Final Report
On
Geohazard Risk Management Workshop 2024

(GeoMandu 2024 Preconference Program)

Kathmandu, Nepal

November 25 to 27, 2024

The Entrance Cafe, Chakupat, Lalitpur

Organizers

Nepal Geotechnical Society (NGS)

National Disaster Risk Reduction and Management Authority (NDRRMA)

BGC Engineering Inc. (BGC)

Background

Nepal is one of the highly susceptible regions to geohazard, primarily due to its young mountain range, diverse climatic condition and unique topography within the Hindukush region. These vulnerabilities are further intensified due to increasing impacts of climate change, presenting a serious concern for the safety and development of the nation. Currently, Nepal is actively engaged in numerous significant infrastructure projects such as the Kathmandu-Terai fast track, East-West railway, Melamchi water supply, Sikta and Ranijamara irrigation projects, and several hydropower initiatives with a combined capacity exceeding 30,000 MW. Unfortunately, these numerous large-scale projects in Nepal are facing significant geotechnical and geo-disaster challenges, resulting in substantial loss of life and property.

In order to address these critical issues, there is a pressing need to empower Nepali engineers, designers, and planners in the field of disaster risk reduction (DRR). Recognizing this need, Nepal Geotechnical Society (NGS) and BGC Engineering Inc. (BGC Engineering) had originally planned to organize a geohazard workshop in 2020. However, due to COVID-19 pandemic, it had to be postponed. Now, NGS has rescheduled the workshop for November 2024, involving several engineers and geoscientists from BGC Engineering. The workshop will be attended by Nepali engineers and geologists, from both government and non-government sector, as well as researchers from Nepali universities. The primary objective of this workshop is to facilitate the transfer of North American expertise and knowledge in disaster risk reduction management (DRRM) to empower Nepalese professionals and researchers, enabling them to contribute to sustainability efforts.

Introduction

The "Geohazard Risk Management Workshop," organized by the Nepal Geotechnical Society and BGC Engineering Inc. (BGC Engineering), is a three-day event planned in Kathmandu, Nepal, with the goal of equipping Nepali engineers and geoscientists with comprehensive knowledge and practical skills for geohazard assessment, mitigation, and management. The workshop comprises lectures, hands-on exercises to ensure a holistic learning experience. It seeks to enhance participants' understanding of various geohazards, promote knowledge exchange, and facilitate hands-on learning. The workshop targets 60 participants from diverse sectors young researchers, policy-makers and professionals. Workshop instructors include experts from BGC Engineering and other parts of globe and professionals/researchers from Nepal. The workshop's primary objective is to empower Nepali professionals to contribute to geohazard assessment and management, ultimately improving the country's resilience.

The Geohazard Risk Management Workshop 2024 was successfully conducted in Kathmandu from November 25–27, 2024. The event brought together over 70 participants from diverse backgrounds, including government officials, researchers, and professionals, to strengthen Nepal’s capacity in geohazard assessment and disaster risk management.

Workshop Objectives

1. Enhance Understanding of Geohazards: The workshop aims to provide participants with a comprehensive understanding of geohazards, their types, and the specific challenges they pose to infrastructure and communities of Nepal. This includes both natural and anthropogenic geohazards (glof, debries flow, debris floods, landslide) on key infrastructures roads and linear infrastructure, hydropower, dams and reservoirs water supply and resident developments.
2. Skill Development for Engineers: To equip Nepali engineers, professionals and researchers with practical skills, tools, and techniques for geohazard assessment, mitigation, and management. This includes hands-on training sessions to ensure engineers can apply their knowledge effectively in real-world scenarios.
3. Hands-on Learning: The workshop will facilitate hands-on learning through case studies. This practical approach will enable participants to apply geohazard assessment and mitigation techniques, enhancing their proficiency.
4. Promote Knowledge Exchange: To foster a platform for knowledge exchange and collaboration among participants, instructors, policy makers, as well as national and

international experts. This collaborative environment will encourage the sharing of best practices, innovative solutions, and experiences related to geohazard assessment and management.

Workshop Overview:

- *Duration:* 3 Days (Nov 25–27, 2024)
- *Venue:* The Entrance Café, Chakupat, Lalitpur
- *Participants:* 70+ engineers, researchers, and professionals
- *Organizers:* NGS, NDRRMA, and BGC Engineering Inc.

The workshop featured interactive lectures, practical case studies, and group exercises led by international and national experts. Sessions focused on hazard identification, risk management frameworks, and geohazard mitigation strategies.

