

RISK2RESILIENCE

Nepal's Collective Journey towards a Safer Future

International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal

18-20 June 2018
Kathmandu, Nepal

Convener's Report

LEARNING FROM THE PAST 3 DECADES

UNDERSTANDING THE PRESENT

SEARCHING THE FUTURE



NSET
Earthquake Safe Communities in Nepal



Chief Editor

Dr. Amod Mani Dixit

Editors

Khadga Sen Oli

Alice Boyd

Contributors

Session Coordinators

Mr. Bijay Krishna Upadhyay
Mr. Dev Kumar Maharjan
Mr. Ganesh Kumar Jimée
Ms. Hima Shrestha
Mr. Khadga Sen Oli
Ms. Kirty Tiwari Jaisi
Ms. Maritess Tandingan
Dr. Narayan Marasini
Ms. Nisha Shrestha
Mr. Ranjan Dhungel
Mr. Surya Bhakta Sangachhe

Rapporteurs

Mr. Aashis Tiwari
Ms. Aditi Dhakal
Ms. Aparajita Gautam
Mr. Ayush Baskota
Mr. Dipu Chapagain
Ms. Hima Shrestha
Mr. Kapil Bhattarai
Mr. Mahanand P. Timalisina
Ms. Manisha Pantha
Mr. Manish Raj Gouli
Ms. Maritess Tandingan
Mr. Nirajan Budathoki
Ms. Omkala Khanal
Mr. Prakash Guragain
Mr. Pramod Khatiwada
Ms. Priyanka Singh
Mr. Rabin Chaulagain
Mr. Prayash Malla
Mr. Sanju Sharma
Mr. Sushil Pandit
Dr. Sweeta Sijapati

Secretariat

Ms. Niva Upreti, Ms. Rita Thakuri, Ms. Nirmala Rai

Layout and Graphics Works

Mr. Chandan Dhoj Ranamagar





RISK2RESILIENCE Organizing Committee

Chair:	Mr. Kedar Neupane, then Chief of Disaster Management Division of the Ministry of Home Affairs (MoHA)
Co-Chair:	Mr. Varun Prasad Shrestha, President, NSET
Convener:	Dr. Amod Mani Dixit, General Secretary, NSET
Co-Convener:	Mr. Surya Narayan Shrestha, Executive Director, NSET
Member:	Mr. Bijay Krishna Upadhyay, Director, NSET
Member:	Mr. Ganesh Kumar Jimjee, Director, NSET
Member:	Prof. Dr. Gokarna Bahadur Motra, Campus Chief, Pulchowk Campus
Member:	Mr. Khadga Sen Oli, Advocacy Manager, NSET
Member:	Mr. Manohar Rajbhandari, Board Member, NSET
Member:	Dr. Rabindra Prasad Dhakal, Technical Faculty Chief, NAST
Member:	Mr. Rajendra P. Khanal, DG, DMG
Member:	Mr. Shiva Hari Sharma, DG, DUDBC
Member:	Mr. Shreeram Singh Basnet, Board Member, NSET
Member:	Mr. Yam Lal Bhusal, Joint Secretary, NRA (later transferred to PMO)
Member:	Mr. Yogeshwor Krishna Parajuli, Board Member, NSET

RISK2RESILIENCE Advisory Committee

1.	Dr. Achyut Sapkota	11.	Mr. Kul Mani Acharya
2.	Dr. Binod Shrestha	12.	Dr. Netra Prakash Bhandary
3.	Prof. Dr. Binod Tiwari	13.	Prof. Rajendra Dhoj Joshi
4.	Dr. Ganga Lal Tuladhar	14.	Mr. Rajesh Thapa
5.	Mr. Gopi Krishna Khanal	15.	Mr. Reshmi Raj Pandey
6.	Er. Hare Ram Shrestha	16.	Mr. Shambhu KC
7.	Lt. Col. Jagdish Khadka	17.	Mr. Sushil Gyewali
8.	Prof. Dr. Jiba Raj Pokharel	18.	Mr. Thakur Dhakal
9.	Dr. Kabi Raj Paudyal	19.	DIG Thule Rai
10.	Mr. Krishna Bahadur Raut	20.	Prof. Dr. Tri Ratna Bajracharya

RISK2RESILIENCE Technical Committee

1.	Dr. Basanta Raj Adhikari	7.	Prof. Dr. Prem Nath Maskey
2.	Dr. Bishnu Hari Pandey	8.	Dr. Ramesh Guragain
3.	Mr. Dwarika Shrestha	9.	Dr. Soma Nath Sapkota
4.	Dr. Hari Ram Parajuli	10.	Mr. Shreeram Singh Basnet
5.	Ms. Hima Shrestha	11.	Mr. Surya Bhakta Sangachhe
6.	Dr. Narayan Prasad Marasini		



Message from Prem Kumar Rai, Secretary, Ministry of Home Affairs



I am delighted to learn that a report capturing the experience, learning and resolution of the international conference Risk to Resilience is to be published and the convener has requested for my message. I am happy to write this message because I was impressed by the objectives, proceedings, assertions and resolution of the conference.

The conference was organized almost two and a half years after the April 2015 Gorkha earthquake that caused heavy physical devastation in 32 districts of Nepal. The earthquake also revealed the inherent resilience of the Nepalese society which helped us face the earthquake hazard and embark upon the tasks of search and rescue, relief, recovery and finally reconstruction; the entire response being firmly grounded on the principles of building back better, inclusiveness, sustainability and holistic approach. Nepal consistently addressed the different phases of the earthquake disaster as a continuum, looking at the phenomenon philosophically, and trying always to make the best out of the opportunities of improvement offered by the nature including the sense of unity which helped us to promulgate a new constitution of the Federal Democratic Republic of Nepal – a document that reflects the aspirations and dreams of all Nepali people. In the spirit of new Constitution, Nepal promulgated the Disaster Risk Reduction and Management Act 2017, which encompasses modern concepts of comprehensive Disaster Risk Reduction. Just before the conference, a Meeting of National Council for Disaster Risk Reduction and Management on the June 18, 2018 chaired by Rt. Hon. Prime Minister of Nepal has endorsed National Disaster Risk Reduction Policy 2018 and National Disaster Risk Reduction Action Plan 2018-2030. These steps are to support the process of building community resilience and furthering the provisions of the new Act and also in line with Sendai Framework for Disaster Risk Reduction (SFDRR).

The International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal, also known as Risk 2 Resilience or R2R was organized exactly to emphasize these needs and priorities. Organized jointly by Government of Nepal, Ministry of Home Affairs, Nepal (MoHA), National Reconstruction Authority (NRA), Nepal Academy of Science and Technology (NAST), and the National Society for Earthquake Technology-Nepal (NSET) in partnership with various DRR stakeholders in Kathmandu during June 18-20, 2018, R2R listened to invaluable keynote speeches, Technical Sessions, Panel Discussions and Side Events. R2R concluded with a resolution that has suggested priority areas for effective implementation of DRR and CCA contributing to the achievements of the sustainable development goals.

Last but not the least, I would appreciate and thank organizing teams from the Ministry of Home Affairs, National Reconstruction Authority (NRA), National Academy of Science and Technology (NAST) and NSET for the untiring efforts to accomplish this International Conference with such a grand success. Also, we are very much grateful to our Organizing Partners, Knowledge Partners and Platinum Sponsor of this Conference.

Thank you all!





Message from Mr. Kedar Neupane¹, Chair, RISK2RESILIENCE Organizing Committee



I am happy to learn that the proceedings of the **International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal**, also known as Risk 2 Resilience or R2R, is about to be published as the convener's report. The conference was an example of joint works by the National Reconstruction Authority (NRA), Nepal Academy of Science and Technology (NAST) and National Society for Earthquake Technology Nepal (NSET) in association with DRR stakeholders under the leadership of the Ministry of Home Affairs –the apex body for disaster management in Nepal. During the conference time, I was serving as the Chief of the Disaster Management Division of the Ministry of Home Affairs of the Government of Nepal. The organizers unanimously proposed to me to serve as

the Chair of the Organizing Committee, a responsibility I could discharge thanks to the cooperation and understanding I received continuously from all the members of the organizing committee and also from the Government of Nepal. Then I was serving as the chief of the Disaster Risk management division of the Home Ministry – the apex body for disaster management in Nepal.

R2R made a comprehensively assessment of the efforts made by Nepal in aspects of disaster risk management in the past two decades and judged the efficacy of the efforts against the experience of managing the Gorkha earthquake of 2015 and conducted a wide discussion on the priorities of disaster risk management efforts of Nepal in line with the recently updated national strategy for DRR and according to the four priority actions of the Sendai Framework for DRR

In this conference, there were a total 15 Keynote lectures and more than 80 papers presented in 12 Technical Sessions; the key conclusions of the technical sessions were further discussed in the related of the 11 Panel Discussions spread over the four SFDRR priorities. Two side events, one on youth's involvement in DRR and another on the social impacts of historical earthquakes in the region were also organized. A total of 250 technical and social scientists and senior administrators and managers shared their research and experience findings and opinion. Of the participants, 200+ were from Nepal and 40 participants from India, Bangladesh, Japan, UK, USA, Canada, Mexico, New Zealand, Malaysia, Singapore, Italy, Ireland, and China. I would like to thank them all for their invaluable contribution. I am thankful also to the distinguished members of Advisory Committee for all their guidance to conceptualize, design and execute the proceedings of this historical conference.

I extend my sincere gratitude to Hon. Home Minister and Home Secretary for their trust and regular encouragement to me and our team from Ministry of Home Affairs to work in the sector of Disaster Risk Reduction and Management in Nepal and for their continuous support to the conference.

NSET was responsible for managing the logistics of this collaborative scientific effort. I thank and appreciate NSET team and the Conference Convener Dr. Amod Mani Dixit for the dedication and oversight in organizing this conference from the stage of conceptualization to the conclusion of the conference resolution.

I appreciate and thank the National Reconstruction Authority (NRA) and National Academy of Science and Technology (NAST) for their contribution and ownership. We are much thankful to all other partners associated with the organization of this conference.

At last, I would like to acknowledge the untiring efforts of Organizing team members from the Ministry of Home Affairs and the Disaster Management Division.

Thank you all.

¹ Mr. Neupane was then Joint Secretary and Head of Disaster Management Division, Ministry of Home Affairs, Government of Nepal. He is now the Secretary, Ministry of Land Management, Cooperatives and Poverty Alleviation, Government of Nepal.



Message from Surya Narayan Shrestha, Co-Convener, RISK2RESILIENCE Organizing Committee



NSET was born in the process of the development of the National Building Code, and it was officially registered in 1994 – the year of the First UN Conference on Disaster Risk Reduction in Yokohama. NSET aligns all of the works in the past 25 years with that of the efforts made by Nepal since the 1988 Udaypur Earthquake to the reconstruction of 2015 Gorkha Earthquake - that way a jubilee year for NSET happened also the quarter century long efforts of managing and minimizing disaster risk in Nepal by all stakeholders including the UN system and the international development partners under the leadership of the Government of Nepal.

In this background, NSET is very happy to have International Conference RISK2RESILIENCE (R2R) organized under the leadership of Government of Nepal's Ministry of Home Affairs together with National Reconstruction Authority, National Academy of Science and Technology (NAST) and NSET in close collaboration with various agencies, organizations and individuals.

The NSET's experiences of organizing Annual Symposium annually on the occasion of the Earthquake Safety Day as the Member Secretary of the ESD National Committee and NSET's leadership in the implementation of the regional program for enhancement of emergency response (PEER) in South-East Asia since 2003 and currently in South Asia exposed NSET to earthquake response works in Gujarat, Banda Aceh, Bam and in Kashmir. Our professionals worked in the earthquake theatres on invitation and contributed to the response and reconstruction. Similarly, our professionals are in close relation with the emerging group of emergency responders in SAARC and AESEAN countries in MFR, CSSR, SWR, CADRE etc. This has helped develop the understanding and person-to-person relation among the DRR professional of the region and that of Nepal.

NSET homed into the organization of the conference with this background. As we learned from the events in the region and implemented those in the broader framework of DRR in Nepal, learning from the experiences of other countries, we therefore considered it our responsibility to consolidate the gains made by Nepal in the past 25 years, check what worked to face the Gorkha earthquake and where we failed and how we can improve our modus operandi and policies as well as implementation strategy for helping the country and the region meet the indicators of DRR and SDGs for the watershed of 2030 .

The 2015 Gorkha Earthquake indicated several areas of improvement including those in policy and standards. The R2R was a great platform to look into the achievements of earthquake reconstruction in a continuum of the entire process of earthquake response – and the policy and legislative changes. New areas of improvements have been identified together with new avenues that Nepal should chart.

I thank the organizing committee headed by the Ministry of Home Affairs and all of the members from NRA, NAST and various government agencies, academia, DRR professionals, private sector and NSET; the speakers, presenters and conference participants as well and all partners and everyone involved in this important endeavor.

I am happy that NSET, the member secretary has endeavored to bring out the proceedings. I find that this book has made justice to the conference participants by correctly reflecting their views. This will also be a historical document as it reproduces the road map of DRR that the R2R came up with.

Thank you all.





Convener's Reflection and Acknowledgements



Awareness on disaster reduction started with the devastation due to the Udaypur Earthquake of 1988 and the floods in South-Central Nepal in 1993 – national building code was formulated and the need for better relief standards and coordinated efforts in health sector preparedness and others was realized. Participation in the UN-led initiatives in disaster management helped a lot in Nepal's quest towards realizing the needs. However, low level of education and low economic strength of the country combined with prevailing fatalism retarded the process although several initiatives such as enhancing capacities in medical first response, search and rescue in collapsed buildings, hospital preparedness for emergencies and community led household level disaster response were started. The need for radical change in policy and legislative regime in the country was realized and several efforts such as policy instruments such as NSDRM, NDRF, DPRP/LDRMP developed and enacted, mechanisms established, and work procedures implemented; and capacity development works including establishment of training centers done, training curricula in DRR started.

The 2015 Gorkha Earthquake put all these efforts to a litmus test. The impact was massive, nearly 9,000 persons lost their lives, more than 22,000 persons got injured, more than 800,000 houses collapsed; and millions of people impacted, massive economic losses incurred. Concerned were raised if Nepal could withstand such massive devastation and people drew parallels with recent earthquake response in Haiti. Nonetheless, Nepal started earthquake response immediately and rationally, with search and rescue operations executed effectively, with the Ministry of Home Affairs leading a coordinated effort of our national security forces augmented by the assistance from more than 30 international search and rescue teams that started landing in Nepal within hours after the main event. Local communities throughout the earthquake affected areas demonstrated unprecedented resilience and act of collaboration in extricating the victims trapped inside the collapsed houses to dead body management and distribution of relief packages. Damage assessment started immediately after shaking and got more organized after a short while. Nepal could accomplish Post Disaster Needs Assessment (PDNA) within two months of main shock, that formulated principles of building back better with locally owner driven approaches maximizing the use of local materials and human resources. A National Reconstruction Authority (NRA) was established that coordinated the efforts of earthquake reconstruction providing regulatory leadership to all efforts by the different stakeholders national or international. Reconstruction works were almost midway when the conference was held.

Thus, the policies, strategies, and all efforts of institutional and human resources capacity building as well as that of our approaches and methodologies of risk reduction – all were subjected to testing by the Gorkha Earthquake sequence of 2015. The outcome of this testing needed to be documented and the experiences and expensive lessons learned had to be documented.

It is with this desire to collectively discuss the successes and mistakes of the past and to learn about the efficacy of our approaches, and based on this knowledge, to chart out a strategy for earthquake risk management in the country, we decided to organize this international conference. Celebrating the current success of Gorkha Earthquake reconstruction was another reason why we decided to organize the **International Conference on Experience of**



Earthquake Risk Management, Preparedness and Reconstruction in Nepal (R2R). 2018 also marked the 25th year since the formulation of the National Building Code during which NSET was established. I am very happy to report that the conference was a great success and we achieved the desired objectives.

I sincerely thank the Ministry of Home Affairs and NSET for assigning me with the responsibility of convening this conference. I retired from the position of the Executive Director of NSET after 25 years of service to the organization which I founded in 1994. For me, this conference also was a review of my own mistakes and contribution to the cause of earthquake risk reduction in Nepal and the region. I am happy to report here that endorsement by many distinguished personalities of the works of NSET has made me extremely proud of the works we have done collectively through this unique and magnificent organization NSET which always acted as per the directives and aspirations of the government of Nepal.

I am thankful also to the Ministry of Home Affairs, National Reconstruction Authority (NRA), National Academy of Science and Technology (NAST), the Management Committee of NSET and its current executive leadership, and all organizing partners, knowledge partners and sponsoring partners who joined hands in this endeavor.

I am indebted to the Chair and members of the organizing committee for the guidance and inspiration provided. The Technical Committee helped in the initial design and structuring of the conference and deserve special acknowledgements.

