



Tragic Events of June 2013 in Uttarakhand and Consequences Thereafter

Uttarakhand, a state in North India, located at the foothills of western Himalaya, is considered a paradise on earth for its out of the world scenic beauty. The state is strategic for various reasons such as bordering areas, extensive water and forest resources, rich flora fauna, rich wild life, and above all, though fragile but, the cleanest eco-system. The state is capped with most important glaciers of the Himalaya which are source of some of the major rivers of the country on which sizable population is dependant. It is the destination of millions of pilgrims, travelers, tourists etc. who visit four Char Dham i.e. Badrinath, Kedarnath, Gangotri and Yamunotri. Every year, more than three million tourists, from all over the world, arrive in the state for the pilgrimage and tourist purposes. Majority of tourists arrive during the summer season (May-July) and this is the time when disastrous events of cloudbursts, flash floods, landslides etc. are mostly experienced. The cloudburst, a phenomena of sudden copious rainfall, has proved to be one of the major disasters which rock the region now and then. The severity of this localized hydrological/climatic disaster can be understood by the consequences of

its by products like flood and landslides. The multi-hazard dimension of cloudburst is particularly disastrous when it is experienced in or near inhabited areas /settlements such as villages, towns and cities. The associated infrastructures like highways and roads, which are one of the important communication routes and cater to the need of emergency post disaster management including evacuation, emergency food and medical supply etc, are generally found severely affected. As a result, the death toll as well as property damage increases by multiple fold.

The most recent disaster which astonished the entire Uttarakhand state and the country as a

whole, took place in the month of June 2013. It started on June 15 with heavy precipitation (many times more than usual). The unprecedented amount of rainfall, which occurred by at least two weeks before normal monsoon arrival time fell between 15 to 18 June. In higher reaches, generally snow is noticed at that point of time. The heavy rain added with the fresh snow came down heavily through a high gradient slope, met the old aged moraine on the way and carried them forcefully away in the form of violent debris flow.

There are reports suggesting breaching of Chorabari glacial lake, which has also had the similar action generating into a huge debris flow of extreme nature. Some reports suggest, landslides due to heavy rainfall transforming into debris flow of extreme nature while involving the already existing moraine on the way. The exact mechanism, on what happened and how, may take little more churning but the result was extremely disastrous. Whole of Kedarnath village has been destroyed leaving few houses partially damaged (Fig 1). The trails of devastation not only stopped around Kedarnath but

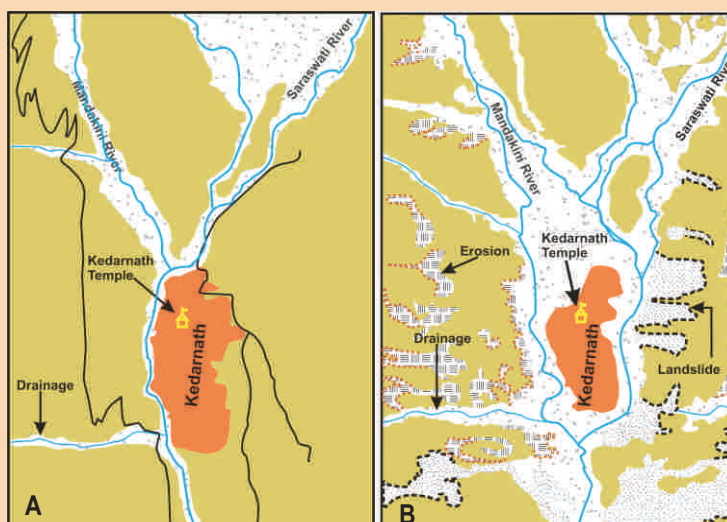


Fig. 1: Pre (A) and Post (B) disaster sketch of Kedarnath area

also far downstream to Sonprayag, Gaurikund, Rambara and further. Rambara was completely depleted from the scene while Gaurikund and Sonprayag were heavily destroyed.

A preliminary assessment (using satellite data) by National Remote Sensing Centre, ISRO indicated 2266 number of landslides along the various river valleys (Mandakini, Basuki Ganga, Mandani, Kali, Madhyamaheshwar, Bhillangana, parts of Alaknanda from Srinagar to Chamoli and parts of Bhagirathi around Gangotri).

