

One day awareness workshop on Landslide and Climate Change

Held on 25th August 2014

Mascot Hotel, Thiruvananthapuram

Jointly organized by Kerala State Disaster Management Authority, Geological Survey of India and GoI-UNDP Project on Enhancing institutional and community resilience to disasters and climate change (2013-17)

Report



Empowered lives.
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1 BACKGROUND

Kerala is a landslide prone state; 14.4% of the state is known to be susceptible to landslides. The most common type of landslides in Kerala is debris flows. Published scientific evidences indicate that landslides causing fatalities have increased considerably since 1970s and have caused more than 265 fatalities between 1961 to 2012. It is one of the most frequent disaster that the state faces. One of the worst landslide events in the history of Kerala is the Amboori landslides in Thiruvananthapuram which caused 39 fatalities. It is also widely acknowledged by the scientific community that unsustainable landuse practices prevailing the hilly regions of Kerala is the primary conditioning factor for triggering of landslides. Almost all landslides in the state are known to have been triggered by rainfall and both the intensity and amount of rainfall plays a major role in determining the temporal probability of the events.

Many authors have projected based on statistical and stochastic modelling that the rainfall amount of Kerala is decreasing while rainfall intensity is increasing. Although the scientific robustness of such predications may be questioned based on several statistical significance tests and validation criteria, even the distant possibility of increase in rainfall intensity is not a favourable phenomenon for the densely populated hilly tracts of Kerala.

Considering these factors, the Kerala State Disaster Management Authority, the Geological Survey of India and the GoI-UNDP Project on Enhancing institutional and community resilience to disasters and climate change (2013-17) decided to organize a one day awareness workshop on 'landslide and climate change' for the benefit of the stakeholder government departments, NGOs and institutions involved in disaster risk reduction in the State. The GoI-UNDP Project on Enhancing institutional and community resilience to disasters and climate change (2013-17) agreed to financially support the programme.

1.1 Objectives:

Objectives of the workshop were to create awareness to the stakeholders in disaster management regarding:

- the processes and types of landslides in Kerala
- possible changes to landslide susceptibility in Kerala, in light of the predicted long term changes in rainfall in the state due to global climate change
- landslide risk reduction and mitigation solutions
- current state-of-the-art in landslide early warning

2 Inauguration session

The function began at 10 am.

- The Chief Secretary of Kerala, Shri. E.K Bharat Bhushan IAS chaired the inauguration and the key note address was delivered by Shri. Harbans Singh, Director General, Geological Survey of India
- Shri. K. Kutumba Rao, Deputy Director General, Geological Survey of India, Kerala Unit extended a warm welcome to the dignitaries and participants.
- Prof. Dr. Keshav Mohan, Member KSDMA & Director, ILDM addressed the audience and enlightened them regarding the necessity of imparting training starting from schools for landside risk reduction

- Shri. M. Raju, Deputy Director General and National Mission Head (IV), GSI, Kolkata introduced the objectives of the workshop.
- Shri. E.K Bharat Bhushan, Chief Secretary, Kerala and chairman of the function highlighted the specific expectations of Kerala. He highlighted the following:
 - The State Government expects GSI to provide technical support in local level interventions for landslide mitigation particularly along the hilly road segments
 - The State requests GSI to conduct investigations along the hilly roads of Kerala and provide specific intervention inputs along each segment for landslide mitigation
 - The SDMA is in the process of developing a decision support system for enhancing the operational warnings of landslides and floods that it issues in the state. GSI's active participation, as it is now, is expected in the future and continued efforts of the State Government in its endeavour.
- Shri. Harbans Singh, Director General, GSI highlighted the need for the state to proactively take steps for conducting local level interventions and awareness campaigns for landslide risk reduction. He extended all technical support from GSI for the same. He opined that Kerala is far ahead of most other landslide prone states in the country as far as landslide hazard assessment and awareness regarding landslides is concerned.

Two reports, namely “Post Disaster Landslide Studies in Kerala” and “Landslide Susceptibility Mapping on macro scale along the major road corridors in Idukki district, Kerala” were released by the DG, GSI and handed over to Chief Secretary, Kerala.