I also extend my gratitude to the international scientists invited to deliver keynote speeches. Many of these are prominent scientists have helped Nepal while being affiliated to different international agencies, universities, consulting and research organizations. One common denominator for all of them is their important works and contribution in earthquake hazard and risk assessment and more importantly, in aspects of earthquake risk and vulnerability reduction through technical assistance, capacity building, policy dialogues, and planning for modern instrumentation and methodology improvement and updating.

I am thankful to the paper presenters – these were the senior scientists selected from among those movers and shakers who actually contributed to implementing programs and initiatives for reduction of earthquake and other hazard risks in Nepal through providing professional services in areas of policy development, hazard and risk assessment, reduction of earthquake risk either through helping to build better code compliant houses or developing capacities for better preparedness in medical response or collapsed structure and water rescue.

I should also mention here that the rank and file of NSET always assisted me with their professional hard work, communication and logistics management skills, devotion and excellent teamwork. I thank them all. Last but not the least, I extend my thankfulness to the current executive leaders, Mr. Surya Narayan Shrestha (Executive Director), Dr. Ramesh Guragain (Deputy Executive Director) and all division chiefs and program managers for the collective work and congratulate at this collective accomplishment.





ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AIRDR	Assessment of Integrated Research on Disaster Risk
APF	Armed Police Force, Nepal
BBB	Build Back Better
BCIT	British Columbia Institute of Technology
BCP	Business Continuity Planning
BTS	Base Transceiver Station
CCDRR	Child Centered Disaster Risk Reduction
CDS/IOE	Center for Disaster Studies of the Institute of Engineering
CEO	Chief Executive Officer
CLPIU	Central Level Project Implementation Unit
CSS	Comprehensive School Safety
CSR	Corporate Social Responsibility
CSSR	Collapsed Structure Search and Rescue
DCH	Drop, Cover and Hold On
DCH	Dhaka Community Hospital
DFID	Department for International Development
DMC	Disaster Management Committee
DPER	Disaster Preparedness and Emergency Response
DPNet	Disaster Preparedness Network, Nepal
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRR&M	Disaster Risk Reduction and Management
DWIDM	Department of Water Induced Disaster Management
E-BPS	Electronic Building Permit System
EMIS	Emergency Management Information System
ERP	Emergency Response Plans
ESD	Earthquake Safety Day
FORIN	Forensic Investigations of Disasters
GDP	Gross Domestic Product
GEM	Global Earthquake Model
GHI	GeoHazards International
GIZ	German Agency for International Development
GLOF	Glacial Lake Outburst Flood
GMPE	Ground Motion Prediction Equation
GON	Government of Nepal
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HRRP	Housing Recovery and Reconstruction Platform
ICIMOD	International Centre for Integrated Mountain Development
ICNR	International Conference on Nepal's Reconstruction
ICSU	International Council for Science
ICUS	International Center for Urban Safety Engineering
IHRR	Institute of Hazard, Risk and Resilience
IIS	Indian Institute of Science
INGO	International Non-governmental Organization



IOE	Institute of Engineering
TU	Tribhuvan University
IRDR	Integrated Research on Disaster Risk
JICA	Japan International Cooperation Agency
KMC	Kathmandu Metropolitan City
KN	Keynote
MFR	Medical First Response
MIP	Micro Insurance Pool
MOALMC	Ministry of Agriculture, Land Management and Cooperatives
MOEST	Ministry of Environment, Science and Technology
MoHA	Ministry of Home Affairs
NA	Not Applicable
NAST	Nepal Academy of Science and Technology
NCDRR	National Council for Disaster Risk Reduction
NDRF	National Disaster Response Force
NEA	Nepal Engineers' Association
NEOC	National Emergency Operation Center
NGO	Non-Governmental Organization
NHSSP	Nepal Health Sector Support Programme
NP	Nepal Police
NPR	Nepalese Rupees
NRA	National Reconstruction Authority
NRCS	Nepal Red Cross Society
NSET	National Society for Earthquake Technology - Nepal
NSM	Non-Structural Mitigation
NTA	Nepal Telecommunications Authority
OGS	National Institute of Oceanography and Experimental Geophysics, Italy
PD	Panel Discussions
PDNA	Post Disaster Needs Assessment
PDRF	Post Disaster Response Framework
PO	Partnering Organization (in disaster response and /or reconstruction)
PSHA	Probabilistic Seismic Hazard Analysis
Q&A	Question and Answer
R2R	Risk2Resilience International Conference
RADAR	Radio Detection and Ranging
RADI	Institute of Remote Sensing and Digital Earth of the Chinese Academy of Sciences
RDT	Resolution Drafting Team
ROAP	Regional Office for Asia and the Pacific
SAR	Search and Rescue
SCAEF	Society of Consulting Architectural and Engineering Firms
SDG	Sustainable Development Goals
SEANEP	Structural Engineers Association Nepal
SERI	Structural and Earthquake Engineering Research Institute
SFDRR	Sendai Framework for Disaster Risk Reduction
SiDRR	Silk Road on Disaster Risk Reduction
SONA	Society of Nepalese Architects





SSDMA	Sikkim State Disaster Management Authority
SSDP	School Sector Development Plan
TA	Technical Assistance
Tech.	Technical
TS	Technical Session
TU	Tribhuwan University
TUTH	Tribhuwan University Teaching Hospital
UK	United Kingdom
UN	United Nations
UNDP	United Nations development Programme
UNICEF	United Nations International Children's Emergency Fund (United Nations Children's
UNDRR	Office of United Nations Disaster Risk reduction (UNDRR)
UNISDR	United Nations International Strategy for Disaster Reduction (Renamed as the Office of United Nations Disaster Risk reduction (UNDRR)
UNOPS	United Nations Office of Project Services
US	United States (of America)
USAID	United States Agency for International Development
WB	World Bank



Table of Contents

1	Introduction	1
1.1	General	1
1.2	Background	1
1.3	Conference Objectives	2
1.4	Conference Themes	2
1.5	Conference Participants	2
1.6	Conference Resolution	3
2	Conference Organization	3
2.1	Organizing Committee	3
2.2	Advisory Committee	4
2.3	Technical Committee	4
2.4	Sessions Coordinators	4
2.5	Conference Participants	4
2.6	Conference Partners	4
2.7	Knowledge Partners	4
2.8	Conference Sponsors	5
3	CONFERENCE STRUCTURE	5
3.1	General	5
3.1.1	Three Days of the Conference divided as Past, Present and Future	5
3.1.2	Learning from the experience of the past 3 decades	5
3.1.3	Understanding the present: lessons from the 2015 Gorkha earthquake sequence	6
3.1.4	Setting the future - National Priorities in Earthquake Risk Management	6
3.2	Side Events	6
3.2.1	Earthquakes in South Asia: Lessons from History	6
3.2.2	Young Scientists in Disaster Risk Reduction of Nepal	8
3.3	A Musical Soiree	8
3.4	Field Excursion on Earthquake Reconstruction	8
3.5	Conference Documentation	8
4	Conference Proceedings	9
4.1	Opening Ceremony	9
4.2	Keynote Sessions	9
4.3	Technical Sessions	11
4.4	Panel Discussions	14
4.5	Conclusion of Other Panel discussions on Specific Topics	16
4.6	Conference Resolution and its genesis	17
4.6.1	The resolution	17





4.6.2	Resolution Discussion in Plenary	18
4.7	Closing of the Conference.....	18
4.8	Post-Conference Event: NSET marks Silver Jubilee of its Journey	18
5	Conference Budget.....	19
Appendices		20
Appendix 1: RISK2RESILIENCE Conference Resolution		20
Appendix 2: Conference Organizing Teams.....		26
Appendix 3: Summary of Keynote Presentations		28
Appendix 4: Summary of Presentations in Technincal Sessions		40
Appendix 5: Summary of Panel Discussion Sessions.....		93
Appendix 6: The Musical Soiree		120
Appendix 7: NSET marks Silver Jubilee of its Journey		122
Appendix 8 Key Photographs of the Conference.....		124
Appendix 9: Conference Speakers.....		133
Appendix 10: Financial Report on Income and expenses for the Conference organization (Schedule of Financial Resources and expenditures)		140
Appendix 11: Digital Files of Presentations made at R2R		141



1 INTRODUCTION

1.1 General

This is a Convener's Report on **RISK2RESILIENCE (R2R)**, an International Conference on **Experience of Earthquake Risk Management, Preparedness and Reconstruction** organized in Kathmandu on 18-20 June 2018. The main purpose of this document is to report back to the Organizing, Advisory and Technical Committees, the sponsors, Knowledge Partners, and above all, to the people of Nepal and the international community about the organization and achievements of the conference. This report also provides the financial report – the evidence of achievement of objectives in order to justify the expenses incurred.

The report is structured so that general information and rationale for the conference is in Section 1. Section 2 contains information on the conference organization; Section 3 describes the structure; while Section 4 contains the conference proceedings in chronological order. A summary financial report is presented in section 5. Several appendices provide the details and additional information.

1.2 Background

In the past decades since the 1988 M_w 6.6 Udaypur earthquake, Nepal has taken a great stride in earthquake and disaster risk management, with significant progress in policy formulation. This includes the development and implementation of the National Building Code, which is considered unique in view of its efforts to improve seismic performance of urban-non-engineered and rural buildings. Universities have started teaching courses in different fields of earthquake engineering and increasing number of researches are being undertaken in aspects of earthquake hazard and risk assessment and mitigation. Nepal has also advanced in seismological research including the establishment of a robust national network of seismographs, GPS and strong motion stations, as well as trenching of active faults to better understand past earthquake events.

There is visible development of national school of thought regarding earthquake risk management. Innovative methodologies and programs have been developed and applied collectively. A number of government and private sector organizations, including the civil society institutions, have implemented numerous initiatives in various fields of earthquakes risk management: earthquake awareness and education; assistance to Municipalities in Building Code implementation; and instrumentation and monitoring, for example. The 2015 Gorkha earthquake sequence tested usefulness and applicability of all of these initiatives and practicality of the empirical approaches adopted.

Nepal has learned rich but expensive lessons. It is with this desire to learn from the past and the need to search for future strategy that we organized this international conference *RISK2RESILIENCE*. The conference was aimed also at registering the successes of the Gorkha earthquake reconstruction and to evaluate the approaches adopted, particularly with respect to in their efficiency in the local context. The idea was to design an outline of a future strategy based upon the lessons learned so far in aspects of earthquake risk management in Nepal.





1.3 Conference Objectives

The following were the agreed upon objectives of the **RISK2RESILIENCE** International Conference.

- 1) To critically assess at what collectively was done for earthquake risk reduction & preparedness in Nepal in the past decades, in the light of 2015 Gorkha Earthquake sequence.
- 2) To comprehensively examine the experience of earthquake reconstruction so far – to identify the lessons learned; and
- 3) To looking forward to help set the Way Forward, that is charting out a broad outline of program approaches and major directions for implementing DRR, especially in areas of earthquake risk management so as to meet the goals set by the global frameworks in DRR (the Sendai Framework for Disaster Risk Reduction (SFDRR), the Sustainable Development Goals (SDGs), the New Urban Agenda, the Paris Agreement etc.).

1.4 Conference Themes

The conference was designed as a three-day event with a field trip to the reconstruction sites nearby Kathmandu Valley.

Day 1 – Past

Theme 1: Learning from the experience of the past 3 decades

Lessons from the past and work done so far are discussed by important operators of earthquake risk management initiatives such as the government ministries, academics, private sector businesses, international development partners and the UN system.

Day 2 – Present

Theme 2: Understanding the present: lessons from the 2015 Gorkha earthquake sequence

Exciting accounts of the response to the Gorkha earthquake are presented. These range from early recovery, rescue and relief, PDNA researches, to development of approaches for reconstruction. A critical evaluation of the approaches and methodologies adopted in earthquake reconstruction in the past, and those pursued at present, helped to develop a consensus on the positive, as well as negative, lessons.

Day 3 – Future

Theme 3: Setting the future - National Priorities in Earthquake Risk Management

Lessons from both days 1 and 2 are discussed further to help Nepal develop programs and refine strategies to target the national needs to achieve DRM targets of the Sendai framework (SFDRR) and other global agendas.

1.5 Conference Participants

All participants to the conference were by invitation only. Invitations were given to those who worked in the past in Nepal, either leading DRR initiatives or contributing as professionals, including many who continuously were helping promotion of DRR in Nepal, including those who contributed to Gorkha earthquake response and reconstruction, or are currently contributing to:

1. Understanding seismic hazards, physical and social vulnerabilities and characteristics of the exposure of the elements and assets at risk,



2. Enhancement of policy and legal environment that have facilitated mainstreaming disaster risk reduction into economic development efforts, development of strategies, legislations, regulations, codes and their updating,
3. Improving seismic performance and reduction of vulnerabilities, and
4. Earthquake preparedness for effective response, including enhancing capabilities in damage assessment and building triaging, medical response, collapsed structure search and rescue, hospital preparedness for emergencies, swift water rescues, development and establishment of a system of training for continually producing emergency responders, enhancement of national capabilities in build back better post-earthquake damage and devastation.

1.6 Conference Resolution

A draft resolution was discussed and critiqued in a plenary towards the end of the conference leading to a consensus on the document. The draft was read verbatim in the final closing session of the conference and adopted unanimously in the presence of Honorable Minister and Secretary of the Ministry of Home Affairs, leaders of academic and private sector businesses as well as senior representatives of the international development partners resident in Nepal. The Resolution captures the achievements Nepal has made, the lessons learned, the challenges faced, and identifies the future directions of efforts for Nepal to make in aspects of disaster risk management. The RISK2RESILIENCE Conference Resolution appears in Appendix 1.

2 CONFERENCE ORGANIZATION

The National Society for Earthquake Technology, Nepal (NSET) initiated the organization of the conference in view of a need to assess Nepal's national efforts in earthquake risk management. This is in view of the events over the past three decades since the 1988 Udaypur earthquake, especially since the 2015 Gorkha earthquake sequence tested several postulations and assumptions based on empiricism for implementing earthquake risk reduction initiatives. During the first joint meeting of the Technical and Advisory committees, it was informally decided to request the Ministry of Home Affairs (MoHA), the apex organization responsible for disaster risk management in Nepal, to lead the conference organization. Following a concurrence from all related institutions, the structure was decided:

Lead Organizer – Ministry of Home Affairs (MoHA)

Co-organizers – National Reconstruction Authority (NRA); Nepal Academy of Science and Technology (NAST); National Society for Earthquake Technology, Nepal (NSET)

Conference Secretariat – National Society for Earthquake Technology, Nepal (NSET).

The conference secretariat was hosted at NSET, Bhaisepati, Lalitpur. Dr. Amod Mani Dixit, General Secretary of NSET, who recently retired from the responsibilities of NSET's Executive Director, was given the responsibility of the Convener of R2R.

2.1 Organizing Committee

The **RISK2RESILIENCE** Organizing Committee comprised of renowned scientists and experienced disaster risk managers from pertinent agencies of the government, universities, civil society organizations, and the private sector business of Nepal. It was headed by Mr. Kedar Neupane, then chief of the Disaster management Division of the Ministry of Home Affairs of Nepal. The Chair maintained close communication with the government and chaired the





meetings that were held periodically for giving developing the scope and framework of the meeting, involvement of government and non-state agencies, and provided overall direction and crisis management. Full composition of the Organizing Committee appears in Appendix 2.

2.2 Advisory Committee

The Conference Advisory Committee was formed of senior national and international experts. The Advisory Committee was tasked with guiding the Organizing Committee with a broad oversight and scoping of the conference topics and contents. Appendix 2 lists the members of this committee.

2.3 Technical Committee

The Technical Committee was composed of members of various national and international organizations such as Institute of Engineering (IOE), British Columbia Institute of Technology (BCIT), Department of Mines and Geology, Institute of Engineering/ Tribhuvan University, NRA, and NSET.

2.4 Sessions Coordinators

The conference consisted of 12 technical sessions (TS), 11 panel discussions (PD), and 2 side events. A coordinator and at least one associate were assigned for all sessions. The coordinator designed the session details, was responsible for ensuring logistics and audio/video arrangements and helped session chairs with time keeping. Session Coordinator was also the crisis manager for the session.

The coordinators were drawn from the cohort of NSET. Appendix 2 provides the details.

2.5 Conference Participants

The Conference was attended by more than 500 representatives of eleven different countries: Bangladesh, Canada, China, India, Italy, Japan, Nepal, New Zealand, United Arab Emirates, United Kingdom and United States of America.

Participants came from various professions such as governance, policy maker, security forces, local authorities, scientist, seismologist, engineer, social scientist, geologist, DRR practitioners, researchers and students.

A list of the keynote presenters, invited lecturers, and panelists appears as Appendix 3.

2.6 Conference Partners

The conference was supported by our long-term partners Kathmandu Metropolitan City, Lalitpur Metropolitan City, USAID and Durham University, UK.

