



# AAPDA SAMVAAD



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# IWDRI 2018



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Geotectonic and meteorological conditions make Uttarakhand vulnerable to various hazards and these often result in disasters that take heavy toll of human lives, property and infrastructure. The State Government has been working towards building the capacity of its communities to respond to any disaster situation.

A few important initiatives taken by Uttarakhand in the recent past towards reducing disaster risks are listed below:

### Workshop on Disaster Resilient Infrastructure in the Himalayas



A two-day interactive workshop on “Disaster Resilient Infrastructure in the Himalayas: Opportunities and Challenges” was organized by the Uttarakhand SDMA on 21-22 November, 2017 in Dehradun. The workshop provided a platform to various stakeholders for sharing knowledge on disaster resilience in construction. Inaugurating the workshop, Chief Minister Shri Trivendra Singh Rawat emphasized on the importance of traditional construction practices. “Most seismic events, whenever they occur, take a massive toll on human lives. Such losses can be avoided provided we observe little precautions like adopting our traditional housing architecture.”



Participants emphasised upon the importance of the right design of structures in hill slopes and the implications of wrong construction practices. They also highlighted the need of specific construction guidelines for hilly regions.

Uttarakhand lies in seismic zone IV & V and is thus prone to high-intensity earthquakes. It has experienced two major earthquakes in the recent years - Uttarkashi (1991) and Chamoli (1999). Besides, approximately 40 light tremors have been reported in the hill State in the last two years.

Shri Kamal Kishore, Member, NDMA; Shri Amit Negi, Secretary, Disaster Management Department, Uttarakhand and Dr. Piyoosh Rautela, Executive Director, Disaster Mitigation and Management Centre, Uttarakhand also participated in the workshop.

### USDMA felicitates volunteers

Realising the importance of organized response at the grassroots level on the aftermath of any disaster, the State has been organizing 10-day search, rescue and first aid training programmes since 2010 and more than 15,000 community members have so far been trained at the Nyay Panchayat level. These trained locals have helped the Uttarakhand State Disaster Management Authority (USDMA) not only during search and rescue operations after a disaster but also during other emergency situations such as road accidents.



On January 5, 2018, the SDMA organised a function to felicitate the Search and Rescue trainers to highlight the exemplary work that the trained locals have been doing. On this occasion, Shri Amit Singh Negi, Secretary, Department of Disaster Management, Uttarakhand, honoured Ms. Seema Parmar, a national-level skier who has represented India in 2010 South Asian Games at Auli, for her contribution during 2017 monsoon period. Other members of the team were also felicitated by Shri Savin Bansal, Additional Secretary, Department of Disaster Management, Uttarakhand.

### Mock Exercise in Rudraprayag

A mock exercise on earthquake was conducted in Rudraprayag on January 6, 2018. An abandoned village, Barasu, with around 35 scattered houses was chosen for the exercise.

The exercise was conducted at night without prior information. Electricity supply was cut off, debris and boulders were put on the road leading to the village along with fallen trees.

An earthquake alert was sounded at around 1800 hrs. Soon, Incident Response System was activated, resources were gathered at the designated staging area and teams were dispatched to the site. A total 120 persons, including police personnel, healthcare workers, State Disaster Response Force personnel, a few volunteers and a column of Army participated in the exercise.

The search and rescue operation saw the use of



victim location cameras, concrete cutters, inflatable lighting devices and search lights. Those with minor injuries were given first aid and those with serious injuries were sent to the district hospital. Arrangement for treating the affected persons was done outdoors as the hospital was also affected in the earthquake.

The exercise was a major learning experience. Wireless communication was not smooth, some equipment did not function properly and transporting inflatable lighting towers was a big challenge. There was some operational issue with the lights as well. It was recommended that these be substituted by light weight and easy-to-operate lighting equipment, at least for remote villages.

