

STAKEHOLDER CONSULTATION PROCEEDINGS

30th September, 2020

Supported by:

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under

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GoI)





Prepared by:

Integrated Research and Action for Development (IRADe)



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"Developing Disaster Resilience Action Plan through GIS and Prioritizing the Actions for Natural Disaster Risk Reduction for Urban Agglomerations of Shillong and Gangtok"

Supported by: National Mission on Himalayan Studies (NMHS), under Ministry of Environment, Forest and Climate Change, Government of India (MoEFCC, GoI)

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We are particularly thankful to Prof. **Vinod Sharma**, Vice-Chairman, Sikkim State Disaster Management Authority (SSDMA) for being the **Chief Guest** and **Mr P N Sherpa**, Relief Commissioner –Cum-Secretary Land Revenue and Disaster Management Department, Govt. of Sikkim, Dr. P L N Raju, Director, NESAC for being the **Guest of Honour** for this event.

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Mr Rohit Magotra

Deputy Director, IRADe

Prof. Ajit Tyagi Senior Advisor, IRADe

Project Partners	
NMHS National Mission on Himoloyan Studies	National Mission on Himalayan Studies, NMHS Ministry of Environment, Forest & Climate Change, MoEFCC, GoI
Integrated Research and IRADe Action for Development	Integrated Research & Action for Development, IRADe
	North Eastern Space Application Centre, NESAC
G.B. Pant National Institute of Himalayan Environment'(NIHE)	GB Pant National Institute of Himalayan Environment (NHE)
Supporting/ Collaborati	ingOrganization
	Sikkim State Disaster Management Authority
THE SURFECTION OF THE SURFECTI	Geological Survey of India (GSI), Gangtok
	India Meteorological Department (IMD), Gangtok
	Gangtok Municipal Corporation, GMC

Project & Workshop Partners









Table of Content

1.	Int	roduction	1
2.	Ba	ckground	2
	2.1	Need of the stakeholder's workshop	3
3.	De	veloping Disaster Resilience Action Plan, Gangtok	4
	3.1	Inaugural Session	4
4.	Ses	sion 1: Disaster Resilience Action Plan: Methodology & Project Out	8
	4.1	Disaster Resilience Action Plan: Key Strategies	8
	4.2	Hazard & Risk Mapping, Gangtok	10
	4.3	Impact of Urbanization on Gangtok city	10
5.	Rej	lection on the Disaster Resilience in Gangtok city	10
	5.1	Suggestion & Recommendations	12
6.	Par	ticipation in the Stakeholders Consultation	13
A	nnexu	re	14
	Annex	xure 1: Workshop Agenda	14
	Anney	xure 2: Workshop Flyer	16
	Anney	xure 3: Media Coverage	17
	Anney	cure 4: List of Participants	21









1. Introduction

India is geographically located in the high disaster-prone region and has been continuously impacted by natural disasters like floods, cyclones, landslides, earthquakes, heatwaves and Tsunami. **27 out of 35 states** and union territories are prone to these types of hazards. Over the past thirty years, earthquakes have accounted for 34.8% of total deaths by natural disasters. **During 1980-2010, India has experienced nearly 431 natural disasters killing around 0.00014 billion people and affecting around 150 million people, with an estimated economic loss of USD 48.06 billion.¹, ².**

Global Climate Risk Index report 2019, had stated India as the 14th most vulnerable country in the world due to extreme weather-related events, with around 2,736 lives lost in 2017 due to disasters. The **Global Climate Risk Index report 2020³**, ranks India 5th in 2018 in the global vulnerability ladder, with a highest recorded number of fatalities due to climate change and the second-highest monetary losses from its impact in 2018. India's high rank is due to severe rainfalls, followed by massive flooding and landslides that killed over 1000 people.

Indian Himalayan region covers 16% of India's total geographical area, spread over 12 states⁴. **Himalayan Region (IHR) is considered to be vulnerable to a variety of natural disasters like earthquakes, floods, landslides and forest fires etc.** According to the United Nations-affiliated organization and Planning Commission, the **Himalayan region, on an average is hit by 76 disasters, killing 36,000 people and affecting 178 million people every year⁵.** Nepal-based International Centre for Integrated Mountain Development claimed that India's Himalayan region was hit by **532 natural disasters between 1990-2012**¹⁰.

Gangtok, capital of Sikkim, is located in the North-Eastern part of India. Unplanned urbanization and rapid construction in hill slopes have aggravated and increased the risk of environmental degradation in Gangtok. Urban sprawl, urban expansion followed by extensive tourism activities has led to the rapid destruction of green infrastructure. Gangtok has witnessed a substantial change in land use pattern due to rapid urbanization which has increased to four times over a span of almost 30 years, i.e. 2.94181 sq. km to 12.8144 sq. Km from 1978 to 2014 (Chhetri, Ajay. et al., 2014). **Gangtok, like other NE cities, is prone to multi-hazards like earthquake, floods and landslides.**

⁴ http://gbpihedenvis.nic.in/indian_him_reg.htm

⁵https://www.hindustantimes.com/india/himalayan-region-recipe-for-disaster/story-CO2BLfaLMRQNumz5LeUIqJ.html

¹Disaster Management in India, Ministry of Home Affairs, GoI, *EM-DAT: The OFDA/CRED International Disaster Database*

²https://www.thehindubusinessline.com/opinion/india-is-not-prepared-for-natural-disasters/article30463153.ece ³https://economictimes.indiatimes.com/news/environment/global-warming/india-ranks-5th-in-global-climate-riskindex/articleshow/72367505.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst









2. Background

North-East (NE) India is vulnerable to natural and man-made disasters because of its location in the Eastern Himalayan periphery, its fragile geo-environmental setting and economic underdevelopment. The vulnerability of the entire NE region due to earthquake, floods and high wind velocities is very high. The seven states of NE region lie in Seismic Zone V, and Sikkim lies in Zone IV which poses serious threats to life and property