2.7 Knowledge Partners

The following professional association and civil society organization extended their collaboration in the business of the conference organization and its ownership as Knowledge Partners.

1. Nepal Engineering Association (NEA)
2. Society of Consulting Architectural and Engineering Firms (SCAEF)



3. Society of Nepalese Architects (SONA)
4. Disaster Preparedness Network, Nepal (DPNet)
5. Nepal Red Cross Society (NRCS)

2.8 Conference Sponsors

The sponsors are as outlines below:

Platinum Sponsor Jagadamba Steel Industries of Nepal

Other sponsors Medicity Hospital

World Link Communication

3 CONFERENCE STRUCTURE

3.1 General

The chart in the next page provides an overview of the entire proceedings of R2R. The next section provides the details.

3.1.1 Three Days of the Conference divided as Past, Present and Future

Day 1 commenced with registration and the opening ceremony. This was followed by a keynote talk. After lunch, there were 4 parallel technical sessions followed by 4 parallel panel discussions, all focusing on the priorities specified in the Sendai framework (SFDRR). The evening hosted a classical music event, which was by invitation only.

Day 2 began with a keynote session, which was followed by 4 parallel technical sessions focusing on priorities from the Sendai framework (SFDRR) alongside a side event. In the afternoon, there were 4 more parallel technical sessions, and then 4 parallel panel discussions, again all focused on the SFDRR priorities. The day ended with a conference resolution drafting committee meeting and the drafting of a resolution.

Day 3 also started with a keynote lectures from professionals, followed by 3 parallel panel discussions focusing on links between organizations, infrastructure and the national building code alongside a side event. To conclude, there was a session reporting from the various sessions and finally a closing ceremony.

3.1.2 Learning from the experience of the past 3 decades

Day 1 was devoted to sharing experiences of earthquake risk management from Nepal the Mw 6.6 Udaypur earthquake. Scientists shared their experiences in conducting earthquake risk management works; from assessment and policy formulation to risk reduction and preparedness for effective response capabilities. It produced a history of glorious works: the school earthquake safety program; the training of masons in earthquake resistant construction; the development of tools and resources such as NSET's shake table; the annual earthquake safety day, etc. There were many speakers throughout the day highlighting Nepal's numerous DRR-related programs and projects.





3.1.3 Understanding the present: lessons from the 2015 Gorkha earthquake sequence

Day 2 was devoted to understanding the value of the past works as tested by the Gorkha earthquake sequence of 2015 and the lessons to be learned. This included presentation and discussion on how Nepalese people and the government faced the Gorkha earthquake: how preparedness paid; what was right and what went wrong; the immediate search and rescue efforts (SAR); post-disaster needs assessment (PDNA); review of the assumptions made; the efficiency of approaches and their chronology; policies adopted in the past; and the needs for corrections and improvements. A good part of the discussion naturally centered around the experience of earthquake reconstruction, which although criticized as being slow, was considered as the best Nepal could do under the given circumstances. There is confidence to complete the physical reconstruction of all housing, heritages and infrastructure within the stipulated time.

3.1.4 Setting the future - National Priorities in Earthquake Risk Management

Day 3 was devoted to strategizing future priorities based upon the lessons of the conference.

3.2 Side Events

The conference proceedings included two side events centered respectively on issues of historical earthquakes and young scientists in disaster risk reduction.

3.2.1 Earthquakes in South Asia: Lessons from History

A panel discussion on the theme of 'Earthquakes in South Asia: Lessons from History' held at **Risk2Resilience Conference**. This session aimed to bring together 20-30 participants, drawn from the disaster risk reduction community and academia in Nepal, India, Pakistan, Myanmar and internationally, and government officials from Nepal. The workshop will be based around research done by the Broken Ground project team at the University of Bristol, UK. "Broken Ground: Earthquakes, Colonialism and Nationalism in South Asia, c. 1900-1960" is funded by the UK Arts and Humanities Research Council from September 2017-September 2019, based at the University of Bristol, UK.

This session was funded by the University of Bristol's Partnership Engagement Fund and had three principal aims:

- To highlight the current research of the Broken Ground project (University of Bristol, UK) in a way that is relevant to DRR stakeholders
- To give the participants an opportunity to help to set the direction of future historical research
- To facilitate networking among participants, academic historians and stakeholders in disaster management.

The long-term goal was to gain a better understanding of the social and political aspects of earthquakes: particularly the historical causes of vulnerability, the long-term consequences of relief and reconstruction policies. The objective was to promote the potential of historical case studies to provide examples of best and worst practices.

RISK2RESILIENCE: Nepal's Collective Journey towards a Safer Future

An International Conference for Sharing Experiences & Promoting Collaboration for Effective Earthquake Risk Management in Nepal

18-20 June 2018, Kathmandu

Time/ Day	Day 1: Monday 18 June 2018 (Asadh 4, 2075) Theme: Learning from the Experience of past 3 decades				Day 2: Tuesday 19 June 2018 (Asadh 5, 2075) Theme: Understanding the present				Day 3: Wednesday 20 June 2018 (Asadh 6, 2075)
8:00-09:00	Registration				Registration				
9:00-10:30	Opening Ceremony				Keynote session: Understanding the Present in the Aftermath of the Gorkha Earthquake Five Keynotes by senior national and international professionals to reflect upon the past efforts of Nepal, achievements made, and lessons learned				Keynote session: Setting the context for the conference Six Keynotes by senior national and international professionals to reflect upon the past efforts of Nepal, achievements made, and lessons learned
10:30-11:00	Tea/Coffee Break				Tea/Coffee Break				
11:00-12:30	Keynote session: Learning from the Past				Technical Session: Understanding the Present – divided according to the Sendai Framework's four priorities papers (with questions and answer)			Side Event 1	Panel Discussion: Enhancing close links among research, education, implementation and local agencies (6 Panelist)
	Five Keynotes by senior national and international professionals to reflect upon the past efforts of Nepal, achievements made, and lessons learned				TS5: (6 Nos) SFDRR Priority 1	TS6: (5 Nos) SFDRR Priority 2	TS7: (6 Nos) SFDRR Priority 3	TS8: (6 Nos) SFDRR Priority 4	Earthquakes in South Asia: Lessons from History
12:30-13:30	Lunch Break				Lunch Break				
13:30-15:30	Technical Session: Learning from the Experiences of Past 3 Decades – divided according to the Sendai Framework's five priorities papers (with questions and answer)				Technical Session: Understanding the Present – divided according to the Sendai Framework's four priorities papers (with questions and answer)				Reporting of the Technical Session
	TS1: (8 Nos) SFDRR Priority 1	TS2: (6 Nos) SFDRR Priority 2	TS3: (5 Nos + 1 Innovative demonstration) SFDRR Priority 3	TS4: (7 Nos) SFDRR Priority 4	TS9: (7 Nos) SFDRR Priority 1	TS10: (5 Nos) SFDRR Priority 2	TS11: (7 Nos) SFDRR Priority 3	TS12: (8 Nos) SFDRR Priority 4	
15:30-16:00	Tea/Coffee Break				Tea/Coffee Break				
16:00 -17:30	Panel Discussion: Learning from the Experiences of Past 3 Decades				Panel Discussion: Thematic Issues				
	PD1: SFDRR Priority 1 (6 Panelist)	PD2: SFDRR Priority 2 (7 Panelist)	PD3: SFDRR Priority 3 (5 Panelist)	PD4: SFDRR Priority 4 (6 Panelist)	PD5: Cause of death due to Gorkha EQ: Lessons on DCH (6 Panelist)	PD6: Need for national programs on co-seismic hazards/ landslide /floods (6 Panelist)	PD7: Private sector in DRR: Opportunities and Realities (7 Panelist)	PD8: Lesson learned and not learned from Gorkha Earthquake (6 Panelist)	
	Summary	Summary	Summary	Summary	Summary	Summary	Summary	Summary	
7:30-18:30	Free Time				Conference Resolution Drafting Committee Meeting and drafting of Resolution				
18:30-20:00	Classical Musical Event (Invitation only)								



3.2.2 Young Scientists in Disaster Risk Reduction of Nepal

The prime theme of this session was to demonstrate the alignment of modern science and technologies along with disaster risk reduction acts, in order to fortify the practice. The target of this side event was to expose the work of young professionals, who have fetched new sets of technologies in order to provide new heights to the disaster management sector. The panel discussions and demonstrations in the session linked the ideas of national and international professionals involved in DRR with the innovative research and findings of the young professionals working in the field.

In the aftermath of disaster and during rescue and recovery expedition, modern inventions have been providing a way forward in various ways: from the use of simple Smartphones to sophisticated infrared sensors. Technology is easing the information distribution and rescue and relief tasks in the times of disasters.

In addition, the involvement of young people can furthermore provide a whole new dimension to the risk reduction practice. They are considered as the strength of nation and will be responsible for DRR measures in the future. They are the tutors, the message carriers, and the ones who can bring real changes into society. Their receptive nature to new ideas and their tendency of sharing knowledge further make them paramount in the progression of disaster risk mitigation.

3.3 A Musical Soiree

A musical soiree was open for the teams of organizers and foreign participants. A famous musical group Sukarma organized the evening with a collection of music designed and composed especially for the occasion to reflect the theme of R2R. Sukarma is a musical group devoted to upholding the musical traditions of Nepal and promoting rediscovery of the musical richness of the country. The group is led by Dr. Dhrubesh Chandra Regmi, who is the third-generation musician of a respectable family of Kathmandu.

A brief about the soiree appears as Appendix 6 and a copy of the performance is available for download for non-commercial usage at <https://www.nset.org.np/r2r/>. A copy of the music is also included in the flash drive that goes along with this report as Appendix 6.

3.4 Field Excursion on Earthquake Reconstruction

On day 4, a field excursion was organized to the Kageshwori-Manahara municipality in the northern part of Kathmandu Valley for foreign participants of the conference. The objective was to present successful examples of earthquake reconstruction showcasing the principles of 'Build Back Better' and reconstruction of non-engineered houses using owner-driven approaches. The trip included a meeting which allowed conversation between contractors, masons, home-owners, Mayor, deputy Mayor, ward members and community representatives involved in earthquake reconstruction. An open call for registration was made and a total of 20 foreign delegates participated in the field excursion.

3.5 Conference Documentation

A Coordinator was assigned responsibilities to manage logistics for each session. S(h)e obtained verbal consent from each presenter to copy their PowerPoint files and for use in publications. All authors obliged. Under the oversight of the Coordinator, two Rapporteurs prepared summary report for each and every session. The summaries appear in Appendix 1.

Permission was also obtained from the author of the musical composition for non-commercial use of the music file which was recorded (nonprofessional recording).

Photography as well as videography of the Conference was done by a professional team. Amateur enthusiasts of NSET also contributed. A few glimpses of the main events appear as Appendix 2. All other photographs and video clips are collected in the flash drive attached (Appendix 5).

R2R documentation are available for free download at

<https://www.nset.org.np/r2r/>

4 CONFERENCE PROCEEDINGS

4.1 Opening Ceremony

Mr. Prem Kumar Rai, Secretary of Ministry of Home Affairs chaired and addressed the opening ceremonial session of the conference in which Hon. Minister of Home Affairs (MOHA) Mr. Ram Bahadur Thapa "Badal" gave the inaugural address. He informed the conference about promulgation by the government of Nepal, where that very morning, a series of policies and regulations would government and facilitate disaster risk reduction in Nepal in line with the SFDRR would come into effect. Mr. Yub Raj Bhusal, Chief Executive Officer of National Reconstruction Authority (NRA) and Prof. Dr. Jiba Raj Pokharel, Vice Chancellor of Nepal Academy of Science and Technology also addressed the conference. The conference Convener, Dr. Amod Mani Dixit, General Secretary of the NSET, explained the objectives, rationale and the logical structure of the conference, provided the details on conference organization, participation, and its expected outcomes.

Statements in the Opening Ceremony reasserted commitments of the Nepal Government to work collaboratively towards achievement of the conditions of the Sendai Framework for DRR and the fulfillment of other related global agendas, such as the SDGs, Paris Agreement, New Urban Agenda, Addis Ababa Agreement on Investment, etc. It also confirmed Nepal's commitments to march ahead with the earthquake reconstruction, not only of the damaged physical objects alongside the principles of Building Back Better, but also a rebuilding and strengthening of society. "Lessons learned from the Gorkha earthquake should continue to be used for enhancing resilience of Nepalese people far beyond the 32 districts affected."

4.2 Keynote Sessions

Each of the three days of the conference started with keynote lectures by prominent national and international scientists and practitioners of DRR. All presenters were well versed with the high level of natural hazards faced by the country and were related, at different times, in aspects of disaster risk reduction in Nepal. A total of 16 keynote presentations were delivered.

The following table provides the key messages delivered and the consensus arrived at by the keynote lectures. These messages set the foundation for the technical sessions to build upon with regards to enhancing disaster risk resilience in Nepal.

Main messages from the keynote sessions appear in Appendix 3.





Key Messages Delivered in 16 keynote addresses, classified as per the SFDRR Priorities

SFDRR Priority 1: Understanding Disaster Risk	SFDRR Priority 2: Strengthening Disaster Risk Governance	SFDRR Priority 3: Investing in DRR	SFDRR priority 4: Disaster Preparedness for Effective Response, Early Warning System and Build Back Better
<ol style="list-style-type: none"> 1. Use science and technology for evidence-based decision making for enhancing human safety and protection of assets from natural hazards. 2. Emphasize creation and implementation of national hazard and risk assessment programs for all hazards 3. Earthquake induced landslides pose problems of a) recognizing potential slope failures a priori, b) predicting landslide size a priori, and c) length of the impact duration after the earthquake, therefore, need to utilize innovations in technology for better landslide mapping. 4. High urbanization is exacerbating the crisis in urban areas 5. Advance seismological research practice through learning lessons and examples from other countries. 	<ol style="list-style-type: none"> 1. Create a central level Disaster Risk Management Authority which should emphasize on strengthening and implementing existing policies and action plans. 2. Build in regular funding for DRR and response efforts; large problems stem from small gap in investment in DRR. 3. Harness the role of volunteers in DRR/DRM 4. Utilize the private sector in DRR 5. Big disasters create changes in policies and implementation. 6. Build a working relationship between scientists and potential users of the information. 7. Collaboration between different tiers of authority is of paramount importance (i.e. local, provincial and federal government.) 8. Critique and commentary on what Nepal have done by external sources may be ignorant of the prevailing constraints and tradeoffs, hence need not to be disheartened. 9. Promote integrated research on disaster risk as part of national DRR strategies, policy making and public awareness 	<ol style="list-style-type: none"> 1. Enhance disaster risk management capacity of government officials at every level 2. Focus on earthquake awareness and education of all communities in Nepal 3. Structural safety should be ensured in all earthquake reconstructions including the retrofitted buildings 4. Consider risk transfer as an integral part of risk management: develop separate insurance pools for urban and rural areas. 5. Improve knowledge transfer of DRR through academic programs of young scholar 6. Communicate and publicize the progress of post-earthquake reconstruction in Nepal. 	<ol style="list-style-type: none"> 1. Expand network of modern monitoring instruments for real time data collection and interpretation, scenario modeling, creation of shake maps, and update of building code etc.) 2. Keep up the successful approaches of “BBB” and “Leave no one behind” campaigns.

4.3 Technical Sessions

A total of 12 technical sessions took place on days 1 and 2, with invited professionals speaking about experiences of earthquake risk management. The sessions covered risk management in Nepal over the past three decades and the lessons learned from the Gorkha earthquake, as per the themes of the day. National and international experts presented 77 technical papers, with expertise ranging from policy-makers, DRR practitioners, emergency responders and rescuers.

The sessions were divided according to the four priorities of SFDRR. Additional themes that deserved wider and intense critical discussion were also discussed:

- a. Causes of Death due to Gorkha Earthquake: Lessons on Drop, Cover and Hold-on (DCH),
- b. Need for National Programs on Co-seismic Hazards/ Landslide/ Floods,
- c. Private Sector in DRR; Opportunities and Realities,
- d. Enhancing Close Links among Research, Education, Implementation and Local Agencies,
- e. Problems of DRR in Infrastructure and Critical Facilities and Ways for Preparedness, and
- f. Updating National Building Code: Factors to Consider, Research to Undertake, Mechanism for Updating.

Each technical session was followed by a panel discussion on the same topic. The aim was to further distil the research findings, opinions, and conclusions advised in each session and integrate them to strategically link with other priorities and to the ground realities of Nepal.

The details of the conclusions arrived at in each of the technical sessions and also the Panel Discussion sessions are reproduced in Appendix 4 and the next Table provides a synthesized summary of the sessions.