### SOP on transportation of dead by air

In a disaster situation, relatives of deceased persons might wish to transport the body to their native place for last rites. This might involve transporting the body by air, which requires fulfilling medico-legal and other formalities before the dead body is accepted by the airline. Uttarakhand has been routinely facilitating such transportation and based on the experience gained in the process,

the State has prepared a Standard Operating Procedure (SOP) for transporting dead bodies by air. This would help in minimising trauma and inconvenience to the relatives.

The SOP is available at: [http://dmmc.uk.gov.in/files/SOP\\_Transport\\_of\\_Dead\\_Body\\_by\\_Air\\_\(1\).pdf](http://dmmc.uk.gov.in/files/SOP_Transport_of_Dead_Body_by_Air_(1).pdf)

### Earthquake Early Warning

As a part of a Memorandum of Understanding (MoU) signed between the USDMA and Indian Institute of Technology, Roorkee, seismographs are being installed across the State to strengthen earthquake early warning system and to ensure propagation of warning to the masses. Apart from 84 seismographs already installed in the Garhwal region, another 100 are being installed in the Kumaon region.

Even though the warning lead time from this network is to be less than a minute, sirens are being installed at SEOC, DEOC and 200 identified location in Dehradun, Haldwani and Kathgodam. Efforts are also being put in for making the masses aware on the existence of the warning system and the manner in which they have to respond in after receiving the warning.

The State Government has already installed eight sirens between Koteshwar and Rishikesh along Ganga to disseminate flood warning related to discharge from Tehri reservoir. This infrastructure would also be utilized for disseminating earthquake warning and other alerts.

### Other Efforts

In order to improve the State's capability of continuous monitoring of various weather parameters Automatic Weather Stations are being installed at Block level. Output from these instruments being installed in collaboration with IMD would improve weather forecasting capabilities of IMD.

To improve communication during emergency situations the State Government is providing satellite phones at Sub-Division level.

The State has undertaken seismic vulnerability assessment of almost all the buildings of Nainital, Mussoorie and Bageshwar towns and the reports of the same are available online. The State Government has also undertaken seismic vulnerability assessment of more than 15,000 lifeline buildings using Rapid Visual Screening (RVS) technique. Of these, Detailed Vulnerability Assessment (DVA) of 90 vulnerable hospital buildings is being done.

The State Government has already undertaken seismic retrofitting of 15 school buildings with technical support from IIT Roorkee, Central Building Research Institute, Roorkee and Nanyang Technological University, Singapore. •



National Disaster  
Management Authority  
Government of India

Organised by  
National Disaster Management Authority  
in collaboration with UNISDR



# IWDRI 2018 TOWARDS A SAFER WORLD!

Infrastructure has shaped human civilization for millennia. Various traditional infrastructure systems, from the drainage system of Indus valley civilisation cities to the system of interconnected lakes in Udaipur, clearly show that our ancestors had a lot of foresight in building resilient systems that have served us for centuries. The way a generation builds its infrastructure either builds risk or resilience for its future generations.

The world will see an unprecedented infrastructure growth in the coming decades and the responsibility of ensuring resilience of this infrastructure lies with our generation.

To take the agenda of disaster resilient infrastructure forward, the National Disaster Management Authority (NDMA) in collaboration with United Nations Office for Disaster Risk Reduction (UNISDR) organised a two-day International Workshop on Disaster Resilient Infrastructure (IWDRI) on January 15-16, 2018) in New Delhi.

"We need to bring to bear tremendous foresight and rigour to ensure that all our new infrastructure is built to withstand the hazards of the present as well as the future." said Shri Rajnath Singh, Union Home Minister, while inaugurating the workshop.

During a disaster, poor quality, weak infrastructure results in loss of lives, livelihoods and causes significant economic loss. It is, therefore, extremely crucial that the new (as well as existing) infrastructure is strong enough to withstand the impact of any disaster. Urging everyone to come together, Shri Singh said that no country can address the challenges involved in creating disaster resilient infrastructure alone. He added, "As the infrastructure systems are globally interconnected, disruptions in one part of the world can cause havoc in another part of the world. It is, therefore, important that all stakeholders come together to address the challenges and devise solutions to create resilient infrastructure."

