to human ratio
	Per Capita Income
	Number of Primary Health Centre per 100,000 households
	Percentage of women in overall workforce
Sensitivity of agricultural production	Percentage area irrigated
	Yield variability of food grains
	Percentage area under horticulture crops
Forest Dependent Livelihoods	Percentage area under open forests
	Area under forests/1,000 rural households
Access to information services and infrastructure	Percentage crop area insured under all Insurance Schemes
	Percentage farmers taking loans
	Average person days per household under MGNREGA
	Average Percentage area with >30% slope
	Road density

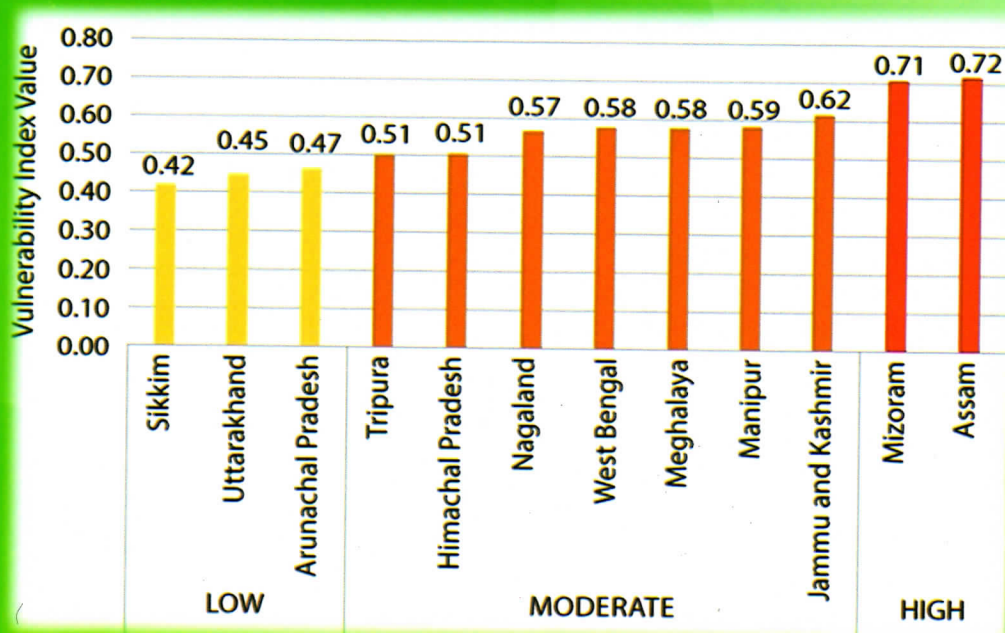
STATE LEVEL VULNERABILITY INDEX

The Vulnerability index value for the four main indicators and the composite vulnerability indices along with their corresponding ranks are provided in Table 2 & 3. Based on the composite vulnerability indices values of the common set of indicators selected reveal that the vulnerability index is the highest for Assam (0.72) and Mizoram (0.71), followed by Jammu & Kashmir (0.62), Manipur (0.59), Meghalaya and West Bengal (both 0.58), Nagaland (0.57), Himachal Pradesh and Tripura (both 0.51), Arunachal Pradesh (0.47), Tripura (0.45). Sikkim is the least vulnerable state with the index being 0.42.

Table 2. Vulnerability Index Values, Composite vulnerability index values and corresponding ranks of IHR states.

State	Vulnerability Index Values of the Four main Indicators				Composite Vulnerability Index	Ranking of the States
	Social economic, demographics status and health	Sensitivity of agricultural production	Forest dependent livelihoods	Access to Information Services and Infrastructure		
Assam	0.80	0.62	0.83	0.60	0.723	1
Mizoram	0.45	0.92	0.79	0.82	0.715	2
Jammu & Kashmir	0.69	0.41	0.72	0.69	0.619	3
Manipur	0.52	0.57	0.83	0.49	0.588	4
Meghalaya	0.57	0.56	0.65	0.58	0.583	5
West Bengal	0.89	0.07	0.88	0.45	0.581	6
Nagaland	0.38	0.55	0.77	0.74	0.570	7
Himachal Pradesh	0.44	0.50	0.59	0.57	0.510	8
Tripura	0.81	0.34	0.45	0.27	0.507	9
Arunachal Pradesh	0.32	0.61	0.03	0.99	0.466	10
Uttarakhand	0.58	0.30	0.48	0.39	0.449	11
Sikkim	0.35	0.46	0.38	0.54	0.422	12

However, it is important to note that all these states are vulnerable to climate risks and the fact that vulnerability is a relative measure which implies that this assessment does not portray Assam and Mizoram as having a high vulnerability in an absolute sense (Fig 1). It also does not imply that the mentioned indicators/drivers are the only indicators/drivers of vulnerability of the mentioned states. These states are most or least vulnerable in comparison to the other IHR states, and that each state may have several inherent drivers of vulnerability that needs to be addressed. Such issues may be resolved at district-level vulnerability assessment.

Table 3. Vulnerability index ranking of IHR states.

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Drivers of vulnerability are determined based on the performance of the indicators selected to generate the vulnerability indices. The indicator(s) or sub-indicator(s) with lower scores are considered to be the main drivers of vulnerability in the 'current' climate condition.

Drivers of vulnerability

As depicted in Fig 1, Assam (0.72) and Mizoram (0.71) are the top vulnerable states in comparison to the IHR States, the major drivers of vulnerability under the current climate conditions are highlighted herein.