SFDRR Priority 1: Understanding Disaster Risk	SFDRR Priority 2: Strengthening Disaster Risk Governance	SFDRR Priority 3: Investing in DRR
Learning from the past		
<ol style="list-style-type: none"> 1. Aim to establish a strong seismic network in Nepal in 2019. 2. Need to develop GMPE (ground motion prediction equations) for Nepal. 3. Model structure and s-wave velocity of deep, heterogeneous sediments in Kathmandu basin. 4. Compliance to the building code should be enforced. 5. Update building code with new research and technology. 6. Develop repair and retrofit guidelines to help preserve historic buildings. 	<ol style="list-style-type: none"> 1. The concept of safer urbanization should embrace integrated view of DRM focused on multi-hazards, including climate change. 2. Use of partnerships and collaboration to reduce physical, socio-economic, environmental, and institutional vulnerabilities. 3. Challenge to implement codes in rural areas. 	<ol style="list-style-type: none"> 1. Need to strengthen capacity of all the local level government in EMIS, planning, operation and maintenance of School level education. (Piloting municipalities of 5 districts with WB TA support) 2. Encourage recruitment of structural engineers with municipalities 3. Ensure Third Party Verification; E-BPS/Effective Regulatory Measures. 4. Focus on unified program for all stakeholders. 5. Compulsory risk-based planning system.
Understanding the Present in the Aftermath of Gorkha Earthquake		
<ol style="list-style-type: none"> 1. Ground assessment method established in other part of the world may not be suitable for Kathmandu valley. 2. Need to define dynamic properties of soils and complete ground assessment in Kathmandu valley. 3. Promote the role of geosciences in local bodies, road department and National Armed and Police Force for better disaster management. 4. Request with government to establish geological council to monitor and control the geoscientist's responsibility. 5. Need to implement technological and community-based approach of earthquake disaster mitigation of existing buildings. 6. Collaboration among institutions is vital. 7. Development of long-term risk management strategies 	<ol style="list-style-type: none"> 1. Finalize the rules and regulations on DRR at all levels for effective implementation. 2. Formulate a financing system to allow implementation for DRR policies. 3. Establish the loan delivery system of financial aid. 4. Mass training of construction force. 5. Train engineers in rural technology and reconstruction techniques. 6. Commit to only goals those that can be done and develop an incremental process 7. Establish Public Health Service delivery mechanism for Federal, Provincial and Municipal level of Governance. 8. Strengthen inter-ministerial coordination. 9. Improve and incorporate traditional knowledge and coping mechanisms existing in various communities 	<ol style="list-style-type: none"> 1. Synchronization of nearby municipalities for disaster preparedness 2. Maintain quality and consistency of training courses. 3. Need to improve coordination among government, development partners and society. 4. Scale up of government required
Setting the Future		



SFDRR Priority 1: Understanding Disaster Risk	SFDRR Priority 2: Strengthening Disaster Risk Governance	SFDRR Priority 3: Investing in Disaster Risk Reduction (DRR)
<ol style="list-style-type: none"> PSHA is not only a technical document; it is rather a social and political. Strengthening of DRR&M has good national and global opportunities Understanding risk is the minimum, but more knowledge is required for a successful DRR&M journey. Enhance coordination and communication between institutions and concerned stakeholders. Capitalize the use technology in DRR 	<ol style="list-style-type: none"> Need to adopt a managing risk approach through focusing on people within communities. Lines of accountability are unclear, a key gap in risk governance. Emphasis is currently on symptoms of risks and not the root cause of disaster Statistics are not adequately utilized. Investments are not informed by risks. DRM needs to be done through a whole society approach: Government DRM Institutions, private sectors, civil society and academia. Banking policies need to be adopted for DRR and response efforts. Developing awareness and promoting disasters and risk is most important. Strict compliance and implementation of Building Code is needed. Regulators including Municipal Corporations and Land Revenue offices to be made more accountable. School safety is reflected in recent policies, such as School Sector Development Plan (SSDP) and Comprehensive School Safety (CSS) Master Plan. Integrate comprehensive school safety and DRR into school curricula and teacher professional development 	<ol style="list-style-type: none"> The focus should be now on community knowledge retention. Need to identify factors for success in rural/remote communities. There is a big challenge to establish Earthquake Research Centre – at least one per state so that sufficient data could be gathered for better decision making in future. Make a framework of Disaster Education from the government (top-down initiatives necessary to establish a new type of education) Need to set up research and testing laboratories in each state to assure quality of construction work. Experience is limited to retrofitting of school buildings and not hospital buildings



Main messages from the Technical sessions appear in Appendix 4. Digital copies of the PowerPoint files obtained from all presenters are included in a Flash Drive attached to this report as Appendix 5² and also made available online at <https://www.nset.org.np/r2r/>.

4.4 Panel Discussions

The panel discussions were organized subsequent to the technical sessions, again, as per the four SFDRR priorities. This allowed consolidation of themes and lessons of the conference so far. There were 11 different panel discussions in which more than 80 national and international professionals contributed. The aim was to identify the areas in which to focus our efforts in the immediate future and the level of urgency required.

The following table summarizes the key conclusions made in each of the panel discussions.

² All invited speakers of the Keynote, Technical sessions and Panel Discussion have permitted the organizers to include their presentations in this publication. Copyright and responsibility for the statement made in the deliberations, however, remain with the respective authors only.



SFDRR Priority 1: Understanding Disaster Risk	SFDRR Priority 2: Strengthening Disaster Risk Governance	SFDRR Priority 3: Improving Resilience in DRR
Learning from the past		
<ol style="list-style-type: none"> 1. Seismic monitoring has increased over the past two decades. 2. The coordination among different organizations and various tiers of government is crucial to set out standard procedures for risk identification and loss estimation. 3. At local level, it is necessary to carry out trainings which encourage the engineers to initiate the works in the field of risk identification and loss estimation. 4. Raise awareness to the public about the casualties and losses which could be averted by disaster mitigation. 5. Educate people about the different methods available: self-help assistance, structural measures, non-structural measures, preparedness, prediction, emergency responses, reconstruction etc. 6. Seismic hazard maps are of too small scale to be useful to all municipalities. 7. Hazard maps are hard to find for outside the capital city, Kathmandu. 8. Published maps are controlled by the consent of Ministry of Agriculture, Land Management and cooperatives. 9. System should be set to prepare standard maps and avoid repetition of works and hence prevents wasting funds, time and resources. 10. It is recommended to conduct peer review before implementing any types of maps. 	<ol style="list-style-type: none"> 1. 2. Problem is in implementation, not in policy. 3. Comprehensive Land Use Plan should be the priority. 4. Current DRR work needs to be scaled up in schools, communities, municipalities, and security force. 	<ol style="list-style-type: none"> 1. Professional organizations like NEA shall take lead in training human resources to match demand of technical resources. 2. Research and development on disaster construction materials must for quality construction. 3. The Government should subsidize on cost research on such. 4. University courses curricula must include DRR and earthquake subjects (Building retrofitting etc.). 5. Disaster Management Committee (DMC) to be formed at each Local Level and seed fund needs to be allocated for their operation.



4.5 Conclusion of Other Panel discussions on Specific Topics

Three specific panel discussions pertaining to specific issues as revealed during the Gorkha earthquake s were organized with participation of the policy makers, field o=operators and academic personnel. The followings were the topics:

- Causes of death due to Gorkha earthquake: lessons on drop, cover and hold on (DCH)
- Need for national programs on co-seismic hazards/ landslide/floods
- Private sector in DRR: opportunities and realities
- Lesson Learned and Not Learned from Gorkha Earthquake
- Enhancing Close links among research, education, implementers and local agencies
- Problems of DRR in infrastructure and critical facilities and Ways for enhancing disaster resilience
- Updating NBC: factors to consider, research to undertake, mechanism for updating

The following Table summarizes the discussion and the conclusions arrived at each of the thematic panel discussions.

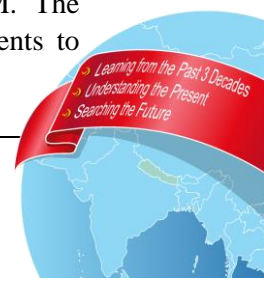
Panel Discussions	Key Messages Delivered and Consensus Arrived at
PD 5: Causes of Death due to Gorkha Earthquake: Lessons on DCH (6 Panelists)	<ol style="list-style-type: none"> 1. Main cause of human casualty during the Gorkha earthquake was failing of unsafe buildings. Hence, all buildings including schools should be made structurally safer, and classroom furniture in school should be more robust. 2. "Drop, Cover and Hold on" should be practiced, with understanding of the situation based upon different building types.
PD 6: Need for National Programs on Co-Seismic Hazards/ Landslide/Floods Panelists)	<ol style="list-style-type: none"> 1. Develop and use computer (mobile) application (APP) for people to access and understand the natural hazards in their locality nation-wide; educate community on natural hazards and early warning messages. 2. Conduct scientific research on impact of other co-seismic hazards including landslides in the mountain and other eco-environments of Nepal. 3. Need to develop high capability competent technical team and GON representatives for handling disaster events.
PD 7: Private Sector in DRR; Opportunities and Realities (7 Panelists)	<ol style="list-style-type: none"> 1. Local governments should mandated to form Disaster Management Committee (DMC) drawing membership from all stakeholders and with planning and implementation coordinated by Disaster Management Division (DMD) which should take a lead in sustainability of disaster awareness and capacity building in collaboration with professional organizations (such as NEA) to match the local demand of technical resources, and to mainstream DRR in the works of other divisions of the municipality including the building code implementation division. 2. Apart from capacity building activities, the private sector should also be involved in research and development on different construction materials. The private sector should gradually develop a culture of safety and building continuity planning.

Panel Discussions	Key Messages Delivered and Consensus Arrived at
	3. University Engineering courses must incorporate curricula on DRR and earthquake subjects (BC, seismic retrofitting)
PD 8: Lesson Learned and Not Learned from Gorkha Earthquake Panelists)	<ol style="list-style-type: none"> 1. A culture of earthquake resistant construction has been established in Nepal in the past decades, this needs to be further strengthened and proliferated into the local governance system by continually sustaining efforts in capacity enhancement of local authorities and use the lessons learnt on what works and what doesn't. 2. The government should categorize and classify NGOs and INGOs as per their work and outputs. 3. Temporary shelters constructed post-earthquake could and should have been made stronger.
PD 9: Enhancing Close links among research, education, implementers and local agencies (6 Panelists)	<ol style="list-style-type: none"> 1. Nepal should urgently fill the gap on authorized data management system, program or portal from where authentic and single system of data can be made available and research findings could be made accessible to policy makers, academics and the general public. Scientific researches should aim at helping decision making and not only for academic excellence, as evidence-based policy is essential for creating a trustworthy relationship with the local communities. 2. Building codes and bylaws should be periodically updated as per the felt need.
PD 10: Problems of DRR in infrastructure and critical facilities and Ways for enhancing disaster resilience (5 Panelists)	<ol style="list-style-type: none"> 1. While periodic inspection and reporting on the condition of bridges are done annually, there is a need to undertake researches and development of Nepal code for bridges and other structures. 2. A lesson learned on emergency communication is the need to use solar power in roof-top cell phone towers for dealing with power outage, and mobile and small GSM networks for undisrupted operation. 3. Satellite phones can be very handy during rescue operations.
PD 11: Updating NBC: factors to consider, research to undertake, mechanism for updating Panelists)	<ol style="list-style-type: none"> 1. Nepal should establish a formal mechanism for regular updating of the national building code that could promote and factor in considerations such as high-rise buildings, low strength masonry building typologies, socio economic issues, and feasible implementation strategy including regulation of licensing for designers.

4.6 Conference Resolution and its genesis

4.6.1 The resolution

R2R organizer decided to develop a resolution that would document and reflect the consensus arrived on evaluation of the past efforts and their contribution in managing the Gorkha earthquake impact and to collectively use the lessons to chart out a broad road map for earthquake risk management in Nepal, and also to contribute to the overall task of DRR and SDGs as committed in the global frameworks namely, SFDRR, SDGs and CRM. The conference was structured accordingly - it started with the expression of commitments to





achieve significant progress in disaster risk reduction from high level authorities of Nepal. Subsequent keynote lectures provided the philosophical background and feasible priorities for planning and designing effective DRR in Nepal. The technical sessions, arranged according to the four priorities of the Sendai Framework and divided into discussing experiences in the past two decades as tested by the much awaited 2015 earthquake sequence, listened to the actual implementers of DRR in Nepal. The session coordinators provided guidance and oversight and the rapporteurs prepared notes (summary report) for each and every plenary, keynote, and technical and panel discussion sessions³. A resolution drafting team (RDT) collated the summary reports to produce a resolution draft.

The Resolution Drafting Team (RDT) consisted of Mr. Kedar Neupane, Mr. Kanak Dixit, Mr. Rego, Prof. Alex Densmore, Dr. Amod Dixit, Mr. Surya Narayan Shrestha, Prof. Bishnu Hari Pandey, Dr. Ramesh Guragain and Mr. Shreeram Singh Basnet. The RDT prepared the initial outline of the draft resolution of the conference from the summary notes of the proceedings. The RDT sat every evening and synthesized the draft as the conference progressed.

4.6.2 Resolution Discussion in Plenary

The Draft Resolution prepared by the RDT was presented in the afternoon plenary of the third day. The draft was read and was opened to critique, comment and suggestions for amendments. The discussion was moderated by Mr. Kunda Dixit, Senior journalist and chief editor of the weekly Nepali Times. A panel consisting of Mr. Prem Kumar Rai (Secretary, MOHA), Mr. Youb Raj Bhusal (CEO of NRA), Prof. Dr. Jiba Raj Pokharel, (Vice Chancellor, NAST), Dr. Brian Tucker, (President, GeoHazards International), and Prof. Vinod Kumar Sharma (Hon. Executive Vice Chairman, Sikkim State Disaster Management Authority) discussed the outcome document and suggested improvements.

All comments on the Draft Resolution were incorporated into the document by the RDT. The plenary adopted the final improved version of the resolution (Appendix 1).

4.7 Closing of the Conference

The formal closing of the conference was chaired by Mr. Prem Kumar Rai, Secretary of MoHA. Dr. Amod Mani Dixit, Convener and General Secretary of NSET presented the Conference overview report, and also the draft of the conference Resolution that was finalized in the preceding plenary. The house adopted the conference Resolution unanimously. Concluding remarks, echoing the feeling of all participants about the success of the meet, were given by Prof. Dr. Jiba Raj Pokharel, Vice Chancellor, NAST and Mr. Yub Raj Bhusal, Chief Executive Officer, NRA. The final Vote of Thanks was given by the Chair, Mr. Prem Kumar Rai, Secretary, MOHA, who reiterated the commitments of the Government of Nepal to follow up on the resolution of the conference and thanked all for their contribution.

4.8 Post-Conference Event: NSET marks Silver Jubilee of its Journey

Right after the conclusion of International Conference “Risk2Resilience” on June 20, 2018, National Society for Earthquake Technology–Nepal (NSET) marked Silver Jubilee of its journey with a gala event. On the occasion, NSET organized various programs



³

including 25th NSET Day Ceremony with cultural events at Radisson Hotel in Kathmandu. NSET, which was established in 1993 with its mission to enhance seismic safety of Nepal and the beyond, observes the day on June 18 every year as 'A Day to Reaffirm the Commitments to Earthquake Safety'. The brief note on NSET Silver Jubilee event is placed in Appendix 7.

5 CONFERENCE BUDGET

The conference expenses were supported by the organizers, partners, and sponsors including a Platinum Sponsor. No registration fee was charged to the participants. Members of the Organizing -, Technical -, and Advisory committees thankfully volunteered their time. Only two participants were fully sponsored for their travel and accommodation. The total expense of the conference is approximately NPR. 4,000,000.00. All expenses have been made as per the respective procurement, financial and other management procedures of NSET as according to the pertinent ruling regulations of Nepal. No indirect cost has been paid. The indirect costs have been contributed by the organizers including NSET in the form of vehicular and human resources. A separate financial account has been maintained at NSET. This will be subject to audits as per the standard practice of NSET and will be available to all upon request.





APPENDICES

APPENDIX 1: RISK2RESILIENCE CONFERENCE RESOLUTION



RISK2RESILIENCE

Nepal's Collective Journey towards a Safer Future

International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal

June 18-20, 2018, Kathmandu, Nepal

RESOLUTION

(Kathmandu Declaration – 2018)

Background

Nepal hosted RISK2RESILIENCE (R2R): An International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal during June 18-20, 2018 in Kathmandu, Nepal. The Government of Nepal, Ministry of Home Affairs, Nepal (MoHA), National Reconstruction Authority (NRA), Nepal Academy of Science and Technology (NAST), and National Society for Earthquake Technology-Nepal (NSET) in association with various agencies and partners jointly organized the Conference.