- Shri. C. Thanavelu, Director, Engineering Geology & Landslide, GSI, Kerala Unit delivered the vote of thanks

3 Interactive Session 1: 11.30 am to 1 pm

- The first interactive session was chaired by Shri. Harbans Singh, Director General, Geological Survey of India (GSI).
- Shri. C. Thanavelu, Director, GSI, Kerala Unit: Delivered a lecture on the overview of landslides studies carried out by GSI in Kerala.
- Shri. G. Sankar, Scientist F, National Centre for Earth Science Studies: Delivered a lecture on landslides of Kerala. His talk was in Malayalam such that the scientific facts known are understood by majority of the audience better than when explained in English. He explained that debris flows and landslips are the most common type of landslides in Kerala. He highlighted that natural soil piping (alias, natural tunnel erosion) has become a prominent land degradation process in Kerala and that it reported from about 7 districts. He also explained that soil piping is increasingly starting to be noted as a cause of landslides and land subsidence.
- Dr. Sekhar L. Kuriakose, Member, KSDMA & Head, SEOC: Delivered a lecture on vegetative control of landslides. He highlighted the fact that in many parts of the state frequency of landslides can be reduced by vegetative control measures. Vegetation alone will not prevent landslides from occurring and outgrown buttressed trees and roots may also favour the occurrence of landslides with sufficient wind loading. Hence careful selection of species (preferably local species) is needed which can develop anchor roots. In urbanized areas and road cuts, outgrown trees should be pruned and the state needs a pruning policy. He

also flagged the issue of effects of climate change on vegetation; changes to climatic patterns will impact plant growth.

- Shri. M. Raju, DDG, GSI: He presented the nation-wide landslide susceptibility mapping programme with the intention of publishing 1:50,000 landslide susceptibility maps. He informed the audience that Kerala was the first state to respond to GSI's request for organizing such a workshop this year and it is highly appreciated.
- The Chairman concluded the session and highlighted the amount of knowledge available in the state of Kerala regarding landslides. He also directed GSI Kerala Unit to interact with other organizations involved in landslide studies prior to initiating the 1:50,000 landslide susceptibility maps as Kerala already has such maps. He pointed out that the need of the state as highlighted by the Chief Secretary needs to be catered to.

4 Interactive Session 2: 2.00 pm to 4 pm

- The second interactive session was chaired by Shri. G. Sankar, Scientist F, National Centre for Earth Science Studies.
- Dr. Saibal Ghosh, Supt. Geologist, GHRM Cell, GSI, Kolkata: He deliberated upon various site specific landslide investigation and prescribed remedial measures based on field experience across the country. Numerous case studies were presented which offered significant insights to the audience regarding structural interventions possible and feasible for landslide mitigation and control. Case studies from other countries which may be utilized in tropical areas such as Kerala was highlighted. He concluded highlighting the need to conduct detailed investigations of every possible landslide and seeking localized cost effective remedial and control measures.
- Prof. Dr. Sreekumar, Geology Department, Christ College, Iringalakuda: He spoke in Malayalam for the favour of the majority audience. He critically analysed a number of landslides in Kerala and showcased the diversity of causative intrinsic and extrinsic factors leading to landslides. From inherent structural aspects of the rocks, characteristics of the overburden and anthropogenic interferences, his talk brought out various typical characteristics of the landslides in Kerala. He highlighted that slope stability analysis is incomplete without systematic micro-level geological and geotechnical mapping. He highlighted the fact that the clearance of a geomorphologist/geologist/disaster management specialist should be made mandatory prior to approval of the construction of any major roads/bridges.
- Dr. Pankaj Jaiswal, Supt. Geologist, GHRM Cell, GSI, Kolkata: He deliberated upon landslide forecasting in the Western Ghats using rainfall thresholds. He, with the help of data, stochastic analysis and GIS explained the process of creating rainfall thresholds to the audience. He also explained how such data has been used along the Nilgiri hills railway corridor for forecasting landslides. He highlighted the fact that fluctuations due to global climate change in the rainfall pattern (intensity and amount) as forecasted for the peninsular region of India implies that such thresholds have to be as local as possible and dynamic, linked to soil saturation conditions. He appealed to the Govt. of Kerala to revitalize the network of rain-gauges at village level. He concluded stating that Kerala can be a good example for threshold modelling for regional landslide forecasting.

- The Chairman concluded the session and highlighted that forecasting techniques needs to be worked upon for progressing further in landslide risk reduction in the state.

5 Concluding note

As a concluding note, Dr. Sekhar L. Kuriakose, Member, KSDMA highlighted the following points as the resolution of the workshop. All participants agreed to the resolutions and agreed to work forward in a coordinated manner to ensure landslide risk reduction in the state.