Figure 1: Experts in different module of Workshop

Workshop principle:

► Themes

A. Understanding Landslides:

- Focus on Case Studies: Shift from detailed technical explanations of landslide types to real-world examples showcasing different causes and triggers.

B. Risk Management for Landslides:

- Decision-Making Process: Highlight steps in identifying hazards, engaging stakeholders, and selecting mitigation strategies.
- BGC Workflow: Present BGC's process from problem identification to post-implementation monitoring.
- Data Collection & Analysis: Emphasize practical methods like field data collection, remote sensing, and risk modeling.
- Performance-Based Design: Showcase adaptable, resilient design approaches suited to evolving conditions.

► Include hands-on activities
  - Practice sessions
  - Case history discussions

► Presentations by both Nepali experts and BGC and maybe other international experts

► This is a short course rather than a conference. Content will be curated and delivered by invited lecturers. Presentations will be 30 to 60 minutes long followed by interactive discussions.

Figure 2: Interaction of participants with Experts and Group Exercise

Workshop Course and schedule

Day 1 (Monday, November 25): 2024 Geohazard Risk Management Workshop

Start time	End time	Session	Presenters	Presentation Topics
9:30	10:30	Formal program and group photo		
10:30	11:00	Introduction Session	Netra Prakash Bhandary	Introduction to the workshop - purpose, objectives, expectations, outline of hazards / topics / presenters
11:00	11:30		Anil Pokhrel	Current practice in Nepal: examples of hazards, disasters, risk management practice, gaps in experience & knowledge
11:30	12:00	Hazard types, triggers, causes (Landslides primarily)		Technical summary of the primary hazard types that will be discussed in the workshop - landslides, GLOF, debris floods
12:00	12:45	Lunch Break		
12:45	13:45	Risk and risk reduction	Alex S (BGC)	Risk is intersection of hazard, exposure, vulnerability
13:45	14:45	Risk management framework	Alex S (BGC)	Defining the problem and objectives, regional prioritization
14:45	15:00	Regional Perspectives	Bhesh Raj Thapa	Wrap-up with local experience and practice
15:00	15:15	Short break		
15:15	17:45	Geohazard risk management for Roads and Linear Infrastructure	Lauren H (BGC)	Project workflow for regional prioritization for multi-asset and multi-hazard projects. Introduce two case studies from British Columbia, Canada on application of geohazard risk management and risk-informed prioritization for linear infrastructure projects.
17:45	18:00	Regional Perspectives	Prabhat Kumar Jha	Wrap-up with local experience and practice.

Day 2 (Tuesday, November 26): 2024 Geohazard Risk Management Workshop

Start time	End time	Session	Presenters	Presentation Topics
9:30	9:45	Day 2 Introduction	NGS	Welcome, review of day 1, expectations for day 2
9:45	10:00	Geohazard risk management for Communities	Emily (BGC)	Introduction to communities projects and project objectives
10:00	11:30			Canmore case study: short and long term mitigation, early warning systems, regional prioritization, quantitative risk assessment, lessons learned
11:30	11:45	Short Break		
11:45	12:30	Geohazard risk management for Communities	Emily (BGC)	Cheekeye case study: scope definition; use of decision tools, including quantitative risk assessment and cost-benefit analysis; importance of operations and maintenance
12:30	13:00		Ramesh Guragain	Vulnerability reduction - Earthquake risk, NSET's building code implementation program
13:00	14:00	Lunch Break		
14:00	15:30	Geohazard Risk management for Water Supply and Dams	Alex S (BGC)	Melamchi water supply intake case study: risk reduction options, risk management design process
15:30	15:45	Short Break		
15:45	17:15	Geohazard Risk management for Water Supply and Dams	Alex S (BGC)	Dams: Common risks and failure modes, potential failure mode analysis, semi-quantitative risk assessment
17:15	17:30	Regional Perspectives	Vishnu Prasad Pandey	Wrap-up with local experience and practice

Day 3 (Wednesday, November 27): 2024 Geohazard Risk Management Workshop

Start time	End time	Session	Presenters	Presentation Topics
9:30	9:45	Day 3 Introduction	NGS	Welcome, expectations for day 3
9:45	10:45	Codal Practice	Neelima Satyam	Codal Practice for Infrastructure Design in South Asia
10:45	13:00	Group Exercises – Session 1	Keshab Sharma Emily Mark Alex Strouth Lauren H	Participants will apply the geohazard management framework to local Nepali case studies through facilitated exercises.
13:00	14:00	Lunch Break. Additional short breaks will be offered within the sessions in the morning and afternoon as needed.		
14:00	15:30	Group Exercises – Session 2	Keshab Sharma Emily Mark Alex Strouth Lauren H	Continuation of Session 1.
15:30	16:00	Workshop closing formal program	NGS	