The Conference was held with the main Objectives to:

- Critically look back at what we all collectively did for Earthquake Risk Reduction & Preparedness in Nepal in the past decades in the Light of 2015 Gorkha Earthquake sequence
- Critically examine the experience of Earthquake Reconstruction so far, and also
- Looking forward to helping set the Way Forward in the Long Journey of Disaster Risk Management in Nepal

The Conference brought together 240 participants including national and international citizens. A total of 40 international professionals from 13 different countries participated. Throughout the proceeding of the Conference, there were 15 Keynote Speeches made on key issues; and total 220 more persons including government officials, DRR Experts, Practitioners and Academia shared their ideas and views as speakers, presenters or panelists. Total 12 Technical Sessions, 11 Panel Discussions and 2 Side Events were held in the conference.

The Risk2Resilience Conference has resulted successfully with the approval of the Conference Resolution endorsed by Conference participants incorporating their final comments and suggestions.

RESOLUTION

(Kathmandu Declaration – 2018)

We, the organizers and the participants of the RISK 2 RESILIENCE (R2R) International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal, organized jointly by Government of Nepal, Ministry of Home Affairs (MOHA), National



Reconstruction Authority (NRA), Nepal Academy of Science and Technology (NAST) and National Society for Earthquake Technology-Nepal (NSET), held on June 18-20, 2018, in Kathmandu, Nepal, with both Nepalese and those from countries across continents, having attended the Conference in order to:

Learn about Nepal's progress in areas of Disaster Risk Management,

Share the results of our scientific research,

Share our concern about the growing disaster risks in Nepal,

Collectively explore ways for Nepal to further strengthen its efforts in Disaster Risk Reduction, and

Pledge continued support to the people of Nepal for their excellent and innovative work on Disaster Risk Reduction and Preparedness under the leadership of the Government of Nepal, hereby:

ACKNOWLEDGE that the Constitution of the Federal Democratic Republic of Nepal, 2015 embodies Right to live with dignity and Right to property as fundamental rights of the people;

RECOGNIZE Nepal's tremendous achievements, despite political uncertainty and economic hardships, in aspects of multi-hazard disaster risk management, especially earthquake risk management, including:

- Development, enunciation and incremental implementation of policy and legal instruments such as the recently enunciated Disaster Risk Reduction and Management Act - 2017 (DRR&MA-2017), National Disaster Risk Management Policy – 2018, Disaster Risk Reduction and Management Strategic Action Plan (2018-2030), which pave way for development and enunciation of corresponding bylaws. Earlier, the Government has promulgated the National Disaster Response Framework (NDRF), and made implementation of the National Building Code mandatory throughout the country. These legal provisions will surely be instrumental in linking Disaster Risk Reduction (DRR) actions to the legal requirements and strengthening collaboration and cooperation among DRR actors, thereby comprehensively energizing the Disaster Risk Management (DRM) sector in Nepal.
- Development and implementation of innovative methods of earthquake risk reduction including simple and cost-effective seismic retrofitting of vernacular buildings and schools as well as non-structural retrofitting of hospitals.
- Promotion of earthquake awareness in sustained ways by efficient use of electronic and print mass media and nationwide campaign like the annual observance of National Earthquake Safety Day (ESD) first observed in 1999, and the building of national and local capacity in medical first response, collapsed structure search and rescue, community level emergency response which has also included the enhancement of women's capacity to lead emergency response.
- Implementation of comprehensive school earthquake safety programs, with integrated community engagement, and the establishment of a sustained system of training of engineers, code enforcement officials, builders, and masons in earthquake-resistant construction of urban and rural buildings.
- Development and piloting of methodologies for hazard assessment, exposure mapping, and vulnerability assessment.





- The technical and financial assistance to Nepal and Nepalese institutions provided by research institutions, academia, UN Agencies, bilateral, multilateral and inter-governmental agencies, International Financial Institutions and well-wishers to attain these significant accomplishments.
- In light of Nepal's ever-increasing vulnerabilities to a host of hazards and, therefore, the urgency in implementing actions for containing risk creation, for reducing existing risks, and, for enhancing disaster preparedness at all levels and in every part of the country.

APPRECIATE the work of the Government of Nepal and the Nepalese people for:

- Responding to the 2015 Gorkha Earthquake with dignity, exhibiting a sense of self-help and cooperation between individuals, communities and agencies, and avoiding chaos and social anarchy.
- Mobilizing existing national resources and effectively coordinating and mobilizing international assistance in emergency response and relief.
- Establishing appropriate policies, approaches and guidelines for temporary shelter, conducting Post Disaster Needs Assessment (PDNA) and Post Disaster Recovery Framework (PDRF),
- Initiating early recovery and reconstruction based on the principles of Build Back Better (BBB), and incorporating lessons learned from the recent earthquake reconstruction following the Gujarat and Kashmir earthquakes.
- The actions of the Government of Nepal to make compliance to the National Building Code mandatory for all urban and rural settlements of Nepal.
- Successfully embarking upon rural housing reconstruction based upon scientific assessment of damage extent and grade, and for devising procedures for providing equitable assistance to the affected households for Build Back Better reconstruction by a combination of financial assistance, technical assistance, and governance assistance to ensure compliance.
- Clarifying the roles and responsibilities in disaster risk reduction to all 753 rural and urban local governments of Nepal and pledging to support them in capacity development and discharging their responsibilities.
- Mobilizing national and international assistance for the earthquake reconstruction of schools, hospitals and other critical facilities and infrastructure, cultural monuments and heritage sites.

Call on the Government and all Stakeholders to Ensure:

- A shift from disaster management to disaster risk management, from damage assessment to vulnerability assessment and reduction, and from relief and response to risk reduction and preparedness.
- Adherence to the commitments made to global frameworks - including the Sendai Framework for Disaster Risk Reduction (SFDRR), the Sustainable Development Goals (SDG), the Paris Agreement, and the New Urban Agenda - by developing and enacting appropriate additional policies, by clarifying roles, responsibilities and accountability, and by developing appropriate monitoring and evaluation mechanisms.
- Development and implementation of a new program for disaster risk reduction nationwide, with special emphasis on earthquake vulnerability reduction, to be achieved by the 25th anniversary of the Gorkha Earthquake in 2040.
- Integration of scientific and technological evidences as well as the local wisdom and indigenous technologies, into disaster risk reduction activities.



- Involvement of the private sector by assigning clear roles, responsibilities and accountability and by helping businesses to conduct Business Continuity Planning (BCP), and Disaster Risk Reduction (DRR) as a part of their Corporate Social Responsibility (CSR).
- Respect for the principles of environment preservation, gender and social inclusion, and the commitment to "leave no one behind" in all actions in disaster risk reduction.
- Development and implementation of national programs for hazards-specific DRM such as for earthquake, landslide, flood, fire etc., and involvement of all stakeholders including the government agencies and scientific research organizations to work in cooperation and collaboration, and breaking across silos, to achieve Nepal's national targets and goals.

Adopt the Following as Strategic Actions for Disaster Risk Reduction

Support achievement of the seven SDFRR global targets in the context of Nepal by 2030, through the following actions:

1. Under SDFRR Priority 1: Understanding Disaster Risk

1. Create a freely-available National Hazard Map and National Vulnerability Assessment, and make the use of these assessments mandatory for all national and provincial level development projects.
2. Create detail maps in GIS for all urban municipalities by 2020 that includes all development programs, municipal taxation, utility services, insurance, mortgages, and building permits.
3. Assist all rural and urban municipalities (Gaunpalika and Nagarpalika) to prepare multi-hazard maps at appropriate scales and ensure their use for infrastructure and development planning. Promote hazard risk understanding by engaging school teachers and students in school-based hazard monitoring and early warning systems such as weather stations, accelerometers, extensometers etc.
4. Develop a system to capture and inventory all large and small-scale hazard events at national to local levels. Use the analysis of data into development planning, disaster risk management planning and implementation.

2. Under SDFRR Priority 2: Strengthening Disaster Risk Governance to Manage Disaster Risk

1. Encourage and support municipalities to ensure meaningful participation and representation of women and other groups disproportionately affected.
2. Support children and youth and persons with disabilities in leadership roles within disaster risk reduction programs.
3. Support rural and urban municipalities (Gaunpalika and Nagarpalika) to prepare risk-sensitive land use plans.
4. Develop a science and technology strategic plan to support disaster risk reduction, and support research for evidence-based DRR policies, practices and solutions.
5. Initiate multi-year, long-term (min. 15 years) programs involving multiple institutions at multiple levels to support the government at various levels.
6. Support local governments in rural and urban municipalities (Gaunpalika and Nagarpalika) in DRR through closer engagement with Universities and research institutions.



3. Under SFDRR Priority 3: Investing in Disaster Risk Reduction for Resilience

1. Ensure all new schools and hospitals are built disaster resilient.
2. Retrofit at least 50% of existing schools and all health institutions and public buildings by 2035.
3. Ensure that all school new construction and retrofit projects are enveloped in robust programs of community engagement and capacity building that provide risk awareness and education, hazard resistant construction training, and support for school disaster management.
4. Establish and implement 15-year national programs for earthquake, flood, landslide and fire risk reduction.
5. Ensure all new infrastructure are disaster resilient following national standards developed for specific infrastructure.
6. Ensure at least 5% of development budget is spent on DRR including a significant proportion in disaster research and mainstreaming of DRM in economic development initiatives.
7. Ensure that all large private sector businesses (industry, trade, insurance, banking, hotels, travel, tourism industry etc.) develop and operationalize their Business Continuity Plans (BCP) by 2020 to address all major natural and non-natural hazards.
8. Engage the private sector in targeted investments in DRR in their respective sectors (tourism, industry, trade, hydropower etc.).
9. Require hazard insurance for all major public investments and promote the expansion of hazard insurance to all households.
10. Develop a special program for preserving, rehabilitating, and strengthening cultural heritage structures to insure they meet required level of safety for natural hazards.
11. Ensure livelihood concerns are explicitly integrated into risk reduction programs.
12. Enhance mass media's capacity to accurately and effectively cover disaster preparedness and risk management.

4. Under SFDRR Priority 4: Enhancing Disaster Preparedness for Effective Response and to "Build Back Better" in Recovery, Rehabilitation and Reconstruction

1. Establish a well-resourced system of institutions, people and equipment for disaster preparedness at all levels of government, including all rural and urban municipalities (Gaunpalika and Nagarpalika).
2. Make sure all rural and urban municipalities (Gaunpalika and Nagarpalika) have disaster preparedness plans that consider self-help, mutual support and public support, and pre-positioning of food/non-food items.
3. Develop a system of national disaster volunteers at all levels in all rural and urban municipalities (Gaunpalika and Nagarpalika).
4. Equip all volunteers with basic training as well as search and rescue equipment.
5. Scale-up programs for First Aid, Medical First Response, Collapse Structures Search and Rescue, Hospital Preparedness for Emergencies, Swift Water Rescue and other trainings to reach to the community and household levels.
6. Develop evidence-based, consensus key messages for disaster safety and insure these messages are effectively disseminated.
7. Expand and strengthen ongoing efforts of accurate and effective risk communication through mass media.
8. Make sure the institutions, capacities, and lessons learned during reconstruction are retained and adapted to ensure complete recovery and no further risk accumulation.



And; Call on All Major Groups and Stakeholder Groups

1. To deliver on their Voluntary Statements of Action within 2018, and periodically report on progress by reviewing, revising and renewing commitments to the above action items in the years 2020, 2025, 2030, and 2035;
2. Appreciate the leaderships of the Ministry of Home Affairs (MOHA), the National Reconstruction Authority (NRA), and the National Academy of Science and Technology (NAST) in hosting the Risk to Resilience (R2R) Conference and engaging NSET in the organization of the conference; and
3. Express our sincere gratitude and appreciation to the foreign participants for their continuous concern and support to the cause of enhancing disaster resilience in Nepal.

ADOPTED on June 20, 2018 in Kathmandu, Nepal





APPENDIX 2: CONFERENCE ORGANIZING TEAMS

RISK2RESILIENCE Organizing Committee

Chair:	Mr. Kedar Neupane, then chief of Disaster Management Division of the Ministry of Home Affairs (MoHA).
Co-Chair:	Mr. Varun Prasad Shrestha, President, NSET
Convener:	Dr. Amod Mani Dixit, General Secretary, NSET
Co-Convener:	Mr. Surya Narayan Shrestha, Executive Director, NSET
Member:	Mr. Bijay Krishna Upadhyay, Director, NSET
Member:	Mr. Ganesh Kumar Jimjee, Director, NSET
Member:	Prof. Dr. Gokarna Bahadur Motra, Campus Chief, Pulchowk Campus
Member:	Mr. Khadga Sen Oli, Advocacy Manager, NSET
Member:	Mr. Manohar Rajbhandari, Board Member, NSET
Member:	Dr. Rabindra Prasad Dhakal, Technical Faculty Chief, NAST
Member:	Mr. Rajendra P. Khanal, DG, DMG
Member:	Mr. Shiva Hari Sharma, DG, DUDBC
Member:	Mr. Shreeram Singh Basnet, Board Member, NSET
Member:	Mr. Yam Lal Bhusal, Joint Secretary, NRA (later transferred to PMO)
Member:	Mr. Yogeshwor Krishna Parajuli, Board Member, NSET

RISK2RESILIENCE Advisory Committee

The Conference Advisory Committee was formed of senior national and international experts.

1. Dr. Achyut Sapkota	11. Mr. Kul Mani Acharya
2. Dr. Binod Shrestha	12. Dr. Netra Prakash Bhandary
3. Prof. Dr. Binod Tiwari	13. Prof. Rajendra Dhoj Joshi
4. Dr. Ganga Lal Tuladhar	14. Mr. Rajesh Thapa
5. Mr. Gopi Krishna Khanal	15. Mr. Reshmi Raj Pandey
6. Er. Hare Ram Shrestha	16. Mr. Shambhu KC
7. Lt. Col. Jagdish Khadka	17. Mr. Sushil Gyewali
8. Prof. Dr. Jiba Raj Pokharel	18. Mr. Thakur Dhakal
9. Dr. Kabi Raj Paudyal	19. DIG Thule Rai
10. Mr. Krishna Bahadur Raut	20. Prof. Dr. Tri Ratna Bajracharya

RISK2RESILIENCE Technical Committee

The Technical Committee was composed of members of various national and international organizations such as Institute of Engineering (IOE), British Columbia Institute of Technology (BCIT), Department of Mines and Geology, NRA, and NSET.

- | | |
|--------------------------------|--------------------------------|
| 1. Dr. Basanta Raj Adhikari | 7. Prof. Dr. Prem Nath Maskey |
| 2. Dr. Bishnu Hari Pandey | 8. Dr. Ramesh Guragain |
| 3. Mr. Dwarika Shrestha | 9. Dr. Soma Nath Sapkota |
| 4. Dr. Hari Ram Parajuli | 10. Mr. Shreeram Singh Basnet |
| 5. Ms. Hima Shrestha | 11. Mr. Surya Bhakta Sangachhe |
| 6. Dr. Narayan Prasad Marasini | |

RISK2RESILIENCE Session Coordinators

The conference consisted of 12 technical sessions (TS), 11 panel discussions (PD), and 2 side events. These sessions were all coordinated by NSET Professionals.