Road is one of the important infrastructures required to meet out all other development, security, employment and other socio-economic needs of the region. Roads are life lines to connect the region with rest of the country, since in any disastrous situation, roads only are the main communication lines required for the safety, rescue, and rehabilitation of people. If roads are affected all other things also get affected. However, it has been observed that every time the tragedy strikes, huge amount of budgetary funds are pumped into the rehabilitation and restoration works without giving least thought to the

long term solutions. By the time the tragedy stricken areas are rehabilitated, monsoon reappears and this vicious process repeats again and again and restoration and rehabilitation process never gets completed. The construction agencies like PWD/BRO meet the cost of repair and maintenance, restoration, rehabilitation or the replacement of damaged properties out of the maintenance budget only allocated to them for the whole year. As a result, mainly overall maintenance of roads is affected and problem remains unchanged, due to constraints of funds. The frequent and long duration blockade of national highways in critical landslide locations (Fig 2) create social unrest amongst the communities living at both sides of the blockade location because of their inability to attend to social obligations. Scenes such as hardships in reaching the destination through the tougher and longer alternate routes, inability to provide medical aids to the critical patients, steep hike in prices of the commodities, inability to run their business etc. cause of sufferings and are repeated during every monsoon.

The increasing trend of landslides incidences and recurrences along the highways is quite alarming



Fig 2: A. Tourists stranded at Kaliasaur landslide & B. BRO workers restored the highway connectivity at Patalganga Rockfall on NH-58 respectively. C. & D. Washed out road formation near Pandukesaur area & Damaged Bridge near lambagarh area due to flash flood in Chamoli district respectively

and raises concerns regarding the stability of landslide areas along these highways and their potential impact to the safety of traveling public, infrastructure and property. Hundreds of chronic landslides which recur during every year are required to be studied scientifically involving large scale mapping; geotechnical, geomorphological and geological investigations; instrumented monitoring; risk analysis; and forecasting followed by permanent stabilization (and not for short term repair). This way, the problems generally keep on multiplying and reach to the point of no remedy.

Landslides should not be viewed as an isolated phenomena but in conjunction with the other events such as floods, earthquakes, cloudbursts etc. For example, a number of seismogenic landslides had developed during the major earthquake events and these continue to reactivate during monsoon/rains and cause substantial damage to highway and other infrastructure. It is, therefore, required to identify the areas prone to such kind of landslides in case an earthquake event happens anytime from now. Similarly, floods which are common phenomenon in the region create hundreds of landslides along the banks of rivers/major streams. Some of the narrow gorges on the rivers/streams get blocked due to generation of excessive slid debris thereby creating artificial dams, on breaching of which huge destruction is caused downstream upto hundreds of kilometres.

In the Aftermath of Uttarakhand disaster, CRRI has been actively discussing the matter related to landslide disasters on the major highways of the region with PWD Uttarakhand and its role in managing the landslides on the highways. Subsequently, as desired by PWD Uttarakhand, discussion were held about the long term stabilization of 25 most critical landslides on Char Dham routes. Consequently, two teams of CRRI

scientists visited all the critical landslides on the following routes:

1. Dharasu Gangotri – NH-108.
2. Rishikesh Dharasu Yamunotri – NH-94.
3. Dharasu Bend Phool Chatti – NH-94 (134).
4. Vikas Nagar Badkot – NH-123.
5. Rishikesh Joshimath Mana – NH-58 (including Gaurikund route).

Following broad classification of the damages on the highways has been reported by the team:

- Damage due to intensive debris flow arising out of existing streams.
- Existing landslides causing debris flow resulting damage of roads.
- Reactivation of old landslide/rock fall/slumps etc.
- Generation of number of new landslide
- Intense toe cutting by rivers resulting in sliding/subsidence/collapse of roads & other infrastructures.
- Temporary pooling & breaching resulted in damage of roads.
- Inadequate drainage facilities provided along the roads.
- Poor maintenance of road infrastructure like retaining/breast wall, culverts etc.

Based on the long expertise of CRRI on landslide management, a proposal with scope of work (Detailed geological, geomorphological & geotechnical field as well as laboratory investigation & analysis & design of remedial measure for long term stability), duration of the project and the minimum budget required for the purpose has been indicated and submitted to PWD Uttarakhand.