### *Sessions:*

- Risk Management of Key Infrastructure Sectors
- Risk Assessment, Standards, Design, and Regulation for Infrastructure development, Operation and Maintenance
- Financing Disaster Resilient Infrastructure
- Reconstruction and Recovery of Critical Infrastructure after Disasters



Various international agreements have also reiterated the importance and long-term benefits of investing in resilient infrastructure. The Sendai Framework for Disaster Risk Reduction (SFDRR), 2015-2030, which is the first major agreement of the post-2015 development agenda, identifies investing in Disaster Risk Reduction (DRR) for resilience and to build back better in reconstruction as priorities for action towards reducing disaster risk. Similarly, Goal 9 of the Sustainable Development Goals (SDGs) recognizes disaster resilient infrastructure as a crucial driver of economic growth and development.

The workshop brought together representatives from 21 countries from across the world - Australia, Bhutan, Bangladesh, Chile, Germany, Italy, Japan, Malaysia, Maldives, Mauritius, Mongolia, Myanmar, Nigeria, Norway,

#### **Quick facts:**

- ✓ By 2040, world needs \$100 trillion for infrastructure
- ✓ By 2030, Asia alone needs \$26 trillion investment in infra
- ✓ More than 70% of infra that our cities will have by 2050 is yet to be built

Nepal, Norway, Republic of Korea, Sri Lanka, Thailand, the United Kingdom, the United States - with different socio-economic backgrounds and geographical features. This translated into a great opportunity to learn from their unique experiences in their efforts towards building disaster resilient infrastructure.

The workshop began with a broad discussion on infrastructure development, risks to which the current assets are exposed to, the direct and indirect socio-economic impact of the disasters, the investment ecosystem, regulatory standards, sectoral roles and opportunities of building resilience in key projects of the future.



Need to rank States in terms of their progress in Disaster Management to ensure that disaster awareness spreads rapidly and widely in society

**- Dr. Rajiv Kumar**

Resilient infrastructure is important not only for the aggregate economic growth but also for ending poverty

**- Shri Kiren Rijiju**

Investment in Disaster Resilient Infrastructure should be seen as an investment in sustainability

**- Dr. P.K. Mishra**

Deliberations at this workshop are crucial for achieving the targets identified in the SFDRR

**- Dr. Robert Glasser**



During technical sessions, best practices as well as key issues in existing practices in the infrastructure sector and ways to address them were discussed in great detail.

Besides reducing infrastructure losses, disaster resilient infrastructure will also help achieve targets pertaining to reduction in mortality, number of affected people and economic losses due to disasters.



Dr. Rajiv Kumar, Vice Chairman, NITI Aayog; Dr. P.K. Mishra, Additional Principal Secretary to the Prime Minister; Shri Kiren Rijiju, MoS, Home Affairs; Dr. Robert Glasser, Special Representative of the UN Secretary-General for Disaster Risk Reduction; Members and senior officials of NDMA; multilateral development banks, the United Nations, the private sector and academics also participated in the workshop.

**For details, visit**

<http://ndma.gov.in/iwdri/index.html>



# DISASTER THAT NEVER HAPPENED

One of the most common hazards in the young Himalayan belt is landslides, which block rivers and roads, cause damage to infrastructure and may result in loss of human lives. One such landslide occurred near the Phuktal river probably on December 31, 2014 about 90 km from Padum in Kargil district of Jammu & Kashmir. The landslide, which blocked the course of river Phuktal, built a massive landslide dam lake of along the river's length – approximately



15 km long submerging nearly 270 hectares of land – posing a great threat to life, property and infrastructure, especially the Nimmo Bazgo dam, in case of a sudden breach.

Noticing a sudden decrease in the flow of water, the district administration conducted an aerial survey on January 18, 2015 and confirmed a blockage across Phutkal. A technical committee was formed to study the blockage and the situation was reported to the National Disaster Management Authority for further action.



