

Workshop & Exhibition
on
“UTTARAKHAND DISASTER – 2013: LESSONS LEARNT & WAY AHEAD”
13-14 March, 2014
Venue: NIDM, Gr. floor Conference Hall

The Fateful Event

Uttarakhand, was severely hit by torrential rains induced flash floods and landslides in the 3rd week of June, 2013. This abnormally high amount of rain fall has been attributed to the fusion of Westerlies with the monsoonal cloud system of the East. Implication of “**heavy rainfall**” warning by India Meteorological Department (IMD) for the regions indicated in Fig. 1, and absence of any modern science based geospatially validated “**flash flood warning system**” in place, caused systemic aberration in the interpretation of such “**warning**” by IMD. Thus meaning of such **unusually usual “heavy rains”** message reportedly given on 14th June 2013, carried luke warm response among the Disaster Managers of the state. So, dissemination of the same among the public through feasibly nontransparent “**emergency operation protocol**” met up with several incoherencies, that finally led to catastrophic situation. Unprecedented rain fall in the large areas led to flash flood, causing high amount of erosion and debris formation, which carried several establishments across, resulting into loss to lives and properties and specially disrupting the peak pilgrimage activities of Char Dham areas. As on date, despite the country is having separate nodal agencies for weather and flood forecasting, and another agency for capturing sub-meter level satellite imageries, our capability to know pre & post “**flash flood**” scenarios in Uttarakhand have become issues fuelling the national debate.



Fig. 1: Flash flood induced damages in Uttarakhand where massive reconstruction work is under way

An analysis of rainfall data for the past five years, points to changes in rainfall trends in India, with a greater number of incidents of excess rain in Uttarakhand in the last couple of years. The trends in rainfall, however, do not indicate the kind of heavy rainfall that the state would have received. However, it is imperative to look into the causative factors leading to such events and more importantly to the disaster resilience of infrastructures lined up along the hilly terrains.

Disaster Highlights

- *The scale and magnitude of the extreme event was such that more than 680 persons are confirmed to have lost their lives. Besides, another 4,117 persons who are still missing and feared to be dead.*
- *1.5 lakh people were evacuated to safe places in the “shortest possible time, notwithstanding widespread destruction of roads, difficult terrain and extremely hostile weather.*
- *The Army, Air Force, Indo-Tibetan Border Police (ITBP), National Disaster Response Force (NDRF), Border Roads Organisation (BRO) Public Works Department and local administration worked together for quick rescue operations*
- *In the massive response operation “Surya Hope”, the IAF rescued 23,775 persons, the army 38,750 and the ITBP 33,000, NDRF 9000 from the affected areas.*
- *IAF dropped 730MT of essential commodities at different places.*
- *Civil helicopters airlifted 13000 pilgrims/local people to safer places.*
- *Other state govt. agencies such as police dept., district authorities, NGOs and volunteers also helped in the rescue and relief operations.*
- *The major part of the evacuation was accomplished in less than a fortnight making it one of the largest, swiftest and safest rescue/evacuation operation.*
- *A missing person cell was constituted on 27th June. As on 8th August total no. of persons that have been found to be missing included 4421 pilgrims and 938 local residents. In addition 91 Nepali citizens have also been reported missing.*
- *A total 237 bodies have been cremated by Home/Police dept with full respect.*
- *69 relief camps were run where 151629 pilgrims/locals were looked after.*
- *Out of 2092 roads damaged, 1710 roads have been opened till 29th July as temporary arrangement.*
- *Out of 2180 damaged water supply schemes 1669 have been restored temporarily.*

- *Out of 3758 villages where power supply was disrupted, supply was restored in 3695 villages temporarily.*
- *43 medical teams comprising of 313 doctors and 4977 paramedical staff deployed. Central Govt. also supplemented with 80 doctors, 11 psychiatrists and 5 public health teams.*
- *On June 25, one Indian Air Force (Mi-17V5) rescue helicopters returning from Kedarnath, carrying 5 Air Force, 9 NDRF, and 6 ITBP officers crashed on a mountainous slope near Gauri Kund, killing all on board.*