International Experts
Alex Strouth, Ph.D., P.Eng., Principal Geological Engineer.
Emily Mark, M.Sc., P.Eng., Senior Geological Engineer
Keshab Sharma, Ph.D., Geotechnical Engineer
Lauren Hutchinson, M.Sc., P.Eng., Senior Geotechnical Engineer
Neelima Satyam, Prof. Ph.D., Geotechnical Engineer

National Experts
Amod Mani Dixit, Prof. Ph.D., Disaster Expert (Earthquake)
Anil Pokharel, NDRRMA CEO, Disaster Expert
Bashant Raj Adhikari, Dr. Chief Center of Disaster Studies, IOE
Bhim Kumar Dahal. Dr. Geotechnical Engineer, IOE
Dhundi Raj Pathak, Assoc. Prof. Ph.D., Geo-environmental Engineer
Krishna Chandra Devkota, Dr. Vice President, National Planning Commission
Mandip Subedi, Assoc. Prof. Ph.D., Geotechnical Engineer
Mohan Prasad Acharya, Ph.D, Geotechnical Engineer.
Netra Prakash Bhandary, Prof. Ph.D., Geotech/Disaster Expert
Prabhat Kumar Jha, Joint Secretary GON, Geotechnical Engineer
Ramesh Guragain, Ph.D, NSET, Structural Engineer (Earthquake Disaster)
Ranjan Kumar Dahal, Assoc. Prof. Ph.D., Geological Engineer
Vishnu Prasad Panday, Prof., Water Resources Engineer

Technical Coordinator
Alex Strouth. Principal Geological Engineer.

Organizing Committee
Amod Mani Dixit, Prof. Ph.D., Disaster Expert
Apil KC, Urban Planner and Disaster expert, PhD student Michigan University
Dhundi Raj Pathak, Assoc. Prof. Ph.D., Geo-environmental Engineer
Indra Prasad Acharya, Ph.D., Geotechnical Engineer
Kalpana Adhikari, Geotechnical Engineer
Mandakini Karki, Geotechnical Engineer
Mandip Subedi, Assoc. Prof. Ph.D., Geotechnical Engineer
Netra Prakash Bhandary, Prof. Ph.D., Geotech/Disaster Expert
Rajan K.C., Geotechnical Engineer
Swati Acharya, Geotechnical Engineer
Uday Neupane, Geotechnical Engineer
Saroj Adhikari, Geotechnical Engineer
Bipul Mainali, Graduate student
Biplab Acharya, Undergraduate student

Organizing Coordinator
Mandip Subedi, Assoc. Prof. Ph.D., Geotechnical Engineer

Workshop Participants

A. Workshop: Professionals from government of Nepal, private firms and consultancies, INGOs, NGOs, and graduate students (PhD an MSc) of geotechnical engineering and engineering geology

   Participants no: 70

Organization	Nos	Remarks
Grad students/researchers	30	Students PhD and Masters, working researchers
Professionals	15	Working individual or with non-governmental organizations
Government Engineers	15	Working in different department. Engineering related
Policy makers/Journalist	10	People who influence in policy makers, MP, municipality mayor, National planning commission, NDRRMA etc.

Impacts of this workshop

The impacts of "Geohazard Risk Management Workshop" are:

1. Enhanced Expertise: Participants gained a deeper understanding of geohazards, enabling them to assess and manage these hazards more effectively.
2. Resilient Infrastructure Development: Improved knowledge and skills resulted in the design and construction of infrastructure capable of withstanding geohazard challenges.
3. Effective Disaster Risk Reduction (DRR): Participants developed strategies to minimize geohazard impacts, improving safety and protection of property.

4. Policy Influence: The inclusion of policymakers created opportunities to influence disaster risk reduction policies at various levels.
5. International Collaboration: Interaction with international experts fostered collaboration and supported the adoption of global best practices in geohazard management and DRR.

In summary, the workshop empowered professionals to enhance geohazard preparedness, leading to safer infrastructure, resilient communities, and more effective disaster risk reduction efforts.

Gallery

Figure 3: Regional Perspective from National Experts

Figure 4: Casual Picture during Workshop

Figure 5: Interaction Activities beyond workshop Activities

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Organizing Partners