Physical risks and vulnerabilities posed by disasters in the Himalayan cities are often accompanied by a lack of necessary resources – financial, human and institutional – as well as access to relevant scientific information to cope with them. It is virtually impossible to prevent the occurrence of natural hazards, but it is possible to contain and prevent them from turning into disasters. It is imperative to concentrate on minimizing and mitigating the magnitude of the damaging effects of disasters by undertaking plausible disaster risk reduction measures through better scientific tools and knowledge and taking steps to build the resilience of the citizens, especially vulnerable communities. Thus, there is a need for a **systematic review to collect evidence related to the impact of urbanization on disaster risk and vulnerability to natural disasters in the Indian Himalayan region.**

Under the project *Developing Disaster Resilience Action plan through GIS and prioritising actions for Natural Disaster Risk Reduction in Urban Agglomerations of Shillong & Gangtok* supported by *National Mission on Himalayan Studies (NMHS), under Ministry of Environment, Forest and Climate Change Government of India (MoEFCC, GoI), IRADe with partner organizations North Eastern Space Application Centre (NESAC) and GB Pant National Institute of Himalayan Environment (GBPNIHESD-SRC)* aims to develop Disaster Resilience Action Plan for Gangtok city.

The **Objectives** of the project are:

- To develop maps at the scale of 1:4000 and map the hazard/disaster wise vulnerable zones of the Shillong and Gangtok urban agglomerations
- To identify and map critical infrastructure at risk through ground surveys telecommunication, emergency operation centres, shelter, slums, hospitals, schools etc. on maps of 1:4000.
- To develop a disaster resilience action plan for the identified cities and prioritize actions for disaster risk reduction through multi-stakeholder consultations involving citizens, government, public and private sector.
- To spread awareness and capacity building of citizens, city, district and state authorities on disaster resilience of the North East Region Cities.

Following **Outputs** are envisaged from the project:

• Land use/land cover maps of NE cities at cadastral scale 1:4000









- Disaster wise Vulnerable zone maps of identified cities
- Vulnerability assessment of selected NE cities to natural disasters
- Critical infrastructure risk mapping of identified cities
- Disaster resilience plans for the two NE cities
- Capacity building of the city, district and state authorities on disaster resilience.

2.1 Need for the stakeholder's workshop

Integrated Research and Action for Development (IRADe) in collaboration with Sikkim State Disaster Management Authority (SSDMA) organized a Stakeholders' workshop on "Developing Disaster Resilience Action Plan, Gangtok city, Sikkim".

As a part of the Project's broad objectives, it was intended to deliberate the development of a disaster resilience action plan for the city with a diverse set of stakeholders through this workshop. The objectives of the workshop included:

- Discussion on the Key Strategies adapted to draft Disaster Resilience Action Plan
- Hazard and Risk Mapping at the scale of 1:4000, while mapping the hazard/disaster wise vulnerable zones of the Gangtok urban agglomerations.
- Study of the Impact of Urbanization



3. Developing Disaster Resilience Action Plan, Gangtok

3.1 Inaugural Session



Prof Jyoti K Parikh, Executive Director IRADe



Prof. Ajit Tyagi, Senior Advisor,IRADe

Prof Jyoti K Parikh, Executive Director of IRADe, welcomed the speakers while emphasising on the importance of Disaster resilience in the vulnerable North Eastern Himalayan cities. She highlighted that the use of Remote sensing and GIS is crucial to develop action plans which help in emergencies and disasters. She explained that the ongoing Action Plan for Gangtok focuses on ward level resilience and can be a good case study for other Himalayan cities.

In the opening remarks, **Prof. Ajit Tyagi**, Senior Advisor, IRADe, presented a brief overview of the project '*Developing Disaster Resilience Action plan through GIS and prioritising actions for Natural Disaster Risk Reduction in Urban Agglomerations of Gangtok*' to set the context of the ongoing project in Gangtok and moderated the panel discussion on developing Disaster Resilience Action Plan for Gangtok City.

He introduced the partner organization NESAC and GBPNIHESD-SRC and other knowledge partners IIT-G, GSI, NDR, SSDMA and explained the deliverables/overall achievements made under the

project against the set objects, like Land use land cover maps at the scale of 1:4000, critical infrastructure mapping, identification of urbanization induced vulnerable areas, mapping the impact of urbanization on natural eco-system for last 40 years, primary and secondary survey at ward levels, Rapid Vulnerability Assessment, draft Disaster resilience Action Plan, along with state-level workshops, consultation meetings and likewise.





Dr. P L N Raju, Director, North Eastern Space Application Centre (NESAC)



Prof. Vinod Sharma, Vice-Chairman, Sikkim State Disaster Management Authority (SSDMA)

Dr P L N Raju, Director of NESAC, highlighted the importance of GIS and Remote sensing mapping. He stressed on the need for a mechanism to update the latest data from time to time as cities are growing faster. He concluded by affirming the future assistance of NESAC to the government and the local communities to provide a comprehensive solution to tackle Disaster risks in Gangtok and other cities. He emphasised that the application of this project will be most important for the local communities and disaster resilience strategies should reach to authorities and capacity building for disasters resilience should be available for all at the click of a button.

(NESAC

Prof. Vinod Sharma, Vice-Chairman, Sikkim State Disaster Management Authority (SSDMA) was the <u>Chief Guest</u> and appraised the much-needed study carried out by IRADe and partner organizations. He stressed that more such collaborations between Research organisations and Government is the need of the time.