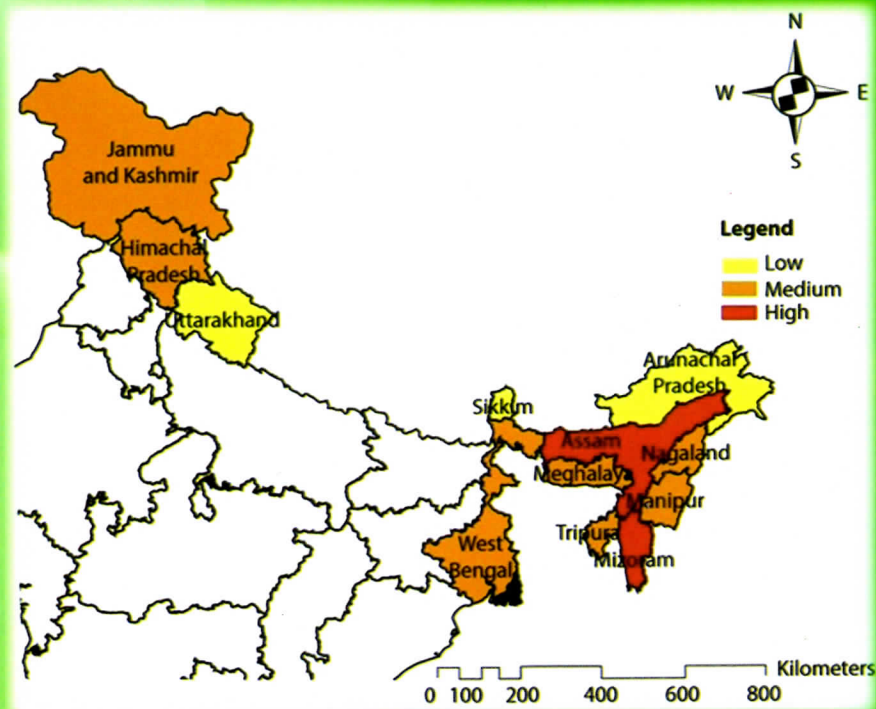


Fig 1. Vulnerability index map of IHR states.

Mizoram have a high sensitivity in agricultural sector with respect to future climatic variation. The agricultural yield variability is the highest among the 12 IHR states. This is further compounded by zero crop insurance availed by the farmers in times of crop failure. Mizoram in spite of having one of the highest forest cover in the country has the largest area under open forest in comparison with the 12 IHR states and hence more vulnerable. Moreover, being a rugged mountainous terrain has the largest area under slope >30% which make agricultural activities much more challenging than rest of the IHR states. Mizoram also doesn't fare well in terms of irrigation having the second lowest area under irrigation. Being situated in the extreme corner of the country and having 2 international boundaries, Mizoram still lag behind in terms of road connectivity and access to services and infrastructures. It holds the third lowest road density position among the 12 IHR states. The present assessment represented in the vulnerability index values to the indicators shows that agricultural sensitivity and lack of accessibility are the two main drivers leading to the state being at the top most vulnerable states in the IHR.

However, the above report is based on indicators for which data is commonly available for all the 12 IHR states and hence may not fully illustrate the state specific conditions per se. Moreover, the data collected for this report are based from different sources (e.g. Census 2011, Statistical Abstract of Mizoram, NHM_HMIS, MIRSAC, etc.) and are of different time period, as such further vulnerability assessment is required upon availability of more updated data of the indicators.

WAY FORWARD

The vulnerability assessment reported here are primarily based on Tier I approach i.e. through secondary data which are commonly available for all the IHR states. Future assessments at district level is to be taken up by Mizoram State Climate Change Cell (SCCC) for the state of Mizoram following Tier II and Tier III approach involving greater consultation with the stakeholders. The SCCC also plan to carry out vulnerability assessment for different sector in the future at various levels.

Contributing Team (Mizoram):

- » Dr. R.K. Lallianthanga : Chief Scientific Officer & Member Secretary, Mizoram Science, Technology & Innovation Council (MISTIC)
- » Mr. Samuel Lalmalsawma : Senior Scientific Officer, MISTIC
- » Mr. Lalthanpuia : Scientist 'B', MISTIC
- » Dr. James Lalnunzira Hrahsel : Project Scientist, MISTIC
- » Dr. John Zothanzama : Assistant Professor, Mizoram University
- » Mr. F. Lalbiakmawia : Assistant Hydro-Geologist, Public Health Engineering
- » Dr. Carmelita Lalchhanhimi Pachuau : Horticulture Extension Officer, Directorate of Horticulture
- » Dr. Lalnunluangi : Medical Officer (Planning), Directorate of Health Services
- » Mr. C. Lalnithanga : Deputy Director, Plant Protection, Directorate of Agriculture
- » Mr. Lalchhanhima : Deputy Director, Land Resources, Soil & Water Conservation Department



Pic 1. Contributing team from Mizoram with Prof. N.H. Ravindranath (IISc. Bangalore, main Resource Person) during Methodology Workshop at IIT Guwahati on 10th-14th September, 2018

References:

1. <https://www.ipcc.ch/report/ar5/wg2/>
2. <http://www.dst.gov.in/document/reports/climate-vulnerability-assessment-indian-himalayan-region-using-common-framework>

Source:

**Mizoram State Climate Change Cell,
Mizoram Science, Technology &
Innovation Council (MISTIC)**