

Concept Note for Session on Mass Movements (Landslide & Avalanches)

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Introduction

Mass movements are massive failures of slope masses including rock, debris, soils and snow/ice that cause loss of life, economy, environment, land and natural resources. These events are widespread and frequently recurring geological hazards that disrupt socio-cultural and commercial activities, communication and transport services, basic amenities and utilities like power, drinking water and irrigation supply etc. in the affected area. These mass movements are also often associated and sometimes even form a major part of other disasters such as earthquakes, floods, thunderstorms, heavy rainstorms, cyclones, forest fires, wild fires, volcanoes and so on. Haphazard human activities like construction of roads, buildings, structures and infra-structure facilities; mining, quarrying, deforestation and logging; blasting; disturbances in natural drainage and slope conditions etc. have further aggravated the incidences of these disastrous mass movements. Besides aggravating the hazardous processes, humans have also increased their vulnerability and exposure to the consequences of these mass movement by occupying areas highly prone to such hazards and unrestricted unscientific development of critical structures such as dams, tunnels, bridges and highways at such sites. This has led to other potentially hazardous events like dam bursts, glacial lake outburst floods, flash floods, debris flow and bursting landslide dammed lakes. If one considers the cumulative impacts of mass movements including all such primary and secondary hazards directly or indirectly related to mass movement, the losses would be thousands of billions of Rupees besides innumerable losses of human lives.

A World Bank Report (2005) indicates that 3.7 million square kilometers of land area of the globe is exposed to landslides and the population exposed to it is 300 million i.e. 5% of world population. About 8,20,000 km² is identified under high risk category which has a population of 66 million at high risk. The CRED data shows that landslides are responsible for 17% of all fatalities from natural hazards worldwide. It has been observed that Asia is the worst affected continent due to landslides and within the Asian countries, it is South Asian Countries which are more affected and even among the South Asian Countries, India is the most affected country. About 25% of the India's landmass (~0.82 million square kilometers) is prone to landslides. These unstable hill slopes are spread across 22 States and 2 UTs to varying extent. Even in the Indian scenario, the Himalayan States suffer more due to landslides compared to Western

Ghats, Nilgiris etc. Some of the studies have indicated that on an average, a landslide occurs at almost every two kilometers along the highways in Himalayan terrain. Although individual landslides in these areas do not result in mass causality or heavy damages yet the cumulative losses over a period of time are comparable to other disasters like earthquakes, cyclones and floods. Average Annual losses are estimated to be approximately 3-4 billion Rupees (INR) besides loss of hundreds of lives and other intangible damages. However, the losses are rising due to increased occupation of human population on susceptible slopes and unscientific haphazard development without due consideration to landslides risk management.

Context

As outlined above, the losses/risks from landslides in the hilly terrains have a rising trend and need a serious concern to minimize these losses and protect people's life, property, infrastructure, environment and natural resources. National Disaster Management Authority, Government of India, took a great initiative by issuing national guidelines on landslides and avalanches on 23 June 2009 to guide the Central Government, State Governments, District Administration, Different Ministries/Agencies/Organization in preparation of plans for management of landslides and avalanches. But still there are lot of existing gaps in information, data-bases, maps, methodologies, techniques and technologies in this field and few dedicated efforts have been made in education, training, research and capacity building of human resources to cater to the needs of this sector. A systematic action is required for building reliable and credible databases on mass movements, preparation of inventory maps, hazard zonation maps at different scales for use by various stakeholders, vulnerability and risk assessment studies, classification and prioritization of the risks, prevention, mitigation, preparedness, response and risk reduction measures. An overview of the status of practices in landslides risk management indicates that the application of state-of-art technologies in assessment, prevention, mitigation, monitoring, warning, and preparedness is lacking in Indian context. Most often crude traditional approach of constructing a retaining wall (made of gabions or RR masonry) is followed at landslide sites as a reactive measure. There is a need to shift this attitude for a proactive continuum risk management. Not much use of scientifically prepared hazard and risk zonation maps has been made in selection, designing and development of sites/projects. There is also a dire need to prepare minimum standards for landslide / avalanches database, inventories, hazard zonation mapping, investigation and management.

The country lacks good rehabilitation, relocation/resettlement, and reconstruction policies which affect adversely the affected people of these areas. A significant reduction of risks/losses could be achieved by preventing / minimizing the exposure of people and properties through landuse and developmental regulations and enhancing the coping capacities of communities. Little attention is given to the use of indigenous knowledge, information, skills, expertise/experiences and local resources while planning and implementing activities related to management of mass movements.

NIDM has a national mandate to undertake training, capacity building, networking, linkage, coordination, dissemination of knowledge, documentation, and research related to disaster risk management. In order to achieve its goal, the session on mass movements has been included in the Second India Disaster Management Congress to address various issues mentioned above.

Objectives

The following objectives are outlined for the session on mass movements.