Aftermath

Reconstruction in Uttarakhand is to be taken up as an opportunity to reduce the vulnerability of the state against impending natural and manmade disasters by relocating settlements in safer sites, introducing new building technologies for hilly terrains, updating national building codes for disaster safe hill areas, and by enhancing (through multiple strategies) disaster preparedness at different levels. The reconstruction process shall enable effective recovery support to flash flood impacted areas of Uttarakhand in an unified and collaborative manner. It also focuses on how best to restore, redevelop and revitalize the health, social, economic, natural and environmental fabric of the community and build a more resilient state.

Reconstruction works must start with the technical evaluations to identify vulnerable establishments in the State by initiating damage surveys and looking into the erstwhile design practices, construction methods, and building materials that either failed under the forces generated by the heavy rain fall induced flash flood or were successful in resisting such forces.

In addition, the reconstruction efforts should also look at land use management and planning practices, as well as natural/man made hazard identification and risk assessment. This is to be done in an effort to learn whether actions of the Government, other than those involved in designing and constructing buildings/dams/roads along the river valleys and temple towns in Uttarakhand are upto the mark in minimizing damages from natural hazards, including earthquakes.

All reconstruction projects must be cost-effective, be both engineering and technically feasible, and meet environmental planning and heritage preservation requirements of the nation.

Reconstruction Process

Reconstruction of Uttarakhand is to be taken up by:

- Evaluating local/traditional construction methods and vulnerability of the affected buildings and infrastructures such as roads, bridges, tunnels, dams, water/power supply networks, etc. not only for heavy rainfall induced disasters but also for earthquake effects
- Transferring the latest technologies to the state and central Government line agencies such as PWD, NHAI, CPWD, PMGSY, BRO, ...by taking up site specific

pilot project works under the Reconstruction Assessment Team (RAT) consisting of consultants who are experts in specific fields such as structural engineering, building design and construction in hills, land use and floodplain management, river training, dam engineering, forestry, landslides, bio-engineering, building codes and construction management; and other technical, administrative, and general support personnel.

- Establishing procedures for third party peer review/check of the design, construction quality and thereby ensuring resiliency of the newly constructed facilities against impending hazards
- Building construction quality assurance and management capacity to help achieving sustainable development through practical training of local masons, contractors, engineers and town planners.

Reconstruction Measures: few examples [Chapter -6]