Session Coordinator	Session
1 Mr. Ganesh Kumar Jimée	KN3, TS 4, TS 8, PD 4
2 Mr. Bijay Krishna Upadhyay	TS 6, PD 5
3 Ms. Hima Shrestha	PD 11
4 Dr. Narayan Marasini	KN2, TS10, PD 6
5 Mr. Khadga Sen Oli	TS 2, PD 2, Side Event1
6 Mr. Dev Kumar Maharjan	TS 1, TS 5, TS 9, PD 1, PD 9
7 Mr. Ranjan Dhungel	TS 12, PD 8, Side Event 2
8 Ms. Nisha Shrestha	KN1,TS 3, TS 7, TS 11, PD 3
9 Ms. Kirti Tiwari Jaisi	PD 10
10 Mr. Surya Bhakta Sangachhe	PD 7

RISK2RESILIENCE Session Rapporteurs

Ms. Hima Shrestha (Opening)	Mr. Prayash Malla (TS5)
Mr. Kapil Bhattarai (KN1, PD3)	Ms. Aparajita Gautam (TS6, TS10)
Mr. Rabin Chaulagain (TS1)	Mr. Nirajan Budathoki (TS7)
Mr. Ayush Baskota (KN2)	Mr. Sanju Sharma (TS8)
Mr. Pramod Khatiwada (KN2)	Mr. Prakash Guragain (TS9)
Mr. Mahanand P. Timalisina (TS2, PD2)	Ms. Priyanka Singh (TS11)
Ms. Aditi Dhakal (TS3, PD7)	Mr. Manish Raj Gouli (TS12, PD8)
Ms. Maritess Tandingan (TS4)	Ms. Omkala Khanal (PD5)
Mr. Aashis Tiwari (PD1)	Mr. Sushil Pandit (PD5)
Ms. Manisha Pantha (PD4, KN3)	Dr. Sweata Sijapati (PD6)
Mr. Dipu Chapagain	





APPENDIX 3: SUMMARY OF KEYNOTE PRESENTATIONS

(Summary prepared by the rapporteurs under the guidance and oversight of Session Coordinators)

RISK2RESILIENCE

Nepal's Collective Journey towards a Safer Future

International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal June 18-20, 2018

Keynote Session Day 1

Time/ Day	Day 1: Monday, June 18, 2018 (Asad 4, 2075) Theme: Learning from the Past
11:00-12:40	A) Learning from the Past: Keynotes (Hall: Nepa Dhuku) Keynote Opening Session Chair: Dr. Amod Mani Dixit
11:00-11:20	Keynote 1 (KN 1): "Policy Intervention and National Building Code Implementation" - Mr. Reshmi Raj Pandey, Chief Secretary, Province 3, Government of Nepal
11:20-11:40	Keynote 2 (KN 2): "Hazard and Risk Studies during the Development of National Building Code" - Dr. Richard Sharpe, Senior Technical Director, BECA, New Zealand
11:40-12:00	Keynote 3 (KN 3): "Midway into NSET's First Half-Century" - Dr. Brian E. Tucker, President, GeoHazards International, USA
12:00-12:20	Keynote 4 (KN 4): "Parliamentarians for Enhancing Political Commitments for DRM" - Dr. Ganga Lal Tuladhar, Former Minister of Education, Nepal
12:20-12:40	Keynote 5 (KN 5): "Strategies for Reducing Earthquake Risk in Nepal: A Proposed Blueprint for Improved Earthquake Monitoring and Interagency Coordination" - Dr. Susan Hough, Seismologist, United States Geological Survey, USA
	Session Coordinator: Ms. Nisha Shrestha, M&E Manager, NSET Rapporteur: Mr. Kapil Bhattarai, Engineer, NSET

Message Summary

- Governance, use of science and technology should be backed up with human safety and protection of assets.
- Capacity building at every level of governance level is a prerequisite
- There should be a central level disaster risk management department and the department should take all the initiatives in DRR.
- Community did a great job during search and rescue immediate after Gorkha Earthquake. We need to train more and more community people to respond quickly after large earthquakes.
- Hazard assessment and risk reduction programs are necessary (Modern monitoring networks shall be installed- Real time information and scenario, shake maps, development and update of building code is necessary. Shake maps that can be developed in no time will be very helpful for emergency response)
- Incremental structural safety- for sustainability of retrofitted buildings

Overall Present Situation

1. Constitutional arrangements on all three levels of government
2. Increase in number of organizations working on the field of disaster risk reduction
3. 2015 Gorkha Earthquake was an opportunity to learn for preparing future mega earthquakes

Challenges

1. Risk understanding among political leaders is not same
2. Lack of technical human resources
3. Engineering curricula devoid of subjects related to DRR and earthquake
4. There is not a proper implementation of policies. Monitoring and supervision are not adequate.
5. Still the construction is fragile
6. There is no provision of economic analysis of the built structures

Way Forward

1. Governance, use of science and technology should back up human safety and protection of assets.
2. Capacity building at every level is a prerequisite
3. Engineering curricula must incorporate DRR and earthquake subjects
4. There shall be more organizations working on the field of earthquake
5. Should analyze and concentrate on what Nepal can afford-need to do economic analysis of the structures built
6. Collaboration and collective efforts required (of all organizations working in the field of earthquake risk reduction)
7. There should be central level disaster risk management department and the department shall take the initiatives
8. Mainstreaming DRR and related issues in Nepal is a must
9. Community did a great job during search and rescue immediate after Gorkha Earthquake. We need to train more and more community people to respond quickly after large earthquakes.
10. Hazard assessment and risk reduction programs are necessary (Modern monitoring networks shall be installed- Real time information and scenario, shake maps, development and update of building code is necessary. Shake maps that can be developed in no time will be very helpful for emergency response)

Remarks by Keynote Speakers

Mr. Reshmi Raj Pandey, Chief Secretary, Province 3, Government of Nepal

1. There is Constitutional arrangement (Central, Provincial and Local Level) for effective implementation of building code.
2. Provision of different responsibilities at different levels (3 levels of government)
3. Governance, use of science and technology should back up human safety and protection of assets.
4. Capacity building at every level is a prerequisite
5. Engineering curricula must incorporate DRR and earthquake subjects





Dr. Richard Sharpe, Senior Technical Director, BECA, New Zealand

1. Nepal after 1988 earthquake
 - Construction was fragile
 - Nepal did not need building code
2. New Zealand experience
 - 3 major earthquakes
 - Damaged buildings
 - Huge societal disruption
 - People are afraid to go inside buildings
 - Public wanted buildings that can be used just after earthquake
 - Discredit was given to structural engineers
3. Lessons for Nepal
 - There shall be more organizations working on the field of earthquake
 - Action oriented organizations
 - Should analyze and concentrate on what Nepal can afford-need to do economic analysis of the structures built

Dr. Brian E. Tucker, President, GeoHazards International, USA

1. Creating social change
 - Local authority should understand and feel the risk and realize risk is unacceptable
 - Means to reduce the risk should be affordable
 - Need to develop local capacity according to the requirement
2. Collaboration and collective efforts required (of all organizations working in the field of earthquake risk reduction)
3. Earthquake equal or more than 1934 or 2015 is imminent, we need to prepare for that. Action plan and implementation of the plan is required.

Dr. Ganga Lal Tuladhar, Former Minister of Education, Nepal

1. Parliamentarians are the activists for change
2. Political persons should know about the disaster. Prime minister should know about disasters and risk reduction measures
3. Top level politicians should take the responsibilities or take the charge to implement DRR policies
4. National campaign for disaster risk reduction should be established.
5. There should be central level disaster risk management department and the department shall take the initiatives
6. Mainstreaming DRR and related issues in Nepal is a must
7. 2015 Gorkha Earthquake was an opportunity to learn for preparing future mega earthquakes
8. Community did a great job during search and rescue immediate after Gorkha Earthquake. We need to train more and more community people to respond quickly after large earthquakes.

Dr. Susan Hough, Seismologist, United States Geological Survey, USA

1. Learnings from 7.8 Magnitude Gorkha Earthquake

- This is not a worst-case scenario
 - Still even bigger is imminent
 - Risk reduction should be of high priority
2. Learning from US and Nepal earthquakes
- Risk reduction is a process
 - Modern monitoring network (Real time information and scenario, shake maps, development and update of building code is necessary)
 - Hazard assessment and risk reduction programs
 - Local earthquake professionals shall be trained to reduce the risks from earthquakes
 - Interagency coordination required (This is not a one man, one organization task. Effective coordination and collaboration are necessary)
 - Early warnings

Destruction created by Gorkha earthquake has paved a path of sustainable risk reduction measures

Q&A

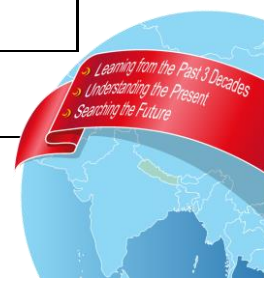
Issues and agendas to drive next 25 years

- Retrofitting
- Earthquake monitoring and hazard assessment
- Public private partnerships
- Compliance to building codes
- Implementation of building code remains critical
- Shake maps that can be developed in no time will be very helpful for emergency response

Incremental structural safety (yearly maintenance): If we come up with ideas of thinking of incremental structural safety during maintenance of buildings that are carried out timely, this may be a sustainable solution to retrofitting of buildings. This will reduce the burdens of heavy cost that will be incurred for retrofitting of buildings.

Keynote Session Day 2

Time/ Day	Day 2 : Tuesday, June 19, 2018 (Asad 5, 2075) Theme: Understanding the Present (Hall: Nepa Dhuku)
	Session Chair: Prof. Dr. Jiba Raj Pokharel, Vice-Chancellor , Nepal Academy of Science and Technology
9:00-9:20	Keynote 6 (KN6): "Earthquake-triggered landslides: what have we learned and what do we need to know?" - Prof. Alexander Densmore, Institute of Hazard, Risk and Resilience and Department of Geography, Durham University
9:20-9:40	Keynote 7 (KN7): "Earthquake Reconstruction - What was good and what could have been better done - Government, International Development Partners, Bilateral Aid Agencies, Multilateral Aid Agencies, Insurance case of Pakistan and Nepal" - Ms. Maggie Stephenson, DRR Expert, Ireland
9:40-10:00	Keynote 8 (KN8): "International Collaboration to Nepal in Strengthening Capacities in DRM" – Ms. Wenny Kusuma, Representative UN Women and Acting UN Resident Coordinator





10:00-10:20	Keynote 9 (KN9): "Main Ingredients of Successful Disaster Risk Reduction: An Analytical Review of Efforts in Developing Countries since 1990s" - Prof. Vinod Kumar Sharma, Hon. Executive Vice Chairman, Sikkim State Disaster Management Authority (SSDMA)
10:20-10:40	Keynote 10 (KN10): "Disaster Risk is a development issue: A development approach to disaster risk assessment and management" – Dr. Carlos Villacis, Director of Applied Science, PDC – USA
	Session Coordinator: Dr. Narayan Marasini, Sr. Manager, NSET Rapporteur: Mr. Ayush Baskota/ Pramod Khatiwada, District Coordinator/ Engineer, Baliyo Ghar Program, NSET

Summary Key Notes:

- Three-fold issue in understanding earthquake induced landslides
 - Can't say which slopes will fail
 - Can't say how large the landslides will occur
 - Can't say how long the impacts will sustain
 - Capacity for landslide mapping, innovations of technology for better landslide mapping.
 - Relationships and trust between scientists and potential users of the information.
 - Big disasters create changes in policies and implementation.
 - High urbanization increases the crisis in urban areas.
 - Critical that Nepal writes its own story. External commentary of what Nepal has done without knowing the constraints and tradeoffs made.
 - Collaboration between different arms and tiers is of paramount importance.
 - Process led by government → sound intra government working → local, provincial and federal govt.
 - Increasing resilience of women, adolescent girls and vulnerable groups.
 - Every governance level (Federal, Province and Local) to work in preparedness and mitigation.
 - NSET → pioneer in many things → change approach slightly → outreach to different provinces which are more vulnerable → Approach should be changed → not only earthquake centric → coming threat with global warming and climate change will be fires and GLOF are new hazards → approach should be multi hazard
 - Problems of developing/underdeveloped countries → Disaster Risk is just a symptom of lack of development similar to poverty, lack of employment and others.
 - Risk reduction → because of poor planning, we are creating risk every day
- Emphasis on preparedness → Still emphasis is given towards emergency response → Investment is needed in preparedness and mitigation rather than for response

Remarks by Keynote Speakers

Prof. Alex Densmore, Durham University

- Each earthquake teaches us something new.
- Importance of recognizing landslide hazard as a critical component of earthquake trigger. Earthquake triggers landslides.
- First systematic study of earthquake induced landslides was done in the 1700s.

- d. Bigger shaking, bigger impacts. Landslide intensity co related with earthquake magnitude
- e. Three-fold issue in understanding earthquake induced landslides
 - i. Can't say which slopes will fail
 - ii. Can't say how large the landslides will occur
 - iii. Can't say how long the impacts will sustain
- f. Landslides can trigger sediment and debris flow into river systems, thus having a long-term effect in the river systems.
- g. In 2008 China Earthquake, flooding issue was raised due to elevation of riverbeds due to landslide debris
- h. Lessons Learnt:
 - i. Resilience is not only about string houses but also where they are built
 - ii. Mapping takes time. Important lesson is the generation of these maps as soon as possible to aid relief and recovery efforts.
- i. Summarize information into guidelines
 - i. Minimize the angle between the slope and the skyline (Keep the slope low)
 - ii. Avoid the steep channels (>15 degrees). Keep structure well away from channels.
 - iii. Build on the lowest slope possible.
- j. Opportunities:
 - i. Capacity for landslide mapping
 - ii. Relationships and trust between scientists and potential users of the information.
 - iii. Post-earthquake mapping technology that can see through clouds RADAR for example.

Ms. Maggie Stephenson, DRR Expert, Ireland

- a. Housing is not only technical and physical system but also an economic and social endeavor
- b. Haiti→keeping in mind how much of earthquake damage is housing. Move away from housing towards housing systems.
- c. Big disasters create changes in policies and implementation.
- d. Things get tested during a disaster→evidence and learnings to move forward.
- e. Cluster of NGOs after any disaster has helped better coordination in efforts.
- f. Livelihood risk is as important as natural risk
- g. In Gujarat, housing designs extended as per Gujarati tradition after the earthquake.
- h. Owner Driven Approach with financial and technical assistance is better
- i. High urbanization is increasing the crisis in urban areas.
- j. Headlines from Nepal→Lessons to use→recovery→lessons to learn for the future→communicate for other disasters outside of the country
- k. Instead of what went wrong, focus on what could be done better next time?
- l. Critical that Nepal writes its own story. External commentary of what Nepal has done without knowing the constraints and tradeoffs made.
- m. What went well





- i. Highlight and explain→great because it took a long time→having codes and curricula was huge advantage
- ii. Cooperation between local and external assistance→was fruitful for external assistance
- iii. Shelter Policy→Developed fast→700,000 built shelters within 6 weeks
- iv. Case Support Mechanism→People will build earlier. Right guidance, policy information
- v. PDNA→Comprehensive document, important that it is consistent and implemented properly (Many countries have constant revisions and u turns)
- vi. Manage mobilize funding and get it to all households→impressive. Can't compare Gujarat and Kashmir.

Ms. Wenny Kusuma, Representative UN Women and Acting UN Resident Coordinator

- a. Thanks to the organizers for convening the conference 9 months after the parliament has passed the Disaster Management Act
- b. Collaboration between different arms and tiers is of paramount importance.
- c. Process led by government→sound intra government working→local, provincial and federal govt.
- d. Role of international actors→Offer a vision of collaboration between GON and International community
- e. Commitment of UN to partner with GON to reduce vulnerability towards disaster and climate change
- f. 2022→strengthen all admin. Level, recovery, advance efforts in DRR and climate change
- g. Increasing resilience of women, adolescent girls and vulnerable groups.
- h. Continue to contribute to preparedness→reproductive health and gender violence

Prof. Dr. Vinod Sharma, Hon. Executive Vice Chairman, Sikkim State Disaster Management Authority (SSDMA)

- a. Every developing country (this region) is facing the same thing in DRR.
- b. Changes seen in the past 30 years→government, NGOs, academic, community
- c. 1990→starting point→people started thinking that only relief is not enough.
- d. Smaller group→How to initiate preparedness, mitigation
- e. NSET initiated→that was the same time in Sri Lanka (NCDM) was started
- f. Other countries started working in this area—paradigm shift from relief towards preparedness
- g. Some countries took seriously, some didn't
- h. Whenever there was a big disaster→1999 super cyclone in Orissa→thinking of the government changed→heavy damage to state→paralysis of the state capital as well→for 3 days, cyclone was churning the state→no outside delegate could
- i. Changed perspective
- j. Other great disasters were the 2001 earthquake and 2004 tsunami
- k. Disaster Management Act in 2005. State, National and District Disaster Management Authority
- l. In Nepal, things have changed→we have acts, authority, strategy for DRR→happened after the earthquake→common in developing country to think preparedness and mitigation is required.

- m. States have developed after a big disaster
- n. Do we need a big disaster to wake up and start working in DRR?
- o. Every governance level to work in preparedness and mitigation.
- p. Nepal→wonderful opportunity→new constitution→provincial and federal system→right time→most of the roles will be given to the states→at state and district level should initiate what is being done at the national level → need implementation at local levels
- q. In India, some states have taken the DRR acts in priority→in other states
- r. Different disasters in Nepal→ GLOF must also be considered as a hazard.
- s. In Sikkim→State and District→Disaster Risk Management Plan→Plans at the district level are prepared by the officers, not by consultants
- t. Climate Change Adaptation must be combined with DRR Plans.
- u. Brian Tucker→Road Map to NSET→Learnings from NSET for public awareness→ESDs and Schools Retrofitting
- v. Mason Training→Gujarat Earthquake→NSET came to India, adopted one village→Nepali masons and Gujarati masons learned and shared with sign language.
- w. NSET→pioneer in many things→change approach slightly→outreach to different provinces which are more vulnerable→Approach should be changed→not only earthquake centric→coming threat with global warming and climate change will be fires and GLOF are new hazards→approach should be multi hazard
- x. Request to Chair→Sendai Framework has given role to science and technology in DRR→academic institution in DRR→NAST should form a committee of scientific institutions to better collaborate in the field of DRR. Similarly, for academic institutions as well.
- y. Each and every one can and should contribute towards the reduction of disaster risk.

