

## A Report on National Symposium on “Natural Hazards & Build Better for Risk Mitigation” and Annual Convention of ISES “Advances in Earthquake Science (AES 2024)”

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It is heartening that a National Symposium on “Natural Hazards and Build Better for Risk Mitigation” was held at CBRI, Roorkee during 28-29 March, 2024. The National Disaster Management Authority as well as MoES, Government of India has planned several national and international projects for combating Earthquake and Landslide Hazards, especially after India’s G20 presidency. This symposium was timely to take stock of status and challenges and suggest future plans especially for natural disaster-prone state of Uttarakhand (UK). The symposium was jointly organized by Indian Society of Earthquake Science (ISES), CBRI & Dept. Earth Sc., IITR. It was sponsored by the Ministry of Earth Sciences, New Delhi, National Disaster Management Authority, New Delhi and CSIR-NGRI, Hyderabad. It was attended by two Padma Shri awardees, several stalwarts, cutting edge scientists and students.

The following four Themes were covered:

Theme 1: Earth’s Structure and Seismotectonics

Theme 2: Neotectonics and Paleoseismology

Theme 3: Seismic Hazard, Microzonation and Engineering Seismology

Theme 4: Landslides and Glacial Hazards

Forty oral presentations were spread into six sessions and there was one session for over 10 Poster presentations. The level of lectures had been kept in 3-tiers: 1. Invited lectures by senior world-renowned experts, cutting-edge research by middle-level scientists and new research by young researchers. The presentations were in Physical mode and one video-lecture was circulated. There were 80 Delegates including a number of students. About 20 Agencies have participated covering seven states of Uttarakhand, UP, Haryana, Telangana, J&K, MP, Orissa. The agencies include: WIHG, CBRI, ISR, NGRI, IITR., Kurukshetra Univ. NCS, Uttarakhand Landslide Mitigation & Management Center, Dehradun, Iikhg, IIT-ISM, NIRM, CEPT, Amity Univ., NIT-Srinagar, Univ. Pet & Energy, HNB Univ., Sagar Univ., Cuttack Univ., Mahendra Univ., Hyderabad, Ind Inst. Remote Sensing.

Prof. Pradeep K. S. Chauhan of CBRI was the Organizing Secretary, Dr. Abhey Ram Bansal of NGRI and Honorary Secy., ISES and Prof. Anand Joshi, HoD Earth Sc., IITR were co-Chairmen of the Organizing Committee. Dr. D.P. Kanungo of CBRI was coordinator of the scientific program.

### Inaugural Function

**Prof. Pradeep K.S. Chauhan**, Organizing Secretary, welcomed the dignitaries and delegates. He informed about the details of the symposium and logistic arrangements.

**Prof. B.K. Rastogi**, President, ISES, Ex-DG, ISR, Ex-Head

Seismology, NGRI spoke about ISES activities including national and international symposia, Workshops for practicing engineers, faculty and students, Training Courses, publishing a journal, books and Newsletters and to create synergy between seismologists, engineers and geologists. It further motivates and helps in establishing centers of Excellence in different states for earthquake-resistant construction. Uttarakhand has high seismic and landslide hazard and needs detailed mapping. It is also prone to flood and glacial hazards. Multidisciplinary investigations are needed for risk mitigation.

**Prof. Pradeep K. Ramancharla**, Director CBRI and Chairman Organizing Committee mentioned that Himalayan region and specifically Uttarakhand is highly prone to different natural hazards like earthquakes, landslide including subsidence, floods and glacial. We need to carry out multiparametric studies for risk mitigation. The present symposium will be helpful in chalking out future programs.

**Prof. Harsh Gupta**, Guest of Honor, impressed upon having awareness programs, especially to High School students to make a resilient society. He said the best way to deal with natural disasters is to learn to live with them by developing resilience and capacity in the society at large. He said that when the countries like Nepal and Haiti can develop such resilience in the wake of large earthquakes the same could be replicated in vulnerable places in India.

**Sri Kamal Kishore**, Member & Secretary NDMA and Chief Guest in his inaugural address mentioned that the present symposium “is a very important event, and I think the kind of issues we are addressing here at this event are important for our country, not just from a disaster risk management perspective but also from a development perspective.” He suggested the following five points for risk reduction from earthquake hazard:

- i. Motivate the society to demand earthquake safety features for a property being purchased.
- ii. Come up with more innovative ways to improve compliance of our building codes not just in large cities but also second and third tier cities which have 3% annual growth.
- iii. Popularize low-cost earthquake-resistant features.
- iv. Continually monitoring of earthquakes to improve the understanding of earthquake mechanics in Himalaya and other parts of the country.
- v. Focus on coming up with ways of earthquake resistant infrastructure.