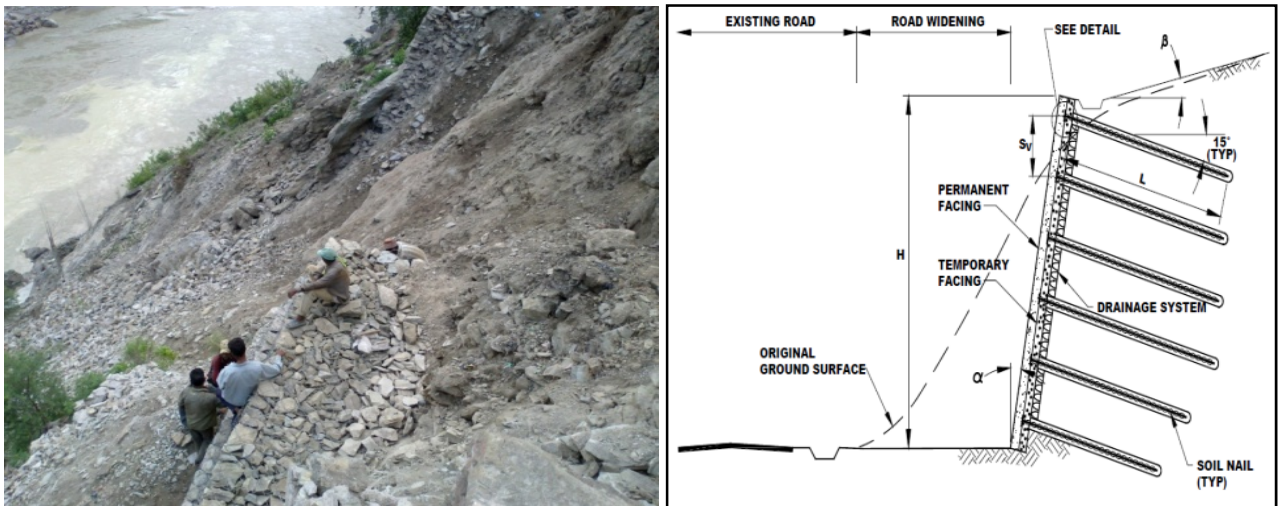


Fig. 2: Reconstruction along NH-58 at Devprayag, where conventional Sauchase walls are being placed in July 2013, which is not going to be effective in the long run. Instead Reinforced soil or nailing technique could make the slope more stable and cost effective



Fig. 3a: Slopes are exposed to rain water infiltration and so they are perennial source of landslides, for which conventional engineering measures are either costly or not enforced



Fig. 3b: Vetiver Grass, whose roots can grow 2-3m inside the soil, can be planted to stop erosion and protecting landslides naturally

Documentation of Uttarakhand Disaster

NIDM documented Uttarakhand Disaster of 2013 based on inputs through field visits, interactions with various stakeholders, role players, discussion and feedback in one-day workshop on “**Uttarakhand Disaster – 2013: Lessons Learnt**” held on Aug 19, 2013. The workshop was attended by a number of government agencies such as Army, Air Force, ITBP, NDRF, NGOs, responders, relief and rehabilitation experts, UN agencies, policy makers, environmentalists, etc.

The documentation of “**Uttarakhand Disaster – 2013**” comprises of six chapters namely **Introduction, The State Vulnerability and Causes of Disaster, The Disaster & Immediate Response, Impact and Damage Assessment, Contextual Findings & Lessons Learned and Reconstruction: Technical Solutions**. The draft report developed was shared with various stakeholders and inputs/ suggestions received were incorporated in the report before its finalization. However, to further value addition to the content of the report and bring it in the form of a more useful document, it is felt that the content of the report once again be shared with the experts.

Validation of Document

NIDM proposes to have a 2 days’ workshop during **13-14 March, 2014**, in which the content of the report will be discussed with concerned agencies, resource persons and experts to seek their comments and suggestions. In addition, the workshop also aims to focus on various cross cutting issues emerged during Uttarakhand disaster management i.e. gender issues, insurance, etc.

The report contains one section exclusively on technical issues related to reconstruction in the disaster affected areas of Uttarakhand. The suggestions made in the report shall also be discussed in the workshop. The Sessions proposed in the workshop will cover various technical issues/solutions related to sustainable reconstruction of damaged roads, Kedarnath shrine complex, SSB-Srinagar complex, riverside establishments, bridges, DAMs, etc.

The main objective of second day of the workshop is to discuss about technical advisories for BRO, NHAI, PWD, RDD, PMGSY and other line department/agencies of Uttarakhand for repairing of roads/infrastructure by Gabion wall, wrapped around walls with wide variety of Geo-synthetics/ woven-non woven geo-textiles, stitching the fragile slope by soil nailing/bolting, controlling rain water infiltration by shotcreting/ ecomorter, adopting simple storm water drains by Vetiver plantation.