- The Government may take steps to ensure that appropriate clearance of geomorphologist/geologist/disaster management specialist are obtained before the construction of major roads/bridges/culverts etc. such that landslide risk reduction is an integral part of such designs, especially in hilly tracts.
- It is needed that such awareness workshops are conducted regionally in local language involving more departments and civil society representatives.
- State should have a tree pruning policy in areas of human settlements such that bottlenecks are minimal to cull overgrown and precarious trees.
- Local self-government should take steps to clean culverts and sluice gates prior to monsoon season every year such that water stagnation is minimal in slopes.
- Rainwater harvesting along slopes of $>20^\circ$ shall not be permitted.
- Government of Kerala shall attempt to revitalize and establish a rain-gauge network up-to village level.

The event concluded with the distribution of mementos and certificates to all speakers and participants.

Annexure-1 – Programme Schedule
Awareness Workshop on Landslide and Climatic Change

(Jointly organized by GSI and SDMA, Kerala)

Venue: Hotel Muscat, Thiruvananthapuram

Date: 25 August 2014

PROGRAMME

Inaugural Function (10.00-11.00 hrs)	
Chairman: Shri Bharat Bhushan, Chief Secretary, Govt. of Kerala	
10.00-10.05 hrs	Welcome by Shri N Kutumba Rao, DDG, GSI, Kerala
10.05-10.10 hrs	Address by Director, ILDM, Kerala
10.10-10.15 hrs	Address by Shri M. Raju, Dy. Director General, National Mission Head - IV, GSI, Kolkata
10.25-10.30 hrs	Release of GSI Report entitled "Post Disaster Landslide Studies in Kerala" Release of GSI Report entitled "Landslide Susceptibility Mapping on macro scale along the major road corridors in Idukki district, Kerala"
10.30-10.40 hrs	Address by Shri Harbans Singh, Director General, GSI
10.40-10.55 hrs	Address by Chairman, Shri Bharat Bhushan, Chief Secretary, Govt. of Kerala
10.55-11.00 hrs	Vote of Thanks by Shri C Thanavelu, Director, EG & Landslide, GSI, Kerala
11.00-11.30 hrs	Tea Break
Interactive Session-I (11.30-13.00hrs)	
Chairman: Shri Harbans Singh, Director General, GSI	
11.30-11.50 hrs	Overview of landslide studies carried out by GSI in Kerala by Shri C. Thanavelu, Director, EG & Landslide, GSI, Kerala
11.50-12.00 hrs	<i>Interaction</i>
12.00-12.15 hrs	Landslides in Kerala (in Malayalam) by Dr. G. Shankar, Scientist F, NCESS, Thiruvananthapuram
12.15-12.20 hrs	<i>Interaction</i>
12.20-12.35 hrs	Vegetative control of landslides by Dr. Shekhar Kuriakose, SDMA, Kerala
12.35-12.40 hrs	<i>Interaction</i>
12.40-12.55 hrs	Role of GSI in study of landslides by Shri M Raju, DDG & NMH-IV, GSI, Kolkata
12.55-13.00 hrs	<i>Interaction</i>
13.00-14.00 hrs	Lunch
Interactive Session-II (14.00-15.00hrs)	
Chairman: Dr. G. Shankar, Scientist F, NCESS, Thiruvananthapuram	
14.00-14.10 hrs	Site specific landslide investigation and remedial measures by Dr. Saibal Ghosh, Suptdg. Geologist, GHRM Cell, GSI, Kolkata
14.10-14.15 hrs	<i>Interaction</i>
14.15-14.25 hrs	Analysis of causative factors of slope instability in Kerala by Dr. S Sreekumar, Christ College
14.25-14.30 hrs	<i>Interaction</i>
14.30-14.40 hrs	Landslide forecasting using rainfall threshold in Western Ghats by Dr. Pankaj Jaiswal, Suptdg. Geologist, GHRM Cell, GSI, Kolkata
14.40-14.45 hrs	<i>Interaction</i>
14.45-15.00 hrs	Concluding Remarks by Dr. Sekhar L. Kuriakose, SDMA, Kerala

Annexure-2 - List of Participants

Attendance Sheet of Awareness Workshop on Landslide and Climate Change				
Sl. No.	Name & Designation	Office	E-mail Address	Mobile No.
1	K. Girija, Deputy Collector	Kottayam Collectorate	lrcollectorate@gmail.com	8547610057
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29	Sunil Rajan K, Senior Clerk	Malappuram Collectorate		9446300435
30	Praveen T, Sr. Clerk	Malappuram Collectorate		9895149841
31	Jagannivasan, Senior Clerk	Malappuram Collectorate		9744236022
32	K V Muraleedharan, Deputy Collector	Kozhikode Collectorate		8547616018
33	Shinoi. K. R, Assistant Divisional Officer	Fire and Rescue Services, Idukki		9497920116
34	Dr. S Sreekumar	Christ College, Irinjalikuda		9447350669
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Glimpses of the Event