WORKSHOPS / MAJOR EVENTS

Training cum workshop on Advanced MS Excel

As part of HRD training, two day training-cum-workshop on Advanced MS Excel (Soft Skill Development) was organized by M/s. Hero Mindmine Institute, Gurgaon on August 29 & 30, 2013. Thirty staff members of Gr.III & Gr.IV attended the workshop.



Training on Advanced MS Excel

CSIR-CRRI Foundation Day

CSIR-CRRI Foundation Day was celebrated on July 16, 2013. The Institute was kept open on that day to facilitate visit by General Public and Students. About 250 students from various Schools and Engineering colleges visited the Institute. Prof. Ajoy



Glimpses of CSIR-CRRI Foundation Day

Kumar Ray, Vice Chancellor, Bengal Engineering and Science University, Shidpur, West Bengal, who delivered foundation day lecture on “Intelligent Instrumentation in Transportation Engineering” was the Chief Guest for the main function. A technical exhibition displaying the technologies and products developed by CRRI was also organized for the public and children.

In the afternoon, a press meet on “Solutions to Monsoon Woes and Potholes for City Roads” was organised. In the meet, CRRI experts highlighted that poor drainage is the greatest enemy of Delhi's roads and that if it is improved substantial expenditure on road repair can be saved. CRRI recommended a host of materials and technologies that civic agencies should use in the city.

Sadhbhawana Divas

Sadhbhawana Divas is observed on 20th August every year. The theme of Sadhbhawana is to promote national integration and communal harmony among people of all religion, languages and religions. Goodwill towards everyone and eschewing violence is the motto of the Sadhbhawana Divas. To promote this theme further, a pledge was also taken by the staff members.

Hindi Saptah

Hindi Saptah was organized from September 9, 2013 onwards. Several competitions such as Essay Writing, Hindi Noting and Drafting, Hindi Writing, On the spot Hindi debate and Presentation of Technical Papers in Hindi were organized. About two hundred employees took part in these competitions.

Dr. S. Gangopadhyay, Director, CSIR-CRRI presided over the function and urged all employees and officers to vigorously use Hindi in day to day official work. The closing ceremony was held on September 19, 2013. Sh. D.D. Ojha, Senior Scientist, Ground



Participant receiving prize from Chief Guest

Water Dept; Jodhpur, Rajasthan delivered the keynote lecture on “Use of Hindi in Administrative and Scientific Works”.

Prizes were given away to the winners of different competitions and also to those employees who have published research papers in Hindi and have done commendable work in Hindi.

Besides above, a Hasya Kavi Semmelan was also organized for the staff of CRRI on September 17, 2013. Shri Dinesh Raghuvanshi and his fellow poets presented their literary poems and recited some of their humorous poems and couplets which were widely appreciated by the staff of CRRI.



Closing ceremony of Hindi Saptah

Workshop on Technologies for North-East Region and Implementation Framework (TIF - CSIR 800)

A Workshop on Technologies for North-East Region and Implementation Framework in collaboration with CSIR-NEIST, NRRDA, RMD Department, Govt. of Sikkim, R&B Department, Sikkim and Bitchem was organized by CSIR-CRRI on Sept 6-7, 2013 in Gangtok (TIF - CSIR 800) to showcase CSIR-CRRI technologies, to trace newer business models for technology transfer, to inculcate an environment wherein the profession understands the requirement and possible ways to adopt new technologies, and to generate visibility for business development.

The workshop was inaugurated by Shri RanBahadur Subba, Hon'ble Minister, Roads and Bridges and Cooperation Departments, Govt. of Sikkim, who was the Chief Guest. The inaugural session began with

welcoming of dignitaries which included Shri M.C. Boro, Commissioner & Spl. Secy., PWD, Assam; Shri G.S. Sharma, PCE cum Secretary, R&B, Sikkim; Dr. R.C. Boruah, Director, CSIR-NIEST. Welcome address was given by Shri Hari Sharma of R&B, Sikkim, Prizes were given away by the Chief Guest to the achievers for commendable work done by them in their respective field.

Presentations were made on technologies for north-east region like Cold mix technology, Landslide investigation and Mitigation, GIS based inventorization and Utilization of waste and marginal materials etc. The workshop was attended by researchers, key professionals from Govt. and Private agencies etc.