Dr. Carlos Villacis, Director of Applied Science, Pacific Disaster Center, Hawaii

- a. Problems of developing/underdeveloped countries→Disaster Risk is just a symptom of lack of development similar to poverty, lack of employment and others.
- b. Ecuador→March 1987 earthquake→nobody living in that area→60 kms of the pipeline broken→oil spilled into the rainforest.
- c. Managing disaster risk
- d. Risk reduction→because of poor planning, we are creating risk every day.
- e. Emphasis on preparedness→ Still emphasis is given towards emergency response → Investment is needed in preparedness and mitigation rather than for response and relief.
- f. Haiti: Poorest Country in the Western hemisphere.
- g. Disaster Risk Reduction:
- h. Move from projects towards long term initiatives.
- i. Incorporate all the sectors in the community into disaster risk reduction.

Keynote Session Day 3

Time/ Day	Day 3: Wednesday, June 20, 2018 (Asadh 6, 2075) Theme: Searching the Future Strategies and Priorities for ERM in Federal Democratic Republic Nepal (Hall: Nepa Dhuku)
-----------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------





9:00-10:30	Keynote Opening by Dr. Amod Mani Dixit Session Chair: Mr. Yuba Raj Bhusal, Chief Executive Officer, National Reconstruction Authority
09:00-09:20	Keynote 11 (KN 11): "Lessons/pointer- coordination, communication, effectiveness as revealed - GQ (Cluster, Logistic & NEOC)" by Mr. Kedar Neupane, Joint Secretary, Ministry of Home Affairs
09:20-09:40	Keynote 12 (KN12): "Insurance for Natural Perils – A Solution for Nepal?" - Anselm Smolka, Senior Advisor, Global Earthquake Model, Italy
09:40-10:00	Keynote 13 (KN13): "IRDR and 3 decades in China" - Dr. Han Qunli, Executive Director, Integrated Research on Disaster Risk (IRDR)
10:00-10:20	Keynote 14 (KN14): "Active Fault- seismological researches for resilience infrastructure development in Nepal" - Dr. Soma Sapkota, Deputy Director General, Department of Mines and Geology
10:20-10:40	Keynote 15 (KN15): "Strategic direction for fulfilling a visible gap in DRM in Nepal" - Prof. Kimiro Meguro, Director, ICUS, IIS, The University of Tokyo
10:40-11:00	Keynote 16 (KN16): "Post Earthquake Reconstruction in Nepal" – Mr. Yuba Raj Bhusal, CEO, National Reconstruction Authority.
	Session Coordinator: Mr. Ganesh Kumar Jimée, Director, DPER/NSET Rapporteur: Ms. Manisha Pantha, TMDS, DPER/NSET

Remarks by Keynote Speakers

Mr. Kedar Neupane, Joint Secretary, Ministry of Home Affairs

Mr. Neupane described the hazard and risk profile of Nepal, disasters and impact in the country's development. He also narrated the major government disaster management acts/policies on which were developed, such as the Natural Calamity Act of 1982, for arranging relief operations and protecting the lives and properties; and the National Disaster Response Framework (NDRF 2013), among other 49 strategic action plans/policies for post-disaster situations.

Looking back at 2015 Gorkha Earthquake, Mr. Neupane highlighted the systematic response structure which was led by the National Emergency Response Center (NEOC), including the coordination structure with the local levels and the international community in the event of a mega disaster.

Even though the preparedness level was very minimal but the effect being prepared was noted, he emphasized. For instance, training of the security forces on Medical First Response (MFR), Collapsed structure Search and Rescue (CSSR), and community preparedness trainings, prepositioning the search and rescue items, predefined open spaces, predesigned cluster system, contingency plan and established disaster management divisions in security forces along with line ministries, were central to the national capacity strengthening. Gaps such as like limited number of skilled responders and SAR equipment, lack of political will and commitment for disaster preparedness, challenges in relief distribution policy were also noted.

As a result, the government has approved the "Disaster Risk Reduction and Management Act 2017" which will address all the areas of mitigation, preparedness, response and recovery. However there is a long way to go and in which he stated, that the Government is committed to Develop Sectoral Disaster Preparedness (DSDP) and Emergency Response Plans (ERP), develop long-term strategy for developing capacity of emergency responders at different levels, preposition emergency supplies in strategic locations at different levels, develop a network of community volunteers for mobilization as required, establish a sustainable mechanism for developing responders and refreshing the skills and knowledge; and allocation of annual budget for disaster preparedness and emergency response activities at different levels.

Summary:

Lessons revealed from 2015 Gorkha Earthquake

- National preparedness efforts spelled in difference; but need to take the lessons more seriously in addressing the groups.
- Step up efforts on:
 - Strengthening policies / action plans
 - Sustain capacity building
 - Harness the role of volunteers
 - Building-in a regular funding for DRR and response activities

Anselm Smolka, Senior Advisor, Global Earthquake Model, Italy

Mr. Smolka underscored the need of micro insurance in Nepal as he says, “Risk transfer by insurance is a widely used practice, and an integral part of risk management.” But according to research, insured losses from the Gorkha Earthquake 2015 were very minimal. A holistic risk management requires sharing the risk between International Donors and Development Banks. Implementing incentives for loss prevention on this framework is the key to an efficient and sustainable risk management.

He furthermore explained, the difference between traditional and non-traditional insurance, where traditional insurance covers the area of reconstruction in which indemnification requires actual loss. Non-traditional insurance covers micro insurance for serving the poor people, government or municipal solutions for relieving fiscal pressure, in which indemnification is not bound to loss but to triggering event. Given the large insurance gap demonstrated by the Gorkha Earthquake and Terai floods, he explained that Nepal presents a typical case for non-traditional insurance.

Nepal’s Micro Insurance Pool (MIP) is in collaboration GIZ/Germany, Nepal Insurance Board (Beema Samiti) and Nepal Insurance Association. All 17 general Companies are participating in which the target is 400000 rural households (10%) by 2018.

Summary:

- Risk transfer as an integral part of risk management
- Is it applicable to Nepal?
- E.g.: micro insurance for rural areas
- Insurance pool for urban

Dr. Han Qunli, Executive Director, Integrated Research on Disaster Risk (IRDR)

IRDR, one of the reputed research organizations, focuses on the practical disaster risk reduction research studies and implementation of effective evidence-based disaster risk policies and practices. Its major objective is effective decision-making in complex and changing risk context based on the researches. Disaster risk reduction, Climate Change and Adaptation, sustainable development goals are some of the major areas of researches. At present, there are 13 National Committees and 1 regional Committee of IRDR.

Under IRDR, the Assessment of Integrated Research on Disaster Risk (AIRDR), helps by proving baseline for supporting a longer-term science agenda for research community and funding entities. While, the Forensic Investigation of Disasters (FORIN) research methodology is based around the development of case studies that answer a set of core questions about responsibility and risk for use with a range of different disaster types.





He furthermore explained about IRDR's Young Scientists Program. The Young Scientists Program is a global youth forum and is supported by UNISDR, ICSU-ROAP and other partners. At present, there are 11 young scientists from Nepal registered with IRDR.

IRDR's latest program, Project Silk Road on Disaster Risk Reduction (SiDRR) is going to be held in April 2019 at Beijing. The target participants are all DRR-related stakeholders, especially young researchers, NGOs and enterprises.

Summary:

- Presentation on IRDR's role in DRR and its activities
- Advance for integrated research as part of national DRR strategies and contribute to SFDRR
- Promote role of young scholars in addressing need for improving knowledge transfer through academic programs.

Dr. Soma Sapkota, Deputy Director General, Department of Mines and Geology

Dr. Sapkota shared the recent research works conducted on Nepal's seismic activities. Nepal, being seismically active, puts less emphasis on the vulnerable areas and continue to develop residential areas in these areas despite the prevailing risks. Dr. Sapkota emphasized that the government should be more vigilant in such scientific problems to minimize the risks. The types of buildings and the building code should be implemented according to these associated scientific researches.

Seismological research in Nepal shows that these factors should not be overlooked while planning for the development and forming policies regarding town/urban planning. Furthermore, he says, researches must be integral to policy making and public awareness.

Summary:

- Seismological researches in Nepal describe the prevailing risks
- Researches must be integral to policy making and public awareness

Prof. Kimiro Meguro, Director, ICUS, IIS, the University of Tokyo

Prof. Meguro's presentation highlighted the correct knowledge on hazard and disasters based on natural and social sciences, proper understanding on regional characteristics and own capacity (national and local capacities). Showing the risk management cycle, he emphasized on the preparedness covering mainly three points: self-help efforts, mutual assistance and public support. He emphasized that the government should focus first on the ideal situation matrix, and secondly, to measure the current situation matrix. After evaluating both aspects, then eventually the Action matrix should be developed.

Prof. Meguro related specific examples, such as 'The overall problem can be related to the failure in the behavior of masons, and unavailability of spaces. In general, approximately 90% of budget is allocated for emergency response (including relief). This trend isn't helpful in disaster reduction. Rather, we should be more focused in preparedness. We must consider that since more than 80% deaths during earthquake is because of building collapse, therefore it is required that we implement retrofitting for older buildings and apply building code for newer construction,' he says.

Government should encourage its people to retrofit their buildings. It can also run a campaign that if retrofitted buildings get collapsed during disaster then the government will compensate the loss with maximum return. By doing this, the general population will be encouraged to retrofit.

The government should also produce cheap and readily available items to be used in retrofitting. This balance between structure and non-structural components can help in minimize the risk and devastation

of the disaster. He also shared the experience of Japan and the success and effectiveness of using PP bands, a cost-effective and practical method.

Summary:

- Effective DRM Mechanisms
- Japan experience on the use of PP band
- Well balanced structural and non-structural components
- Consider disasters as opportunities to improve
- Tap private sector role in DRR

Mr. Yuba Raj Bhusal, CEO, Nepal Reconstruction Authority (NRA)

Mr. Bhusal laid the statistical figure of total financial loss due to 2015 Gorkha Earthquake, i.e. US\$760 billion (about one third of Nepal's GDP) and about US\$938 billion was invested for Nepal's post-quake reconstruction and recovery (including the contribution of NGOs, private sector, donor partners, and Government budget). Nearly \$3.43 billion was pledged during the International Conference on Nepal's Reconstruction (ICNR) held in Kathmandu.

Nepal Reconstruction Authority (NRA) was established under NRA Act 2015, with the goal to promptly complete the reconstruction works of the structures damaged by the devastating earthquake in a sustainable, resilient and planned manner. NRA also aims to provide social justice by making resettlement and translocation of the persons and families displaced by the earthquake. For the private houses, provision was made to give NPR 50,000; 150,000 and 100,000 in three instalments as a grant by the GoN. As per the reconstruction process, 54% of health institutions, 52% of educational buildings, 28% of government buildings, 15% of heritage buildings and 23% of security related buildings have been completed.

This transparency in budget also was helpful in knowing the progress of Post-Earthquake Reconstruction in Nepal, and concerns relating to the financial management. Finally, Mr. Bhusal emphasized the efforts of Nepal Government in Build Back Better (BBB) where he highlighted that in the journey of reconstruction, the principle of 'Leave No One Behind' is of utmost consideration.

Summary:

- Progress of Post-Earthquake Reconstruction in Nepal
- Hurdles highlight financial management concerns
- Government keeps up with BBB and Leave No One Behind.





APPENDIX 4: SUMMARY OF PRESENTATIONS IN TECHNICAL SESSIONS

RISK2RESILIENCE

Nepal's Collective Journey towards a Safer Future

International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal June 18-20, 2018

Time/ Day	Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past
13:30-15:30	Technical Session (TS) 1 SFDRR Priority 1: Understanding Disaster Risk (Hall: Olive Garden)

SESSION OBJECTIVES 1. Critically look back what we all collectively have accomplished in the past 3 decades in Disaster Risk Reduction in Nepal and what were the hindrances and challenges. 2. Looking forward to the opportunities in accelerating and improving Disaster Resilience in Nepal.

13:30-13:35	Chair: Prof. Dr. Binod Tiwari, California State University, USA
13:35-13:50	"History Seismic Monitoring, Lessons & challenges Dialog NSC" - Mr. Lok Bijay Adhikari, Chief, National Seismological Center, Department of Mines and Geology
13:50-14:05	"PSHA (Nepal) for National Building Code Updates" - Dr. Deepak Chamlagain, Trichandra Campus, Tribhuvan University
14:05-14:20	"Micro-tremors Survey for Micro-zonation Purpose in Kathmandu Area" - Dr. Franco Pettenati, Geophysicist/ Seismologist, OGS, Italy
14:20-14:35	"Risk Study During National Building Code formulation 1994" - Dr. Richard Sharpe, Senior Technical Director, BECA, New Zealand
14:35-14:50	"Buildings of Nepal as Revealed - Gorkha Earthquake" - Dr. Ramesh Guragain, Deputy Executive Director, National Society for Earthquake Technology-Nepal
14:50-15:05	"Seismic Characteristic of Historical Buildings in Nepal" - Prof. Prem Nath Maskey, Institute of Engineering, Tribhuvan University
15:05-15:20	"Seismic Ground Improvement with Soil-reinforcement Panels - Potential non-destructive Seismic Retrofitting Technique for Soft Clay Sites" - Prof. Dr. Binod Tiwari, California State University, USA
15:20-15:35	"The Development of Nepal's Earthquake Early Warning System" - Dr. Garry de la Pomerai, Solution System, Dubai
15:35-15:45	Q/A

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, Earthquake Safety Solutions (ESS) Rapporteur: Mr. Rabin Chaulagain, Structural Engineer, NSET

Details of the TS1

Session Chair: Prof. Dr. Binod Tiwari, California State University, USA

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS

Rapporteur: Mr. Rabin Chaulagain, Structural Engineer, NSET/Mr. Sudridh Tandukar, Civil Engineer, ESS

Allocated Durations: 15 min for each paper

Session 1:

Topic: “History Seismic Monitoring, Lessons and Challenges Dialog NSC”

Presenter: Mr. Lok Bijay Adhikari, Chief, National Seismological Center, Department of Mines and Geology

Key points:

- 1st seismic station in Nepal established in the Phulchowki Hill in 1978
- Till now about 21 seismic stations have been established in the Permanent Seismic Network
- GPS and accelerometers network also under upgrade with support of DASE France.
- From the Interseismic Seismic Pattern (1994-2014), recent mapping of epicenters has been prepared
- No of aftershocks of Gorkha earthquake recorded about 498
- 29 GPS stations also established under CGPS network out of which some are online and can be accessed at local level also
- Within 2019, target of establishing a strong seismic network in Nepal
- The task if not a sector directly involved in the production of physical outputs but has hidden priorities, hence policies and budgeting needed to elaborate the science and technology regarding seismicity

Session 2:

Topic: “PSHA(Nepal) for National Building Code updates”

Presenter: Dr. Deepak Chamlagain, Trichandra Campus, Tribhuvan University

Key points:

- Ruptures of past Earthquake mapped into polygons and Gorkha EQ was situated into one of the polygons
- Dip slip = 11.3 ± 3.5 m
Magnitude = 8.6 to 9
Rupture length = 450 km +
- Revision of Building Code necessary due to various reasons such as availability of new EQ data, identified new faults etc.
- Active fault map prepared
HFT is the most active fault in Nepal
MHT has caused most EQ till date
Coupling of MHT
- Open quake is advanced software that incorporated the depth of EQ in computation





- Main Himalayan Thrust 3d model has been prepared
- GMPE (Ground Motion Prediction Equations) needs to be revised for Nepal
- 0.6g PGA – 10 % exceedance in 50 years

Session 3:

Topic: **“Micro tremors survey for microzonation purpose in Kathmandu area”**

Presenter: Dr. Franco Pettenati, Geophysicist/seismologist, OGS, Italy

Key points:

- 2 instruments (H/V curves and S-waves velocity surveys)
- Period Maps developed
- Done microtremor survey inside Kathmandu valley in places such as Ramshah path, Bhrikutimandap.
- Carbon C13 and C14, 7 oscillations glacial/ interglacial
- Ground motion prediction equations for Himalaya is missing
- Emphasized on developing a project of active seismic to model for GMPEs

Session 4:

Topic: **“Risk Study during national building code formulation 1994”**

Presenter: Dr. Richard Sharpe, Senior Technical Director, BECA, New Zealand

Key points:

- Started in 1992 to draft the Nepal Building Code
- Kathmandu Liquefaction Potential of Kathmandu very high
- Engineers and Seismologists should work together
- Risk is a very uncertain so playing games about zoning of earthquake is not very necessary in the country, probably a single critical zoning would work

Session 5:

Topic: **“Buildings of Nepal as revealed- Gorkha Earthquake”**

Presenter: Dr. Ramesh Guragain, Deputy Executive Director, NSET Nepal

Key points:

- 700 thousand building damaged by the Gorkha EQ
- buildings with mud mortar were mostly destroyed
- Photos of damage by Gorkha EQ were presented
- Case studies of Brick masonry in mud mortar done using computer modeling
- Fragility curves were developed
- The proposed damage levels from the computation was compared with the actual damage patterns of masonry buildings and similarities in the degree of damage were observed.