Meanwhile, the district administration prepared a list of all hamlets, families, infrastructure and alternative rehabilitation sites in case the natural dam breaks. Control rooms were established in Kargil, Leh, Padum, Phuktal, Alchi and Chilling by the first week of February, 2015.

NDMA constituted a multi-disciplinary expert team with members drawn from various stakeholder organisations - Central Water Commission (CWC), Geological Survey of India (GSI), National Hydro Power Corporation (NHPC), Survey of India (SoI), Snow Avalanches Study Establishments (SASE), Border Roads Organisation (BRO), Indian Army and State Administration - for further course of action.

On the basis of the observations made by the experts, an action plan was presented before the National Crisis Management Committee. It aimed at creating a trench either manually and/or by using low explosives or low intensity air shelling so that the current yield as well as stored water behind the blockage is cleared. To aid the process, CWC provided information on approximate volume of impounded water, likely additional rise in river water at various locations and corresponding travel time in case of sudden breach of the landslide dam. It also installed Automatic Water Level Recorder (AWLR) to monitor the river water level on a regular basis.

An expert team comprising Shri R. K. Varma (SASE), Shri B. D. Patni (NHPC), Shri V. D. Roy (CWC), Shri A. K. Raina (Central Institute of Mining & Fuel Research), Shri R. K. Dhiman (BRO), Shri D. S. Sindhu (NDMA), Dr. Ravinder Singh (NDMA) and Shri Maheswar Singh (SOI) reached Leh on February 23, 2015 to oversee the

entire operation. However, due to inclement weather conditions, the team could reach the landslide dam location only on March 10, 2015 after several failed attempts.

The team proposed a revised action plan the next day for controlled breaching with adequate safeguards. Soldiers of Ladakh Scouts under the supervision of officers of 70 Engineers constructed a 1.2 km long footpath and installed a safety rope from the camp base to the landslide location.

On March 12, 2015, the NDMA team inspected the landslide dam and identified the least resistant path for water flow for blasting and excavation. After continuous attempts using a variety of tools and techniques, the proposed trench was finally created on 16th March, 2015. The blasted boulders were removed manually and the 2m×1.5m, approx. 100 m long trench was completed for controlled release of impounded water. Small humps, which were impeding the water flow, were removed using crow bars. The finer particles of debris in the channel were gradually washed out and the size of the channel increased resulting in slow but sure breaching of the landslide dam.

A major disaster-in-waiting was thus averted with coordination and cooperation from all the involved agencies.

"We later developed a Standard Operating Procedure (SOP) on Averting Threats Emanating from Landslide Dams on Rivers in Mountainous Regions and circulated the same to all the hill States and concerned stakeholders," said Shri Sindhu, Joint Advisor (Operations), NDMA, who was a part of the team that handled Operation Phuktal. •



IN CONVERSATION WITH



## KAMAL KISHORE ON DISASTER RESILIENT INFRASTRUCTURE

The National Disaster Management Authority (NDMA) in collaboration with United Nations Office for Disaster Risk Reduction (UNISDR) conducted a two-day International Workshop on Disaster Resilient Infrastructure (IWDRI) on January 15-16, 2018 in New Delhi. Participants from more than 20 countries, multilateral development banks, the United Nations, the private sector and academics attended the workshop. To know more about IWDRI and resilient infrastructure, AapdaSamvaad spoke with Shri Kamal Kishore, Member, NDMA.

### **Q. Please tell us more about this workshop.**

A. In November 2016, India hosted the Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR). During this conference, our Prime Minister had announced that India will work with other partner countries and stakeholders to develop an international coalition on disaster resilient infrastructure. The workshop that was held in January was a step in this direction.

This workshop brought together a variety of professionals working on different aspects of disaster resilient infrastructure - engineering, finance, disaster risk management, standards,

operation and maintenance of infrastructure - together for a conversation on how do we move together to encourage the development of disaster resilient infrastructure.

Over time, we plan to develop a collaborative project with an aim to come up with win-win solutions for all stakeholders involved in infrastructure development.