Prof. Sharma gave examples of the 2011 earthquake, tremors being recoded even on the Disaster Risk Reduction Day, 2020 and 2012 while speaking about Natural Disasters in Sikkim like earthquakes, landslides and forest fires. Entire North-eastern region is vulnerable to hazards and technology (GIS & Remote Sensing) plays an important role to understand and mitigate such disasters.

Gangtok Vulnerability maps prepared 10-12 years back on the scale of 1:50,000, are not that useful as maps prepared on the scale of 1:4000, which will be of great use in planning disaster resilience. Delhi has micro-zonation maps for individual wards which can be adopted for Gangtok city too.

Prof. Sharma enumerated the activities/projects carried out by SSDMA under the Sikkim Govt. *Hazard Risk Vulnerability Analysis of 4 districts*, conducted by *TARU*. The documentation, however, was restricted at district level; hence there is a need for city-level study (especially for small towns like Namchi & Jorthang, etc.).

He highlighted that the Mayor, Municipal Commissioner and other state administrators are sensitive about incorporating resilience actions in the implementation plans of the city. He assured that such extensive study would prove to be of great use in the planning stage for the state and Municipal Corporation of SSDMA to develop Action Plan. He suggested forming a committee of experts so that similar plans can be proposed for other cities based on the ongoing project model. He indicated that the Sendai Framework itself enlist the target of Knowing Risk, which forms the base for planning and developing an action plan in accordance with that. Such technology (GIS and Remote Sensing) will



help understanding Risks, as we know about the Disasters and its occurrence and impact; however, Risk cannot be calculated without such studies.

He suggested that Gangtok comprising of 17 wards and 63 villages is a unique type of urban-rural mixed agglomeration, hence while developing a Disaster Resilience Action Plan for the city, one needs to consider numerous aspects of the city. Along with the implementation of the plan, a good team of SSDMA officials, GMC officials is required.

For Capacity Building, the Govt. officials including those working at the grass-root level, need to be trained and exposed to the planning as they will be responsible for the dissemination and implementation of the Action Plan.



Mr P N Sherpa, Relief Commissioner –Cum-Secretary Land Revenue and Disaster Management Department, Govt. of Sikkim)

Mr P N Sherpa, Relief Commissioner –Cum-Secretary Land Revenue and Disaster Management Department, Govt. of Sikkim, was the <u>Guest of Honour</u>, for this workshop. Mr Sherpa stated that Sikkim State Disaster Management Authority under Land Revenue and Disaster Management Department of the State, and under the guidance of Vice Chairman, Prof Vinod Sharma has always been on the forefront to build up the disaster resilience capacity of the State and are giving utmost priority on embracing latest technology tools like GIS for further strengthening the capacity building.

Gangtok is one of the fastest-growing metropolises in the country as it is one of the tourist hotspots in the world. With this pace of urbanisation, it can be anticipated that there are numerous challenges to keep citizens safe in case of an unforeseen disaster.

6

Mr Sherpa stated that Climate change is a major challenge for the Himalayan State of Sikkim that faces large scale climate variability and is most vulnerable to climate-mediated risks. The geo-environment of Sikkim is increasingly getting more susceptible to a number of impacts that include soil erosion, landslides, prolonged dry spells, glacier recession, erratic precipitation, extreme climate events and rapid loss of habitats and biodiversity.

The State is also prone to earthquakes, landslides, cloudbursts, flash floods, avalanches, as well as droughts. Sikkim thus faces the twin challenges of dealing with extreme weather-related disasters (such as GLOF and Forest Fire) and adapting to the impacts of climate change as well. An appropriate, effective and efficient response is imperative for the integration of both disaster risk management and climate change adaptation.

He also stated that following the 2011 Sikkim Earthquake, the State Disaster Management Authority has been taking an active role in preparedness. India's Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) also reiterates the importance of linking disaster risk reduction, adaptation and lays emphasis on "an urgent need for



finance to undertake activities for the early warning system, disaster risk reduction, loss and damage and capacity building at all levels". The Sendai Framework for Disaster Risk Reduction 2015-2030 – the global blueprint for disaster risk reduction (DRR) offers a solution to saving lives, livelihoods and assets globally and is in conformity with the 2030 Agenda for Sustainable Development and the 2016 Paris Agreement on climate change.

While the level of disaster risk exposure can be reduced by regional and urban planning; the resilience of a society depends on physical, social and economic factors which are also the focus of sustainable development strategies

Early interventions can help save lives, mitigate suffering and significantly lower the cost of responding to the humanitarian consequences of shocks. With forecasting and communication of early warnings improving over the years, work has advanced on translating early warning into early action.

Mr Sherpa informed that Land Revenue and Disaster Management Department has started the Cadastral Re- Survey for the entire State. The Cadastral Survey is being carried out under the Digital India Land Record Modernisation Programme, a flagship programme of Government of India. This Cadastral Survey is being undertaken with the latest Survey equipment on a GIS platform, and the data being mapped and collected shall be pivotal for developing GIS-based Disaster risk and hazard models for the entire State.

He apprised IRADe and co-stakeholders for taking the initiative for developing the Disaster Resilience Action Plan for Gangtok, and for the considerable progress made so far; assuring SSDMA's continued support and cooperation.



4. Session 1: Disaster Resilience Action Plan: Methodology & Project Out

In this session, *IRADe*, *NESAC and GBPNIHESD-SRC* elaborated on the results and findings of the project in developing the Disaster Resilience Action Plan for Gangtok

4.1 Disaster Resilience Action Plan: Key Strategies



Mr Rohit Magotra, Deputy Director, IRADe

Mr Rohit Magotra, Deputy Director of IRADe, made a thematic presentation on the features of Disaster Resilience Action Plan project progress. He initiated the discussion with the importance of Urban Resilience and need for Developing Resilient cities in Indian Himalayan Region of India.