Inauguration of TIF-CSIR 800 at Gangtok, Sikkim



Training on ISO 9001:2008, Quality Management System (QMS)

To develop more awareness about ISO 9001:2008 and its implementation in the Institute, a training programme on ISO 9001:2008 (QMS) was organized on Aug. 7, 2013 for the Task Force Members and Group III employees. The programme was inaugurated by Dr. S. Gangopadhyay, Director. Sh. R.S. Bharadwaj, M.R. made a presentation on various issues of Quality Management System, Quality Plan and Documentation etc.

Workshop on Health Management through Clapping

As part of Health Management of CRRI Staff, a half day workshop on "Health Management through Clapping" was organized at CSIR-CRRI, on September 30, 2013.

Mr. Arun Rishi (Swargiya), Founder of Aayushamaan Bhav Trust - Ujjain (M.P.) and visiting faculty of IIMs, LBSNAA-Masoori, and Rly Staff Training College – Baroda, made the presentation. Mr. Rishi stressed on the following:

- Clapping for 15 seconds a day, keep the doctor away for the whole life.

- Ek Dawa Nirali 15 Seconds Ki Tali (a unique concept for the first time in the world)



Presentation on Health Management by Arun Rishi

CSIR Foundation Day

CSIR Foundation Day was celebrated on September 26, 2013. The Institute was kept open on that day to facilitate visit by General public and students. About five hundred students from various Engineering colleges and Public schools visited the Institute. Sh. K.K. Kapila, Chairman-cum-MD, ICT Pvt. Ltd., New Delhi was the Chief Guest for the main function and delivered the Foundation Day Lecture on "Road Development and its Challenges". Earlier, Indoor Sports Competitions were organized for PGRPE



Chief guest delivering Foundation Day lecture



Prizes given by chief guest to the winner of competition

Students from Academy of Scientific and Innovative Research (AcSIR). Besides this, competitions were also organized for the children of employees.

Prizes were given away by the Chief Guest to the winners of various competitions. The employees of CRRI, who had completed 25 years of service in CSIR and those who had retired during the period from Aug. 2012 to Sept. 2013, were also honoured and mementoes presented to them by him. The function was graced by the invited guests, fellow scientists, employees and ex-colleagues of CRRI.

MEETINGS

Research Council Meeting

The 113th Meeting of CSIR-CRRI Research Council, under the Chairmanship of Prof. D.V. Singh was held on July 22, 2013. Besides the Council Members, HoDs and Senior Scientists of the Institute attended the meeting as special invitees.



New Research Council of CSIR-CRRI



Director-General, CSIR constituted a New Research Council (RC) for CSIR-CRRI, New Delhi w.e.f. April 2013 for a period of three years. The Twelve member Council is headed by Prof. M.R. Madhav. The first meeting of the newly constituted CSIR-CRRI Council was held on Sept. 27, 2013. The following members constitute the Council :

1. Dr. M.R. Madhav - Chairman
Professor Emeritus, JNTU-Hyderabad

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|---|------------------------|
| 2. Prof. A. Veeraragavan
IIT, Madras | - Member |
| 3. Prof. Partha Chakroborthy
IIT, Kanpur | - Member |
| 4. Prof. Arun K. Attri
Dean, JNU, New Delhi | - Member |
| 5. Mr. Jose Kurian
Chief Engineer, DTTDC, New Delhi | - Member |
| 6. Dr. Ashwni Pahuja
Director-General, NCCBM, Ballabgarh | - Member |
| 7. Chief Engineer
(Standards & Research), MORTH | - Member |
| 8. Prof. S.K. Bhattacharya
Director, CSIR-CBRI, Roorkee | - Member |
| 9. Prof. G. Biswas
CSIR-CMERI, Durgapur | - Member |
| 10. Dr. Amitaya Sen Gupta
Scientist-G, CSIR-NPL, New Delhi | - Member |
| 11. Dr. S. Gangopadhyay
Director, CSIR-CRRI, New Delhi | - Member |
| 12. Head, PPD or his nominee
CSIR, New Delhi | - Permanent
Invitee |

Memorandum of Understanding (MOU)

An MoU was signed on Sept. 12, 2013 between CSIR-CRRI and Delhi Technological University (DTU) to create a framework for collaboration between CSIR-CRRI and DELTECH with the broad objective to establish close linkages and coordination between CSIR-CRRI and DELTECH in the areas of research and development, training and consultancy.