### **Q. What are the major takeaways from the workshop in terms of suggestions or solutions offered?**

A. Firstly, the entire process of infrastructure development is so complex and multi-dimensional that in order to be able to address the issue of disaster resilience, we need to adopt a multi-disciplinary approach. Disaster risk management professionals need to engage with a broader variety of actors to come up with innovative solutions to disaster resilient infrastructure.

We cannot look at the resilience of infrastructure systems in isolation as they are connected with other infrastructure systems. For example, if we are looking at the safety of roads, then we have to look at how that connects with the safety of bridges. A major takeaway from this



workshop was the emphasis on 'looking at system of systems' and the understanding that we need to embrace the complexity involved in constructing resilient infrastructure and think beyond the narrow infrastructure capital asset to include the system around that infrastructure.

The third takeaway was that we have to devise ways to deal with uncertainty with regards to future risks, particularly in the context of climate change. Traditionally, we have built infrastructure based on the hazard patterns based on as they have occurred in the past. This, however, is not a good guide for the future. In such a context, how are we going to build infrastructure so that we can update or retrofit that infrastructure to address the emerging hazard risks.

**Q. How do we integrate disaster resilience into infrastructure development?**

A. There are several ways of doing this but I will primarily talk about the four areas which the workshop also focussed on. The first is looking at how we are going to come up with systems for assessing risk in a sophisticated way where we not only look at risk to infrastructure but also risk from infrastructure, not only present risks but also future risks. The second area of work is how do we begin to develop standards for developing, operating and maintaining infrastructure so that it nudges us towards disaster resilience. The third is how do we build incentives in financing of infrastructure so that it encourages investment in resilience. Finally, we need to have more predictable systems for recovery of infrastructure systems when they are affected by disasters.

**Q. How can developing countries such as ours ensure that adequate finances are available to incorporate resilience in construction as well as reconstruction following a disaster?**

A. It's not just a matter of adequacy of finance; it's a matter of how we look at cost benefit of investing in resilience. A lot of the times, when we

are building an infrastructure and trying to make it resilient, it appears that the cost is increasing. However, if we look at the life cycle cost of the same infrastructure, which includes the initial cost as well as its operation, maintenance and repair, it makes much more sense to make it resilient in the first place. Thus, investing in disaster resilience makes economic sense as well.

**Q. How can we ensure minimum disruption and swift recovery of essential services - electricity, transport, communication - in the immediate aftermath of a disaster be ensured?**

A. People depend on infrastructure and its efficient service to carry out their day-to-day livelihood activities. If it does not serve properly, then it affects them negatively and makes them more vulnerable. The key ensure minimum disruption and swift recovery of essential services is to have a plan beforehand. First of all, we should build our systems to be resilient. Infinite resilience, however, costs infinite money. There will always be events which will exceed the expected design event that we had prepared for. In such a case, pre-planning can make the process of recovery of infrastructure systems and its operations smoother. •



# SURVIVING AN EARTHQUAKE

Take following steps

## Before

- Consult a structural engineer to make your house earthquake resistant;
- Repair deep plaster cracks on walls and ceilings;
- Fasten shelves securely to walls; place heavy / large objects on lower shelves;
- Have an emergency kit ready;
- Develop an emergency communication plan for family;
- Learn the technique of 'Drop — Cover — Hold'.

## During

- Stay Calm and Do Not Panic;
- DROP under a table; COVER your head with one hand and HOLD the table till the tremors last;
- Run outside as soon as the tremors stop — DO NOT use lift;
- When outside move away from buildings, trees, walls and poles;
- When inside a vehicle — pull over in an open place and remain inside; avoid bridges.

## After

- Avoid entering damaged buildings;
- If trapped in rubble:
  - Do not light a matchstick;
  - Cover your mouth with a cloth;
  - Tap on a pipe or wall;
  - Sound a whistle;
  - Shout only as a last resort.
- Use stairs and NOT lifts or elevators.



**DROP !**



**COVER !**



**HOLD ON !**



◀ Scan & Learn



**Be smart  
Be prepared**



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