Mr Magotra cited the importance of resilience and highlighted that the resilience action plan is based on the following approaches:

- Ward level Hazard Vulnerability & Risk Assessments
- Ward level Socio-Economic Vulnerability Assessments
- Ward level Vulnerability Mapping at the scale of 1:4000
- Mapping Critical Infrastructure
- Short, Medium & Long term Resilience Plan
- Community-level participation in planning/ Participatory planning
- Indigenous adaption and Resilience mechanism

He explained about the Rapid Climate Vulnerability Assessment framework followed by IRADe.

Mr Magotra also drew a comparative of the existing Disaster Management Plan (SSDMA) and Disaster Resilience Plan, which emphasised on the Hazard Risk Assessment for Multi-hazards at ward level and



mapping the hazards and critical infrastructures at the scale of 1:4000 to develop Short, Medium- and Long-term Disaster Resilience Strategies for the city of Gangtok.



Disaster Resilience Action Plan Vs Disaster Management Plan

The strategies included reviewing the existing Construction and Building bylaws, Zonation of Hazard susceptibility at ward level, integration of hazard mitigation plans with Land-use and Land-cover planning strategies, adaption of indigenous slope conservation technique for Slope Landscaping, developing Hazard Early Warning systems and encouraging participatory planning. Stakeholder mapping also defined the roles and responsibility of individual Government Organizations (State and City level), Urban Local Bodies and community at large. He stressed on how resilience is different from the management approach.









4.2 Hazard & Risk Mapping, Gangtok



Dr Diganta Barman Scientist/ Engineer 'SF' (NESAC)

Dr Diganta Barman, Scientist/ Engineer 'SF', NESAC, presented the work carried out by NESAC in developing Hazard Risk maps for the city of Gangtok and its Urban Agglomeration on the scale of 1:4000. So far, 18 maps for Gangtok have been prepared for Critical Infrastructure, Building footprint, Building density, Road network, Road density, Slope, Drainage, Drainage density, Aspect, Lineament buffer, Inventory buffer, Elevation, Land use and land cover, Landslide hazard zonation, Landslide inventory, Potential areas susceptible to flash flood, Inundation depth, Site Response of Earthquake. Dr Barman elaborated on the methodology adapted to map the hazard susceptibility in Gangtok city using WorldView 2/3

Satellite data at a spatial resolution of 0.46/0.31 m. He emphasised on developing critical infrastructure and building footprint maps at the scale of 1:4000 and superimposing maps like aspect, slope, drainage patter, DEM, vegetation cover, land-use to map the hazard (Landslide, Flash Flood, Earthquake) susceptible maps for Gangtok city

4.3 Impact of Urbanization on Gangtok city



Dr Rajesh Joshi Centre Head, (GBPNIHESD-SRC).

Dr Rajesh Joshi, Centre Head, (GBPNIHESD-SRC), elaborated on the work carried out by the institute and its contribution in assessing the impact of Urbanization on Gangtok city. Household surveys and Focused Groups Discussions (FGDs) were carried out, through stratified random sampling method, across 17 wards in Gangtok city, which covered nearly 738 respondents.

The survey captured people's perceptions regarding climate change over the past decades and the change in temperature and rainfall pattern experienced by individuals and impact on the hazard vulnerability. The survey analysis revealed that certain wards have become more vulnerable to hazards like landslides due to the

increase in rainfall in the recent past. Increased deforestation due to urbanization and industrialization has occurred, and water discharge sources have also decreased to a great extent. The study suggested measures for improving the quality of Early Warning System by checking the unplanned urbanization, participatory planning and capacity building for Disaster Risk Reduction.

5. Reflection on the Disaster Resilience in Gangtok city



The sessions included a panel discussion to review the work and provide recommendations. The stakeholder panelists included Mr Hem Kumar Chettri, Chief Municipal Officer, Gangtok Municipal Corporation (GMC); Mr Phigu Bhutia, Additional. Director, SSDMA; Prof. Subashisa Dutta, IIT, Guwahati; Dr Mustafa Ali Khan, Team Leader, SCA-Himalayas, Swiss Cooperation Office India; Shri Lalit Mohan, Senior Geologist, GSI-Gangtok; Dr A K Raha, Director, IMD, Gangtok; Dr Surajit Baruah, State Project Manager, UNDP; Dr Saurabh Baruah, Chief Scientist, CSIR Northeast Institute of Science and Technology, Jorhat, Assam.

The panel discussion highlighted the following points:

1. Basic & Critical Infrastructure Mapping

Prof. Subashisa Dutta, Professor at the Department of Civil Engineering, IIT, Guwahati, emphasised on the challenges faced by Gangtok due to the increasing urbanization and tourism. The city in the near future will experience vertical growth; hence it becomes necessary for geo-coding buildings, basic and critical infrastructure at ward level. Basic infrastructure like potable water supply and other basic infrastructure will become a significant issue with growing urbanization, and ULBs need to consider management plans for the same.

Dr A K Raha, *Director*, *IMD*, *Gangtok* also suggested mapping the drainage pattern, including streams and Jhora, as most of the landslides incidences are located near such streamlines.

2. Common Geo-database

At the City and State level, various activities are being carried out by the respective authorities like Sikkim State Disaster Management Authority, Land and Revenue Department, Geological Survey of India, Gangtok, SCA Himalayas and DST CC to map the hazard/ disaster vulnerability and hazard susceptible zones across the city of Gangtok. *Mr Phigu Bhutia*, *Additional Director*, *SSDMA*, indicated the Land Revenue Department of Sikkim initiative to develop Cadastral re-surveyed maps of the entire state (Digital India Modernization Programme) to make the GIS map standardized. *Dr Mustafa Ali Khan*, *Team Leader*, *SCA-Himalayas*, *Swiss Cooperation Office India*, provided details of the work SCA Himalayas, with DST CC & SSDMA, using Synthetic Aperture Radar (SAR) system to maps disaster/ hazard-prone areas. *Shri Lalit Mohan*, Senior Geologist, GSI-Gangtok, enlisted GSI's work in developing Meso-scale landslide susceptibly mapping at the scale of 1:10,000 and developing Regional Landslide Early Warning System (being tested in West Bengal & Tamil Nadu).