Signing of MoU between CSIR-CRRI & DELTECH

Technology Transfer

A Technology on “Different types of cold mix technology for construction and maintenance of roads” has been transferred by CRRI to M/s. Bitchem Asphalt Technologies Limited, Guwahati on exclusive license term for a period of five years. Agreement to this effect was signed on September 24, 2013.

Patents Filed (International Filing)

PCT Filing on “Stepwise Repeated De-Stabilisation and Stabilisation of Highly Collapsible Soil Mass by 'Soil Nailing Technique' used for Construction of Railway/Road Underpass”, Kanwar Singh, P.S. Prasad, Sudhir Mathur, Farat Azad, S. Gangopadhyay (on July 17, 2013)

Agreements Signed

During the reported period, agreements with the following firms/agencies were signed:

- Bitchem Asphalt Technologies Limited, Guwahati for “Different types of cold mix technology for construction and maintenance of roads” for 5 years (on September 24, 2013).
- Cleantech International Foundation & Continental Carbon Indian Ltd., New Delhi for “Development of carbon based asphalt additive for enhanced performance of bituminous pavement (Phase I and Phase II)” (on September 10, 2013).
- RDCIS, Steel Authority of India Limited (SAIL), Bihar for “Feasibility studies on utilisation of air cooled blast furnace slag in road making” (on July 16, 2013).
- Ghaziabad Development Authority, Uttar Pradesh for a project on “Independent Consultant for 3rd Party Quality Checking for the Construction of 6 lane link Road from NH-24 to NH-58 with ROB over Delhi-Ghaziabad Railway Line” (on July 26, 2013).

EXHIBITION

The Institute participated in the Technical Exhibition organized by IABSE at Kolkata during Sept. 24-27, 2013 on the occasion of 36th Symposium on “Long Span Bridges and Roof Development Design and Implementation”.



STAFF NEWS

New Heads of the Divisions

1. Dr. Rakesh Kumar, Principal Scientist, took over the charge of Civil Section as the Head w.e.f. June 28, 2013.
2. Dr. Neeraj Sharma, Principal Scientist, took over the charge of Civil Section as the Head w.e.f. Sept. 6, 2013 on relinquishing the charge by Dr. Rakesh Kumar.

Welcome on Joining CRRI

The Institute welcomes the newly joined member, as named below.

1. Sanjeev Shankar - Sec. Officer - Sept. 16, 2013

Retirements/Transfers/Resignations

Staff Welfare Committee of CRRI gave a warm farewell party to the following staff member on retirement.

1. Dr. Nishi Mittal - Chief Scientist - July 31, 2013

TRAINING PROGRAMMES/COURSES CONDUCTED

A. Regular Training Programmes/Courses

- Traffic Engineering & Road Safety Audit (July 22-26, 2013).
- Design, Construction and Maintenance of Flexible Pavements (Sept. 2-6, 2013).



B. Customized/Special Training Programmes/Courses

- On the request of National Rural Roads Development Agency (NRRDA), customized training programmes in four batches on Project Preparation, SBD, Quality Assurance and Maintenance of Rural Roads for the field Engineers involved in PMGSY works were organized.
 - July 8-12, 2013 ■ July 15-19, 2013
 - July 29 - Aug 2, 2013 ■ September 9-13, 2013
- Customized training programmes in two batches on "Flexible and Rigid Pavements for Rural Roads under PMGSY scheme" for AEs to SEs of RED, UP were organized.
 - August 12-17, 2013
 - August 22-27, 2013
- An International Course on "Dissemination of HDM-4" was organized from Sept. 16 to 27, 2013 which was attended by twenty participants from Tanzania and India.



सम्पादक मंडल

संरक्षक : डा. एस. गंगोपाध्याय, निदेशक

सम्पादक :

श्री टी. के. आमला, मुख्य वैज्ञानिक एवं प्रमुख, सूचना, सम्पर्क एवं प्रशिक्षण, श्री बी. एम. शर्मा, मुख्य वैज्ञानिक श्रीमती अनिता अरोरा, तकनीकी अधिकारी; श्री मुकेश कुमार मीणा, वैज्ञानिक

फोटोग्राफी :

श्री अशोक कुमार