- To share and exchange information, data-bases, maps, methodologies, techniques and technologies related to mass movements
- To discuss the status of landslides studies, research, education, training, capacity building and risk management in India, with possible scope for improvement and future directions
- To network, link and coordinate different stakeholders and explore options for integrated convergence approaches to holistic risk management
- To develop international cooperation among experts/authorities in India and other countries for strengthening the efforts for landslide risk management and learning from events abroad
- To publish and disseminate the information/database/maps shared by the contributors with other stakeholders and the public

Sub-themes

- Hazard, Vulnerability, Risk Mapping, Investigation, Case Studies, Documentation on mass movements
- Instrumentation, Monitoring, Modeling and Warning Systems for mass movements
- Prevention, Mitigation, Risk Reduction Measures & Management for mass movements
- Awareness, Preparedness, Response and Rehabilitation Issues related to mass movements
- Standards, Codes, Guidelines, Plans, Policies, Regulations and Laws/Acts for Management of Mass Movements

Expected Outcome

It is expected that the session will disseminate knowledge/information/expertise/experiences on opportunities and options available for management of mass movements. It will also be beneficial for planning future directions in education, training, research, planning, policy, advocacy and implementation strategies for controlling and managing the incidences / consequences of mass movements. The proceedings on the abstracts received for the session will help in the learning process.

2nd India Disaster Management Congress
Thematic Cluster: Geological Disasters
Tentative Sessions Plan on Mass Movements (Landslides and Avalanches)

Date: 5 November 2009, **Venue-** Hall No.1, Ground Floor, Vigyan Bhawan, New Delhi

Time: 1400 – 1730 Hrs; **Total Duration:** 3:30 Hours

Number of Total Presentation - 9 Oral Papers + 1 Keynote Speech + 1 Invited Speech

Panel Discussion - 1

Duration of each oral presentation - 10 minutes

Discussion Time - 10 minutes

Session Chairperson - *Dr. R. Siva Kumar*, Head, NRDMS & CEO, NSDI, DST, New Delhi

Session Organizers / Facilitators : *Dr. Surya Parkash and Dr. Ritu Raj*, NIDM, New Delhi

Sub-session 1 (1400-1530 Hrs; Duration - 90 minutes):

1400-1405: Chairpersons will speak about the session

Co-Chairpersons - *Dr. Bhoop Singh*, Director, NRDMS, DST, New Delhi and

Dr. R.N. Sarwade, Former Director, SASE, Chandigarh

Rapporteurs - *Dr. Kishor Kumar*, Scientist `F', CRRI, New Delhi and *Dr. V.D. Mishra*, SASE, Chandigarh

1405 - 1435: **Keynote Speech** - Managing Mass Movements - *Dr. R.K. Bhandari*, *Geohazard Specialist*

1435-1450: **Invited Speech** - InSAR Monitoring of High Risk Geohazard Areas using RADARSAT

- *Dr. Vernon Singhroy*, Canada

1450-1500: **Presentation 1:** Avalanche Threat Evaluation and Mitigation Strategy

- *Dr. Ashwagosh Ganju*, SASE

1500-1510: **Presentation 2:** Characteristics of landslides within Nemuro Group, Japan

- *Prof. Hiroyuki MAEDA*, Japan

1510-1520: **Presentation 3:** Stabilization of Varunawat Landslide

- *Dr. P.C. Nawani, NIRM*

1520-1530: **Questions and Answers** of the sub-session 1.

Sub-session 2 (1530-1700 Hrs; Duration - 90 minutes):

Co-Chairpersons - *Shri Niteesh Kumar Dutta, DG GSI* and

Lt Gen M.C. Badhani, VSM, DG BRO

Rapporteurs - *Shri M. Raju, GSI* and *Brig. A.K. Bhutani, BRO*

1535-1600: **Presentation 4:** Landslides Hazard Mitigation Programmes and Initiatives in India

- *Dr. Bhoop Singh, DST* and *Dr. Surya Parkash, NIDM*

1600-1610: **Presentation 5:** Sonapur Landslide and its mitigation through RCC cut and cover structure

- *Er. S.S. Porwal, BRO*

1610-1620: **Presentation 6:** Preliminary Analysis of Spatial and Temporal Variation of Landslide Hazard

- *Joyesh Bagchi, Rakesh Kumar and Sanjiv Sharma, GSI*

1620-1630: **Presentation 7:** Landslides Hazard Mitigation through application of Bioengineering Methods

- *Dr. Prafulla Soni and Dr. H.B. Vashistha, FRI*

1630-1640: **Presentation 8:** Forecasting Erosion Induced Landslides

- *Prof. Roslan, Malaysia*

1640-1650: **Presentation 9:** Landslide Hazards Mitigation - Aspects related to geotechnical investigations

- *Jai Bhagwan and Sudhir Mathur, CRRI*

1650-1700: **Questions and Answers** on sub-session 2.

Panel Session (1700-1730 Hrs; Duration - 30 minutes):

Chairperson: *Dr. R. Siva Kumar, DST*

Panelists (tentative) - Representatives from GSI, Border Roads Organizations, SASE, NIDM, DST, NGF, NGI, ITC, FRI, CSIR, NGO Representative, Academic Organizations, Administration, and Civil Defence

Rapporteur - *Dr. Surya Parkash, NIDM*

Theme: **Challenges, Opportunities and Strategies for Managing Risks from Mass Movements**