Hence it becomes increasingly necessary to integrate such data and develop a common database and present the same at the common platform for the use of related departments and community at large. Along with a common database, updation of the same (metrological data), meteorological and hazard inventory, is required as suggested by *Dr A K Raha*, *Director*, *IMD*, *Gangtok*

3. Training & Capacity Building

Apart from developing Action Plan, it's essential to work towards capacity building of the Urban Local Body officials and the community at large, with the provisions of ward level community and basic



infrastructure to mitigate disasters. **Mr Hem Kumar Chettri**, CEO, Shillong Municipal Board, stressed on the ground level implementation of such Action Plans and urged the need of training Municipal officials and the elected representatives on the same.

4. Action Plan Dissemination and Participatory Planning

Along with the mapping, dissemination of data and disaster management strategies at the community level is necessary. Sharing of virtual mapping and similar techniques can be considered, as suggested by **Prof. Subashisa Dutta**, Professor at the Department of Civil Engineering, IIT, Guwahati. **Dr Saurabh Baruah**, Chief Scientist, CSIR Northeast Institute of Science and Technology, Jorhat also suggested ground-level implementation of the Vulnerability Assessment and Action Plans.

Similar suggestions were provided by **Dr Surajit Baruah**, State Project Manager, UNDP, wherein Disaster management training, critical infrastructure mapping, developing disaster management team and control rooms at the community level should be considered.

5. Early Warning Systems

Mr Phigu Bhutia, Additional Director, SSDMA, and **Dr Saurabh Baruah**, Chief Scientist, CSIR Northeast Institute of Science and Technology, Jorhat stressed on the installation of all-in-all early warning systems in the highly disaster vulnerable area for early evacuation programmes. **Shri Lalit Mohan**, *Senior Geologist, GSI-Gangtok*, informed about the Regional Landslide Early Warning System (being tested in West Bengal & Tamil Nadu) and initiative being taken to implement it in other cities including Gangtok.

5.1 Suggestion & Recommendations

Some suggestions from the workshop are enlisted below:

- 1. Training and Capacity Building of the ULB Officials, elected representatives and community at large
- 2. Provision of ward level community and basic infrastructure to mitigate disasters.
- 3. Developing a common database (geo-data, survey data) platform for open access and optimal usage by city and state-level stakeholders
- 4. Developing and installing all-in-all early warning systems in the highly disaster vulnerable area
- 5. Understanding and mapping the correlation between Climate Change (meteorological data) and Hazard/ disasters (landslides, floods and earthquakes)
- 6. Geo-coding of Basic and critical Infrastructures for planning vertical urbanization
- 7. Dissemination of data and analysis at the community level
- 8. Developing Regional Landslide Early Warning System
- 9. Developing Disaster/hazard Susceptibility mapping
- 10. Assessing gaps in the finding of work being carried out to Mitigate and Manage Disasters in Sikkim
- 11. Ground-level implementation of the Vulnerability Assessment and Action Plans.



6. Participation in the Stakeholders Consultation

The consultation had a broad spectrum of Participation from various Urban Local Bodies in Gangtok, representatives and experts from Gangtok Municipal Corporation, Land Revenue and Disaster Management Department, Govt. of Sikkim, Sikkim State Disaster Management Authority, Geological Survey of India, Gangtok, Indian Meteorological Department, Gangtok, CSIR Northeast Institute of Science and Technology, Jorhat, Assam and SCA-Himalayas, Swiss Cooperation Office India.



Figure: On-line Panel Discussion (from Left to Right)

Up: Mr Hem Kumar Chettri, CEO, Shillong Municipal Board; Prof. Subashisa Dutta, Professor, IIT, Guwahati; Prof. Vinod Sharma, Vice-Chairman, SSDMA; Prof. Jyoti Parikh, Executive Director, IRADe; Prof. Ajit Tyagi, Senior Advisor, IRADe.

Down: Mr P N Sherpa, Relief Commissioner –Cum-Secretary. L R& DM Dept., Govt. of Sikkim; Mr Rohit Magotra, Deputy Director, IRADe; Dr P L N Raju, Director, NESAC; Dr A K Raha, Director, IMD, Gangtok; Dr. Mohit Kumar, Research Analyst, IRADe











Annexure Annexure 1: Workshop Agenda

Agenda

Stakeholders' Workshop on Developing Disaster Resilience Action Plan for Gangtok Date: 30th September 2020

Time	Session Details		
10:30 – 11:00 am	Inaugural Session		
	Welcome Remarks	Prof. Jyoti Parikh, Executive Director,	
		Integrated Research and Action for Development (IRADe)	
	Opening Remarks	Prof. Ajit Tyagi, Senior Advisor,	
	opening Remarks	Integrated Research and Action for Development (IRADe)	
	Special Remarks	Dr P L N Raju, Director,	
	Special Remarks	North Eastern Space Applications Centre (NESAC)	
	Address by the Chief	Prof. Vinod Sharma, Vice-Chairman,	
	Guest	Sikkim State Disaster Management Authority (SSDMA)	
	Address by the Guest of	Mr P N Sherpa, Relief Commissioner –Cum-Secretary Land	
	Honour	Revenue and Disaster Management Department	
		Govt. of Sikkim	
	Vote of Thanks	Mr Rohit Magotra, Deputy Director,	
		Integrated Research and Action for Development (IRADe)	
11:00am – 12:00 pm	Session on Disaster Resilience Action Plan: Methodology & Project Outputs		
	Disaster Resilience	Mr Rohit Magotra, Deputy Director,	
	Action Plan: Key	Integrated Research and Action for Development (IRADe)	
	Features		
	Hazard and Risk	Dr Diganta Barman, Scientist/Engineer 'SF',	
	Mapping of GangtokNorth Eastern Space Applications Centre (NESAC)		
	Impact of Urbanization		
	on Gangtok City	Dr Rajesh Joshi, Centre Head,	