Focus Areas

The workshop focuses on:

1. Consultations/feedback on the Documentation made by NIDM and cross cutting issues related to the post Uttarakhand disaster
2. Evolving capacity building strategy for BRO, PWD, NHAI, CPWD engineers/officials with innovative slope stabilization by soil nailing, benching, micropiling, inclined drainage pipe, woven/nonwoven geotextiles/ geocomposite to drain/pump out water from highly saturated slopes and finding alternatives for new road/landslide resilient road construction.
3. Landslides and cut slopes stabilization by bio-engineering methods, such as Vetiver grass and other local solutions. Evolving sustainable construction/ restoration methodologies and river/slope training works, specially along Guptkashi to Kedarnath
4. Application of sensor based Geo-intelligence and Geo-spatial technologies for Early Warning dissemination for landslides, GLOF, and DAM breaks

5. Documentation and visualization of damaged road sections, estimation of debris volume, number of bridges collapsed/damaged, road length repaired/reconstructed so far and road map for full reconstruction measures, etc.
6. Capacity development of adequate expertise, technical manpower, machineries available with road constructions agencies of India as on today and possibility/scope for further improvement in man, machinery and modern technology, to adapt new technologies such as mechanically stabilized reinforced earth (use of geosynthetics), anchored earth, gabion walls, geo-netting, soil nailing, etc. Incorporation of such technologies in DPR and manuals for mass scale application by operational agencies in India.
7. Strategy for detailed mapping of potential landslides spots by modern Synthetic Aperture Radar (SAR) and community based landslide early warning deployment at hotspots.
8. Appropriate protective measures in areas threatened with rock falls, debris, and avalanches.
9. Observe man-made changes and its effect on environment by installing a modern warning system to monitor: (i) movement of cloud and cloud bursts, (ii) stability of mountains to watch potential landslides and (iii) precursors which normally are seen before a major earthquake/landslides.
10. Purview planning and sustainable construction of multipurpose DAMs in the entire Indian Himalayas.

Participations/Representatives:

State & Central Govt.: MHA, NDMA, Planning Commission, Uttarakhand Govt., Revenue/Relief/Resident Commissioners/ATIs - all states and UTs, State and central govt. functionaries related to DM, MoRST, MoUD, MHRD, NEC, DST,

Field organizations: BRO, PWD, PMGSY, CPWD, NHAI, NTPC, NHPC, Rural Dev.,

Policy Makers: TCPO, CWC, IRC, CBIP, IE(I), IIPA,

International agencies: JICA, UNDP, UNOCHA, UNISDR, DHI

R & D organizations: IMD, CBRI, CRRI, SASE, GSI, Sol, IITs, NITs, WIHG, IIRS, Central/State Univ,

Technology Providers: Maccaferri, Geobrigg, AIMIL, Integrapp, STRATA, RMSI, FARO, PCI Software, Genesys, TechFab, GeoJute, IDS, etc.

Participation is by invitation only. No Registration fee is required.

Outcome

The workshop would be helpful to value add to NIDM's effort in the documentation of Uttarakhand flash flood and suggest technical measures for reconstruction.

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Towards a Disaster Free India...

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Day One: Thursday, 13.03.2014	
10.00 – 10.05	Welcome Address and Context of the Workshop - <i>Dr. Satendra, Executive Director, NIDM.</i>
10.05-10.25	Presentation on Uttarakhand Disaster Report – 2013 - <i>Dr. Anil K. Gupta, NIDM.</i>
10.25-10.50	Address by Guests of honour 1- Shri G.V.V. Sarma, JS(DM), MHA 2- Lt Gen A.T. Parnaik, DG, BRO 3- Shri. S.K Mattoo, IAS (Retd.) 4- Prof. V.K Sharma, Hon'ble VC, Sikkim SDMA. 5- Dr. T. Chatterjee, Director, IIPA 6- Dr. P.K. Mishra, DG, GIDM
10.50-11.00	Address by Chief Guest Major General (Dr) JK Bansal, VSM, Chikitsa Ratan (Retd), Hon'ble Member NDMA.
11.00-11.05	Vote of Thanks
11:05	Inauguration of Exhibition by Chief Guest
11.05-11.20	Tea
11.20 – 13.30	Panel Discussion - I Uttarakhand Disaster Report-2013 Chairperson- Dr. P.K. Mishra, DG, GIDM, Gandhinagar Chap-2: The State Vulnerability and Causes of Disaster. Chap-3: The Disaster and Immediate Response. Chap-4: Impact and Damage Assessment. Chap-5: Contextual findings and lessons learned. Question and Answers
13.30 –14.30	Lunch
14.30 – 16:45	Panel Discussion - II Disaster & Development- Chairperson-Prof. V.K. Sharma, Hon'ble VC, Sikkim SDMA <ul style="list-style-type: none"> • Environment & Sustainability issues.- Prof. V.K Sharma, Hon'ble VC, Sikkim SDMA • Health – Dr. J.P. Sharma, Medical Superintendent, HIHT, Dehradun • Livelihood- Shri. S.S Bisht, DC, Department of Rural Development, Uttarakhand. • Psychosocial Issues and Vulnerable groups- Dr. Aapga Singh, State Director- Programs, HelpAge India, Uttarakhand. • Relief Distribution and Coordination- Shri. S.S Bisht, DC, Department of Rural Development, Uttarakhand. Question and Answers
16.45 -17.00	Key Messages from the workshop
17.00	Tea