### Invited Talks

1. Gupta, Harsh: Seismicity, seismic gaps and earthquake hazard in Himalaya

2. Dimri, V.P.: A Multidisciplinary Approach for Himalayan Study
3. Rastogi, B.K.: Earthquake, landslide and flood hazards in India: A review [List of all significant incidences of the three hazards, relative degree of hazards in different sectors of Himalaya, seismic gaps, causes and triggering factors of landslides and ways for sustainable development]
4. Sain, Kalachand (WIHG): Climate-induced Disasters in the Himalaya and Way forward [Main conclusion was to identify hotspots where big glacial lakes may burst]
5. D.P. Kanungo [CBRI]: A Tale of Joshimath Land Subsidence [main cause is unplanned heavy construction and inadequate surface and sub-surface drainage]
6. Rastogi, B.K.: Structure and Seismotectonics of Himalaya: New Insights [duplex / thick crust, Low-Velocity Layers / zones]
7. Sumer Chopra [ISR]: A glimpse of seismic hazard studies being done at Institute of Seismological Research [Seismic microzonation findings used in Gujarat for construction of tall buildings, nuclear power plants, natural gas storage and distribution terminals, renewable energy infrastructure, pump-storage facilities for hydro-electric projects (which is a new concept), GIFT City and Dholera Special Economic Zone]
8. Naresh Kumar [WIHG]: An overview of central Himalayan seismicity: Implications for seismic hazard and Joshimath land subsidence [small earthquakes continue in Chamoli area of sub-Himalaya pointing to strain accumulation over the Main Himalayan Thrust]
9. Bansal, AR and Tony Saini [NGRI]: Dynamic triggering of Seismicity in the Indian Continent: A Review

#### **Best Oral and Poster Presenter Awards for Students and Young Researchers**

Certificates from ISES and Prize coupons for e-books to best poster and oral presentations for students were given as per the following list:

#### **Oral Presenter Awards**

1. Mr. Suvam Das, CBRI (*E:suvam.cbri20j@acsir.res.in*)
2. Ms. Rema Vaishali, ISR (*E:astrorema2811@acsir.res.in*)
3. Dr. Archana Das, ISR (*E:rchnidas7@gmail.com*)
4. Dr. Chintan Vedpathak (*E:geochintan28@gmail.com*)

#### **Poster Presenter Awards**

1. Ms. Shreya Mondal, KU  
(*E:shreyamondal2926@gmail.com*)
2. Mr. Sanjay K. Verma, IIT(ISM), Dhanbad  
(*E:saniitjay@gmail.com*)

#### **Recommendations**

The panel discussion on 29th March 2024 was coordinated by Prof. Pradeep K. Ramancharla having members Dr. Harsh Gupta, Dr. B. K. Rastogi, Dr. V.P. Dimri, Prof. M.L. Sharma, Dr. Sumer Chopra and Dr. D.P. Kanungo. Following are the panel's recommendations:

1. The Panels main recommendation was to have multidisciplinary investigations for Natural Hazards. Identify hotspots and plan remedial measures. It was realized that the present investigation plans are isolated and not geared for risk mitigation of all the hazards – earthquakes, landslides, floods and glacial which are frequently happening in the state. A systematic capacity building program needs to be in place and efforts need to be made to achieve disaster resilience in next 5 years.
2. Declare an "Earthquake Day" for the state and have mock drills annually.
3. Motivate the society to demand earthquake-resistant features while buying a property or implement low-cost demand earthquake-resistant features while constructing.
4. Generate awareness in the society that in earthquake-prone areas build small one storied house with bricks / brick shaped stones and cement mortar. For compactness low-cost pillars and beams need to be used. This way the house moves as one unit and withstands seismic waves.
5. Due to sight effects some building in an area may be damaged while similar ones nearby may stand well. It is because of site effects which can be estimated by even Level 1 Seismic Microzonation done by identifying soil layers and their seismic-wave velocities.
6. Society may be motivated using local language. Cost and benefit analysis may be explained for adopting earthquake-resistant features against not doing that.