Time	Session Details		
		G B Pant National Institute of Himalayan Environment and Sustainable Development – Sikkim Regional Centre (GBPNIHESD-SRC)	
12:00 – 12:30 pm	Panel Discussion		
	Panel Discussion	 Moderated by: Prof. Ajit Tyagi, Senior Advisor, IRADe 6. Mr Hem Kumar Chettri, Municipal Commissioner, Gangtok Municipal Corporation (GMC) 7. Mr Phigu Bhutia, Additional. Director, Sikkim State Disaster Management Authority (SSDMA) 8. Prof. Subashisa Dutta, Professor at the Department of Civil Engineering, IIT, Guwahati; 9. Shri Lalit Mohan, Senior Geologist, GSI-Gangtok; 10. Dr A K Raha, Director, IMD, Gangtok; 11. Dr Surajit Baruah, State Project Manager, UNDP; 12. Dr Saurabh Baruah, Chief Scientist, CSIR Northeast Institute of Science and Technology, Jorhat, Assam 13. Dr Mustafa Ali Khan, Team Leader, SCA-Himalayas, Swiss Cooperation Office India. 	
	Conclusion & Way Forward	Prof. Ajit Tyagi, Senior Advisor, IRADe	









Annexure 2: Workshop Flyer











Annexure 3: Media Coverage

1. <u>https://www.sikkimherald.info/stakeholders-e-workshop-on-developing-a-disaster-resilience-action-plan-for-gangtok/</u>

Sikkim Herald

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Stakeholders' e-workshop on Developing a Disaster Resilience Action Plan for Gangtok





Gangtok October 1st: Integrated Research and Action for Development (IRADe) in collaboration with Sikkim State Disaster Management Authority (SSDMA) organized a Stakeholders' eworkshop on "Developing Disaster Resilience Action Plan, Gangtok city, Sikkim" on 30th September. The stakeholder consultation was conducted to share the results and findings of the project on Developing Disaster Resilience Action Plan for Gangtok which is lead by a IRADe, in association









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2. <u>http://www.sikkimexpress.com/news-details/e-workshop-on-developing-a-disaster-resilience-action-plan-for-gangtok</u>

E-workshop on developing a disaster resilience action plan for Gangtok

SE Report

GANGTOK, October 2: Integrated Research and Action for Development (IRADe) in collaboration with Sikkim State Disaster Management Authority (SSDMA) organized a stakeholders' e-workshop on 'Developing Disaster Resilience Action Plan, Gangtok city, Sikkim,' on Wednesday.

SSDMA vice-chairman Prof. Vinod Sharma was the chief guest of the event also joined by P.N. Sherpa, State Relief Commissioner-cumsecretary, Land Revenue and Disaster Management department as the guest of honour, an official release informs.

IRADe executive director Prof. Jyoti K. Parikh, in her welcome address, emphasised on the importance of disaster resilience in the vulnerable North Eastern Himalayan cities. She highlighted that the use of remote sensing and GIS is crucial to develop action plans which help in emergencies and disasters. She commu

explained that the ongoing action plan for Gangtok focuses on ward level resilience and can be a good case study for other Himalayan cities. Senior advisor Prof. Ait

Tyagi gave opening remarks followed by a presentation to set the context of the ongoing project in Gangtok and moderated the panel discussion on developing Disaster Resilience Action Plan. NESAC director Dr.PLN

Raju highlighted the importance of GIS and Remote Sensing mapping. He stressed on the need for a mechanism to update the latest data from time to time as cities are growing faster. He concluded by affirming the future assistance of NESAC to the government and the local communities to provide a comprehensive solution to tackle disaster risks in Gangtok and other cities. He emphasised that the application of this project will be most important for the local

Prof. Vinod Sharma thanked IRADe for this initiative and said this is a much-needed study. A collaboration between research organisations and government organisations is the need of the time, and this project sets an excellent example of IRADe, NESAC, GBPNIHESD-SRC, GSI, SSDMA and others working together, he said. He highlighted that the State administration is concerned in incorporating resilience actions in the implementation plans of the city. He suggested forming a committee of experts so that similar plans can be proposed for other cities based on the ongoing Gangtok project model.

Relief Commissioner P.N. Sherpa informed about the latest technology tools like GIS and remote sensing used by the State government. Gangtok is one of the fastestgrowing numicipalities in India where climate change is a significant challenge. He suggested that the early warning systems for Disasters

Risk Resilience should further evolve into early actions. While the level of disaster risk exposure can be reduced by regional and urban planning, the resilience of a society depends on physical, social and economic factors that are also the focus of sustainable development strategies. He appreciated IRADe and partners for taking the initiative for developing the Disaster Resilience Action Plan for Gangtok and expressed his happiness to note that considerable progress has been made so far. He assured that SSDMA shall continue to provide support and cooperation to IRADe. Gangtok Municipal

Gangtok Municipal Corporation (GMC) commissioner Hem Kumar Chettri implied on the ground level implementation of such action plans and urged the need of training municipal officials on the same. He stressed on the capacity building of the urban local body officials and the community at large.