Day 2: Friday, 14.03.2014		
Theme: Chap-6: Uttarakhand Reconstruction - Technical Guidance		
Time	Description of items	Speakers/ experts
10:00-10:40	Inaugural session Uttarakhand Flash Flood – 2013: Reconstruction Measures	Chief Guest: Dr R.K. Bhandari , Former Director, CBRI Guest of Honour: Er Lalit Mohan , Er-in-Chief, Uttarakhand-PWD Prof. Chandan Ghosh, NIDM
10:40-11:00	TEA BREAK	
11:00-13:15	Session-I: Technologies for Reconstruction of Uttarakhand	Chair:
	1. LiDAR Mapping of Kedarnath and Rishikesh	Shri Amit Malik , Genesys Int., Mumbai
	2. LiDAR mapping and DATA sharing paradigm for upcoming R&D	Dr Aniruddha Roy , Navayuga Spatial, Delhi
	3. Flood Modeling and Forecasting for Disaster Risk Reduction	Dr Guna Nidhi Paudial , DHI, Delhi
	4. Landslides mitigation by reinforced earth technologies	Ms Minimol Korulla , Maccaferri-India, Delhi
	5. Road constructions in hill areas by Geocell	Mr Achal Soni , STRATA Geosystems, Delhi
	6. Slope, drainage and river training by bio-engineering	Mr Shantanoo Bhattacharya , ASSAM, PWD
	7. Smarter & integrated emergency response planning solutions	Mr Vinaybabu Adimulam , Intergraph Solutions, Delhi
	8. Rock fall protections measures	Mr Gaurango Singha , GeoBrugg India, Gurgaon
13:15-14:00	LUNCH	
14:00-16:00	Slides show of damages and suggestive measures – interactive sessions	Coordination: Chandan Ghosh Panel: Rep. from BRO, NHAI, PWD, CPWD, PMGSY.....
16:00-16:15	TEA	
16:15-17:30	Technology-operational agency interaction in disaster mitigation of the country	Panel discussion: Rep. from Industries and product show

LIST OF EXHIBITORS OF PRODUCTS/ TECHNOLOGY:

- 1) Genesys International, Mumbai – LiDAR, Cityscape, 3D street view, Wonobo.com
- 2) GeoBrugg India, Gurgaon - Slope treatment, fencing, rock fall protections measures
- 3) Maccaferri India – Application of Geosynthetics in hill roads stabilization
- 4) FARO India – 3D Laser scanner & imaging technologies
- 5) PCI Software – ikeGPS, GeoPDF for mapping and off-line decision making
- 6) Trunz – Emergency Water Supply by RO system
- 7) STRATA Geosystems India – application of GeoCell/Gabion for road constructions
- 8) Hariti Maa Green Technologies - Vetiver System & Bio-Engineering solutions for Hills and River erosion