SSDMA additional

director Phigu Bhutia welcomed the project and requested that the database developed as part of the project should be made accessible to SSDMA for further updation. He also spoke about data interoperability and stressed that the GIS platform codes should be shared with SSDMA for replication in other towns and cities. He also added that SSDMA is planning to have a data repository for use of stakeholders and line departments. He further gave assurance that SSDMA is open for collaborations and partnerships to enhance the resilience of the State.

IRADe deputy director Rohit Magotra made a thematic presentation on the features of Disaster Resilience Action Plan project progress which was followed by presentations from Dr Diganta Barman (NESAC) and Dr Rajesh Joshi (GBPNIHESD-SRC). The stakeholder

consultation was conducted to

share the results and findings of the project on Developing Disaster Resilience Action Plan for Gangtok which is led by aIRADe, in association with North Eastern Space Applications Centre (NESAC) and G.B. Pant National Institute of Himalayan Environment (GBPNIHESD-SRC). The project is funded by National Mission on Himalayan Studies (NMHS) of the Union Ministry of Environment, Forests and Climate Change (MoEFCC).

The stakeholder consultation proceedings shall be shared further with the SSDMA and other stakeholders for their review and feedback. The project also plans to conduct community level consultations with the local communities and representatives for refining the action plans. The project is first of its kind in developing hazard risk maps on the scale of 1:4000 and will help in building disaster and climate resilience of Gangtok, the release mentions.









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3. <u>https://sikkimgovtfeedback.org/2020/10/stakeholders-e-workshop-on-developing-a-disaster-resilience-action-plan-for-gangtok/</u>

Tuesday, October 6, 2020 Latest: West Covid-19 Update, 05.10.2020 (Monday)



Stakeholders' e-workshop on Developing a Disaster Resilience Action Plan for Gangtok

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Prof. Vinod Sharma, Vice-Chairman, Sikkim State Disaster Management Authority (SSDMA) was the Chief Guest. Shri P. N. Sherpa, Relief Commissioner-cum-Secretary Land Revenue and Disaster Management Department, Government of Sikkim, was the Guest of Honour, for this workshop.









NESAC

4. https://www.facebook.com/Sikkimorganic/posts/3038440826261187?__tn_=K-R





Annexure 4: List of Participants

S. No	Name	City	Organization	Designation	Gender
1	Prof. Jyoti Parikh	New Delhi	IRADe	Executive Director	Female
2	Prof. Ajit Tyagi (Moderator)	New Delhi	IRADe	Senior Advisor, IRADe	Male
3	Dr P L N Raju	Shillong	NESAC	Director	Male
4	Prof. Vinod Sharma	Gangtok	SSDMA	Vice-Chairman	Male
5	Mr P N Sherpa	Gangtok	L R & D M Dept. Govt. of Sikkim	Relief Commissioner –Cum-Secretary	Male
6	Mr Rohit Magotra	New Delhi	IRADe	Deputy Director	Male
7	Dr Diganta Barman		NESAC	Scientist/Engineer 'SF'	Male
8	Dr Rajesh Joshi	Almora	GBPNIHESD-SRC	Centre Head	Male
9	Mr Hem Kumar Chettri	Gangtok	Gangtok Municipal Corporation (GMC	Municipal Commissioner	Male
10	Mr Phigu Bhutia	Gangtok	Sikkim State Disaster Management Authority (SSDMA)	Additional. Director	Male
11	Prof. Subashisa Dutta	Guwahati	IIT, Guwahati	Professor at the Department of Civil Engineering	Male
12	Shri Lalit Mohan	Gangtok	GSI-Gangtok	Senior Geologist	Male
13	Dr A K Raha	Gangtok	IMD, Gangtok	Director	Male
14	Dr Surajit Baruah		UNDP	State Project Manager	Male
15	Dr Saurabh Baruah	Jorhat, Assam	CSIR Northeast Institute of Science and Technology, Jorhat, Assam	Chief Scientist	Male
16	Dr Mustafa Ali Khan		SCA-Himalayas, Swiss Cooperation Office India.	Team Leader	Male
			Sikkim State Disaster Management		
17	Ada Lawrence	Gangtok	Authority	Asst. IT Specialist	Female
18	Akanksha Sharma	Patiala	Lovely Professional University, Punjab	Professor	Female
19	Amit Singh	Delhi	EY	AVP	Male
20	AmitkumarAkoijam	Delhi	JNU	Researcher	Male

DEVELOPING DISASTER RESILINCE ACTION PLAN GANGTOK CITY, SIKKIM



21	Archana Sharma	Gangtok	GBPNIHE	RESEARCHER	Female
22	Arijit Chanda	Bangalore	Utopus Insights	Senior Meteorologist	Male
		West Garo			
23	Binoy Kumar Barman	Hills	Mizoram University	PhD. Scholar	Male
24	Chandrashekhar Singh	Delhi	IRADe	Senior Research Analyst	Male
25	Dilli Ghimire	Patan	Nepal Energy Foundation	Managing Director	Male
			Sikkim State Disaster Management		
26	Dinesh Dhakal	Gangtok	Authority	Asst. Urban Planner	Male
			Urban Development Department,		
27	Dinker Gurung	Gangtok	Government of Sikkim	Additional Chief Town Planner	Male
28	Dr MAHIPAL SINGH	Gwalior	JIWAJI UNIVERSITY Gwalior	Research scholar Geography	Male
29	Dr Kirit Parikh	New Delhi	IRADe	Chairman	Male
30	Dr Laishram Sarjesh	Gangtok	Geological Survey of India	Senior Geologist	Male
31	Dr Mohit Kumar	New Delhi	IRADe	Research Analyst	Male
32	Dr Pankaj Saini				Male
			Hamdard Institute and medical science and		
33	Mohd Rizwan Husain	Delhi	Research Hamdard Nagar New Delhi	Health and Sanitary Inspector	Male
	Ganesh Chandra				
34	Khanal	Gangtok	Rtd.director SSDMA	Freelancing	Male
35	Kaushlendra Tripathi	Gurgaon	PwC	Director	Male
		Gangtok,	Sikkim State Disaster Management		
36	Keshav Koirala	Sikkim	Authority	Training Officer (Disaster Management)	Male
37	Kuldeep Singh	New Delhi	DDF Consultants Pvt Ltd	Sr. Manager-Urban Planning	Male
38	Kumar Abhishek	Delhi	IRADe	RA	Male
39	Malavika Thirukode	New Delhi	The Asia Foundation	Program Officer	Female
40	Mayank Joshi	Gangtok	Gbpant	Scientist	Male
			MP Council Of Science And Technology		
41	Mayank Pawar	Bhopal	Bhopal Madhya Pardesh	Research Associate	Male
42	Megh Rai	Dehra dun	Independent consultant	Redr India emergency personnel	Male
43	Monalisa Sen	Delhi	ICLEI South Asia	Programme Coordinator Biodiversity	Female



44	Mr Santanu Das	Shillong	NESAC		Male
45	Ms Ananya Bhatia	New Delhi	IRADe	Research Associate	Female
46	Ms Moumita Shaw	New Delhi	IRADe	Senior Research Associate	Female
47	Ms Saira Rai	Gangtok			Female
48	Navita Pradhan	Gangtok	Land Revenue Dept, Below RMDD	UNDER SECRETARY	Female
49	NaWon Kim	Mandaluyong	Asian Development Bank	Senior Urban Development Specialist	Female
			Centre for Environment Education,		
50	Neeraj Kumar Pal	Lucknow	Himalaya Initiative	Project Coordinator	Male
51	Nikita Lahiri	Shillong	NESAC	SRF	Female
52	Nimisha Jha	New Delhi	IRADe	Senior Research Analyst	Female
53	Prabhakar Rai	Gangtok	State Government of Sikkim	Director Panchayat	Male
			Centre for Environment Education,		
54	PreetiKanaujia	Lucknow	Himalaya Initiative	Senior Programme Director	Female
55	PugazenthiDhananjayan	New Delhi	IRADe	Consultant	Male
56	RAGHU R S	GUNTUR	ANGRAU, Guntur	PhD Scholar	Male
			District Disaster Management Authority,	Training and Capacity Building	
57	Rajan Kumar	Nahan	District Sirmour (HP)	Coordinator	Male
	RAJENDRA				
58	LOKHANDE	Mumbai	Disaster Management Dept. MCGM	Shift In-charge, (Training)	Male
59	ROSHAN SUBBA	Gangtok	LR&DMD	Government Employee	Male
60	Sharmistha Ghosh	New Delhi	IRADe	Executive Assistant	Female
61	Shashi Gupta	Ballia	PGVS	DRR Training consultant	Male
62	SHIVA PRAKASH	Gangtok	Central Water Commission	SE	Male
	ShrawanKumar				
63	Acharya	New Delhi	JNU	Professor	Male
64	Shweta Pandey	Delhi	Iora Ecological SolutionsPvt. Ltd.	Assistant Manager, Climate Change	Female
65	Sonam Lepcha	Gangtok	LR&DM, GOS	Deputy Director, DDMA East	Male
	Sonam Tshering	Gangtok,			
66	Lepcha	Sikkim	Government in any Departments		Male
67	Sturle Pedersen	Bergen	FiberStrength	Chairman	Male



68	Subha Mukhia	Gangtok	LR&DMD	Government Employee	Female
69	Subhabrata	Hyderabad	Enfragy Solutions India Pvt Ltd	Geomatics	Male
70	Suresh Betapudi	Hyderabad	SDC, Embassy of Switzerland	Sector Lead - Disaster Risk Management	Male
71	T Shangderpa	Gangtok	Roads & Bridges Department		Male
72	Vijay Raj	New Delhi	IRADe	Consultant	Male
73	Yashi Sharma	New Delhi	IRADe	Research Assistant	Female
74	Yeshika Malik	Delhi	World Bank	Climate Change Consultant	Female









About the Project

Developing Disaster Resilience Action plan through GIS and prioritising actions for Natural Disaster Risk Reduction in Urban Agglomerations of Shillong & Gangtok is supported by National Mission on Himalayan Studies (NMHS), under Ministry of Environment, Forest and Climate Change Government of India (MoEFCC, GoI).

The project aims to develop Disaster Resilience Action Plans for Shillong and Gangtok cities; with objectives to develop ward level maps at the scale of 1:4000 and to map the hazard/disaster wise vulnerable zones of the Shillong and Gangtok urban agglomerations while identifying and mapping critical infrastructure at risk through ground surveys. This will assist in developing the Disaster Resilience Action Plan for the identified cities and prioritize actions for Disaster Risk Reduction in the Indian Himalayan Regions (IHR)

About CoE

As a Centre of Excellence, IRADe is furthering the agenda of integrating various urban development efforts and documenting best practices and policy level prescriptions that could be understood and adopted by state and national level decision-makers; local administrations to help them link climate issues with the existing programmes in urban development. The project findings, results, methodology, cities covered and future strategy for India's Urban Climate Resilience has been delivered to various forums like IPCC-SREX, European Union and others. For more details. check www.climateandcities.org

About IRADe

IRADe is an independent advanced research institute that aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, corporations, academic and financial institutions. Energy, Climate Change, Urban Development, Poverty, Gender Equity, Agriculture and Food Security are some of the challenges faced in the 21st century. Therefore, IRADe research covers these, as well as policies that affect them. IRADe's focus is effective action through multidisciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development and policy research that accounts for the effective governance of techno-economic and socio-cultural issues. For more details, check **www.irade.org.**

Contact Us

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