- Especially extensive study of the masonry with and without earthquake resisting elements were modelled and probable value of PGA for collapse were compared. Importance of Seismic elements in buildings were shown

Session 6:

Topic: **“Seismic Characteristics of Historical Buildings in Nepal”**

Presenter: Prof. Dr. Prem Nath Maskey, IOE, TU

Key points:

- Most of the heritages are Unreinforced Masonry in Mud Mortar
- The horizontal and vertical symmetricity of temples, EQ resisting elements made up of timber, and big stone foundation about 30 m height etc. played major role to prevent collapse of temples in Nepal such as Nyatapoli, Nautalle Durbar etc.
- Subsoil condition has prime role to amplify the ground motion
- In mud mortar, if clay% is greater than 20 %, excessive shrinkage and less strength is gained. So, soil selection is of prime importance for mortar
- Major reasons for structural damages are
 - lack of maintenance and repair
 - deterioration of materials
 - ageing of materials
 - use of mix technology and mixing of incompatible materials for repair or retrofit, etc.
- Our history must be preserved not demolished, it is a mirror of our civilization

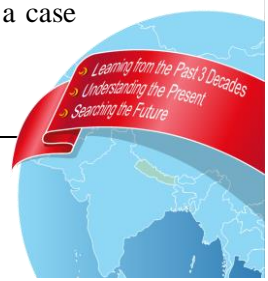
Session 7:

Topic: **“Seismic Ground Improvement with soil reinforcement panels- Potential non-destructive seismic retrofitting technique for soft clay sites”**

Presenter: Prof. Dr. Binod Tiwari, California State University, USA

Key points:

- Studied the geotechnical parameter of soil from the rupture at Lokanthali after Gorkha Earthquake 2015
- From the study, the soil was found to be black cotton and very weak
 - the shear wave velocity was nearly 200 m/s
 - Class E to F as per American classification, worst category
- Done non-destructive soil treatment test in lab by carrying soil from Nepal to America
- The method involves removal of the original soil around a structure as a percentage of plan area (e.g. 10%) and feeding back the void with stabilized soil.
- The result would reduce the amplification factor and demand of structure by 5 to 20 %
- However, the method is hard to implement, so he proposed another method of stabilizing the soil in the site itself by injecting grouts etc.
- It would ultimately save money from the economical design of structure. Shared a case study which saved about 2 million \$





Session 8:

Topic: “The development of Nepal’s Earthquake Early Warning System”

Presenter: Dr. Garry de la Pomerai, Solution System, Dubai

Key points:

- Introduced about ICL system
- Early warning system installed in Japan already about 30 years ago
- According to the study in Japan , in a trained society, the early warning of just 3 sec would reduce casualty by 30 % and the early warning of 5 sec would reduce casualty by 80%.
- Early warning system is possible, he has been working with the scientists involved in developing the system
- In Nepal, 50 EWS has been installed around the vicinity of Kathmandu valley.
- 30 sensors in stock in school and health care vicinities
- Very important for Nepal for reducing casualties during earthquakes

Question/ Answer Session

1. From Susan to Lok Bijay
Q. Developing Shape map system?
A. Not working in that
Q. Time for installation of network?
A. By 2019
2. From Santosh to Dr. Sharpe
Q. Why lesser Himalaya only targeted during code development?
A. I was not directly involved in the task
3. From Santosh to Deepak Sir
Q: PGA value around borders in Nepal, such as in Sikkim?
A: studied for up to about 300 km East/west of border, lesser than 0.6g, like 0.55g, 0.5g
Q: Considered the scenario of Earthquake?
A: Nope. But considered segmentation in the study.

Time/ Day	Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past
13:30-15:30	Technical Session (TS) 2 SFDRR Priority 2: Strengthening Disaster Risk Governance to Manage Disaster Risk (Hall: Gosaikunda)

SESSION OBJECTIVES 1. Share past experiences on Disaster Risk Governance in Nepal.

2. Critically review the accomplishments and consolidate lessons.

13:30-13:35 Chair: Dr. Mahendra Subba, Former DG DUDBC

13:35-13:50	"Advancement of Disaster Policies in Nepal: Natural Calamity Relief Act 1982 to DRR&M 2017, Strategies, Action Plan" - Mr. Umesh Dhakal, Under Secretary, Ministry of Home Affairs
13:50-14:05	"National Building Code for Improving Seismic Performance of All Buildings – Mr. Shambhu KC, Joint Secretary, MoUD "
14:05-14:20	"Efforts Towards Safer Urbanization" - Dr. Mahendra Subba, Former Director General, DUDBC
14:20-14:35	"Requirement for Mandatory Seismic Resilience of Private Hospitals" - Mr. Bibek Sigdel, Engineer, DUDBC
14:35-14:50	Children Safety and Community Resilience/CCDRR - Ms. Pramila Subedi, Save the Children
14:50-15:05	"How Vyas could do National Building Code Implement Components and History of Efforts and Challenges" - Mr. Baikuntha Neupane, Mayor, Vyas Municipality
15:05-15:30	Q/A

Session Coordinator: Mr. Khadga Sen Oli, Advocate and Outreach Manager, NSET Rapporteur: Mr. Mahanand P. Timalisina, Sr. Communication Officer, NSET

Note Taking: Parallel Session (TS2)

Parallel Session

SFDRR Priority 2: Strengthening Disaster Risk Governance to manage Disaster Risk

(Session Coordinator: Khadga Sen Oli, Rapporteur: Mr. Mahanand Timalisina)

Key points:

1. The concept of 'safer' urbanization should embrace holistic and integrated view of DRM focused on multi-hazards including climate change
2. Reduction of physical, socio-economic, environmental, and institutional vulnerabilities, including forging partnerships and collaboration must be stressed.
3. Challenge to implement codes in the rural areas that are newly attached to the adjacent municipalities.

Key messages of Speakers

A) Mr. Umesh Dhakal, MoHA

1. Promulgation of DRRM Act a major policy departure
2. Major features:
 - - DRR bodies envisioned in the Act fully equipped with fund and authority.
 - - Mandate, authority and responsibilities allocated at all three tiers of governments.
 - - Act adopts the policy/ priorities of global policy.

B) Mr. Baikuntha Neupane, Mayor, Vyas Municipality

1. Experience/implementation of NBC in Vyas Municipality
 - Gradual process of NBC implementation 2008 to 2017





- Announcement of NBC implementation in 2010
 - Masson training/engineer training in 2014
 - Field monitoring on its own from 2017
2. Government buildings, schools evading the building permit process
 3. All the houses do not come under house design approval and building permit process
 4. All the houses do not comply despite going through house design approval system
 5. Difficult to bring the rural part of municipality into building permit who were recently merged into the municipality

C) Anthony De La Cruz, UNICEF

1. Children Focused DRR should be the priority including Disaster Risk Assessment, planning at local level (community risk survey assessment, developing hazard map, disaster calendar)
2. Supporting government in promoting child friendly initiatives through formation of child club, school safety club etc.
3. Including Children LDMC in districts to represent the voice of children
4. In 53 districts, 30000 child and school safety club formed, they advocate for local leader and community member

D) Pramila Subedi, Save the children

School safety

1. Policy striving towards disaster risk free education environment in Nepal
2. Policy promoted disaster education among children

Challenges

1. For school DRM- lack of adequate fund
2. Quality assurance or monitoring aspect of school safety lacking

E) Bibek Sigdel, DUDBC

1. Policy clearly manifested in the mandatory comply of stringent safety provision for both new and already constructed hospital building in accordance with NBC
2. Require approval and certification of DUDBC
3. Requirement of hospital Design 1.5 times safer than private residential buildings
4. Safety issue has been followed by new buildings but the safety levels in old buildings are not satisfactory

F) Dr. Mahendra Subba, Former DG, DUDBC

Safer urbanization

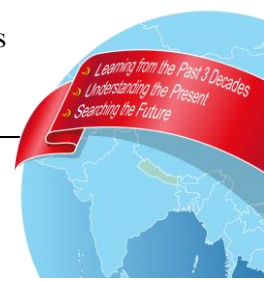
- Need to Identify Safer settlement
- Need to consider Multi hazard aspects
- Need of follow build back better concept
- Need to identify open spaces
- Promoting research and development
- Enhancing capability of community members

Time/ Day	Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past
13:30-15:30	Technical Session (TS) 3 SFDRR Priority 3: Investing in DRR for Resilience (Hall: Begnas)
	SESSION OBJECTIVES 1. Share past experiences on Disaster Risk Governance in Nepal. 2. Critically review the accomplishments and consolidate lessons.
13:30-13:35	Chair: Mr. Sushil Gyewali, Former CEO, NRA
13:35-13:50	"SESP assessment and Preparedness (ADB UNICEF ,Plan and Save the children)" - Mr. Dilip Shekhar Shrestha, CLPIU, National Reconstruction Authority
13:50-14:05	"NBC implement in Dharan Metropolitan City: Approaches, Strategies, Achievements and Lessons Learnt" - Mr. Suraj Shrestha, Sr. Engineer, Dharan Metropolitan City
14:05-14:20	"CBDRM - What Worked and What Didn't (Analyses of the case of Kirtipur, KMC Ward 17, LDRMP development and in action" - Mr. Bijay Krishna Upadhyay, Director, NSET
14:20-14:35	"Efforts of media in Disaster Risk Communication, Success Achieved and Challenges Faced" - Mr. Shreeram Singh Basnet, DRR Journalist
14:35-14:50	"The Need for a Comprehensive Though on Urban Regeneration/Reconstruction, RSLUP, and Reconstruction of Cultural Heritage" - Mr. Surya Bhakta Sangachhe, Sr. Technical Advisor, NSET
14:50-15:35	Innovation in Earthquake Risk Management in Nepal – <ul style="list-style-type: none"> • Mason Training on Earthquake-resistant Building Construction • Shake Table Demonstration • Annual Earthquake Safety Day (ESD) • Simple Earthquake Damage/Loss Scenario and Action Planning for Earthquake Risk Management Facilitation - Ms. Nisha Shrestha Mr. Bal K Kasula, Trained Mason Ms. Reshma Shakya, NSM, Women Group Mr. Rabindra Lal Mul, Engineer, Vyas Municipality

TS 3: SFDRR 3: Investing in DRR

Summary Points

- Need to strengthen capacity of all the local level government in EMIS, planning, operation and maintenance of School level education. (Piloting 20 rural/municipalities of 5 districts with WB TA support)
- Strategy of SITAR (Incremental Approach, Transactive, Radical, Synoptic and Advocacy) should be followed for effective BCI (Keep it simple and involve all stakeholders)
- Structural Engineers needs to be recruited in the municipalities, Third Party Verification; E-BPS/Effective Regulatory Measures needs to be ensured
- Should focus on unified program for all stakeholders rather than program in pockets





- Risk based planning system is a must
- Holistic approach is needed for reconstruction of houses in historic settlements.

DRR in Schools: Dilip Shekhar Shrestha, CLPIU

Key Issues

- Funding gap
- Not appropriate land for safe school construction due to donated land in most of the schools
- Not sufficient land for construction and evacuation.
- High construction cost due to unsuitable construction sites (Site Development)/Remoteness of school locations.
- Lack of fund in SMC for operation/maintenance

Way Forward

- Need to carryout School Mapping of all the schools (To avoid vulnerable location for schools)
- Need to carry out Vulnerability assessment of all the existing school buildings (WB is planning to support from DRM component)
- Should have provision to acquire suitable land for the construction of community school buildings.
- Need to strengthen capacity of all the local level government in EMIS, planning, operation and maintenance of School level education. (Piloting 20 rural/municipalities of 5 districts with WB TA support)
- Need to organize awareness program related to DRR for SMC/communities, students and parents.
- Need to allocate more fund to school sector

Mr. Shree Ram Singh Basnet, DRR Journalist

- Each media houses must give top priority to disaster preparedness and pre- plan for own job continuation. Government and concerning agencies should also extend their support in this regard.
- All the media persons must be trained in Disaster Journalism.

Mr. Suraj Shrestha, Dharan Sub Metropolitan City

For Effective BCI

- Keep it simple, Raise awareness
- Attack the issue from all sides
- Take time for preparation, Involve all the stakeholders mainly grassroot level

What Next

- Recruiting Structural Engineers
- Third Party Verification

- E-BPS/Effective Regulatory Measures (LU Planning Tools; Urban Renewal)
- Retrofitting friendly policy
 - Building Permit Fee Reduction/ Waiver
 - Exempt a portion of IPT for retrofitting of vulnerable buildings
 - Provide Incentives in GC
 - Seismic Evaluation Fund
 - Expedited Permitting processes
 - Technical Assistance; Marketing Assistance via awards, web sites
 - Recognition to House Owners

Derived Strategy

- Incremental Approach (I)
 - Transactive: Involvement of all stakeholders (T)
 - Radical (R)
 - Synoptic (S)
 - Advocacy (A)
- (SITAR Planning Traditions)

Mr. Bijay Krishna Upadhyay, Director, NSET

Challenges:

Weak institutional system in DRR

- Less Inter agency coordination
- DRMCs operate as volunteers
- Not a priority of government

Learnings:

- DRR should be a part of Governance System
- Be Transparent in account authority + activity
- Make CBDRM initiatives "Community Paced"
- Honor and use "Indigenous Wisdom"
- Develop "Simple risk assessment Tool"
- Should focus on unified program for all stakeholders rather than program in pockets

DRR in Private Sector; RSLUP Surya Bhakta Sangachhe

Gaps Deficiency

- Technical Capacities of municipalities
- The private sectors mostly perform CSR in "bits & pieces" so the targeted impact often gets diluted. Most of the businesses are not disaster resilient themselves
- Trained human resources lacking; Communities' coping capacity is very low
- Continuous community awareness needs to be carried out





- Lack of guidelines, manual, SOP, EIC materials; Lack of Hazard, vulnerability and risk information
- Risk based planning process doesn't exist

Lessons Learned

- Risk based planning system is a must
- Holistic approach is needed for reconstruction of houses in historic settlements.
- System of regular inspection and maintenance of the heritages should be developed to save our cultural heritage during earthquakes.
- Community participation is a must for sustainable conservation of our heritages

Time/ Day Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past

13:30-15:30 Technical Session (TS) 4 SFDRR Priority 4: Disaster Preparedness for Effective Response, Build Back Better (BBB) in Recovery, Rehabilitation and Reconstruction (**Hall: Rara**)

SESSION OBJECTIVES To discuss on:

1. Current status of response mechanism, the hindrances and challenges in the past 3 decades in Disaster Risk Reduction.
2. Disaster preparedness and response during Gorkha Earthquake 2015 by different organizations.
3. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

13:30-13:35 Chair: DIG Thule Rai, Nepal Police

13:35-13:50 "Learning from the Experience of Past 3 Decades" - Mr. Daya Ram Shrestha, Section Officer, Ministry of Home Affairs

13:50-14:05 "Disaster Preparedness and Response of Nepalese Army" - Nepali Army

14:05-14:20 "Disaster Preparedness and Response of Nepal Police" - DSP Sameer Kharel, Nepal Police

14:20-14:35 "Disaster Preparedness and Response of Nepal Armed Police Force" - Nepal Armed Police Force

14:35-14:50 "Disaster Preparedness of Nepal Red Cross Society" - Mr. Bhoj Raj Ghimire, Senior Program Officer, NRCS

14:50-15:05 "Experience of Kathmandu Metropolitan City on Disaster Preparedness" - Mr. Indra Man Suwal, Kathmandu Metropolitan City

15:05-15:20 "Program for Enhancement of Emergency Response/Disaster Preparedness Emergency Response contribution for Preparedness for Emergency Response" - Mr. Aditya Tamang, Civil Engineer, NSET

15:20-15:30 Q/A

Session Coordinator: Mr. Ganesh Kumar Jimjee, Director, DPER Division, NSET Rapporteur: Ms. Maritess Tandingan, Dy. COP, PEER Program, NSET

Technical Session(TS): TS4

1. Background:

NSET on the occasion of 25th anniversary is initiating an **International Conference “RISK2RESILIENCE”**. This is mainly to formulate the future direction (strategies and plans) in Disaster Risk Reduction based on Nepal’s three decade of collective experience. The conference will follow the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), which is the first major agreement of the post-2015 development agenda, with seven targets and four priorities for action. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR). The participation will be seen from organizations and institutions of all sectors.

This session is one of the 4 parallel sessions of R2R on SFDRR Priority 4. (Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction)

Disaster can occur suddenly and the knowledge to respond it can minimize the loss of both life and property. In a disaster-prone countries like Nepal, disaster can damage brutally as is also timely noted in the frequent cases like Gorkha Earthquake 2015. The primary task after disaster is response and if respondents are trained from community than the loss of lives can be minimized immensely. **Priority 4** along with the concept of recovery and reconstruction also focuses on the technical and materialistic preparedness to respond post disaster situation. The basic level of rescue and medical response training for the end users will suffice any community to be disaster prepared. Along with this, the basic knowledge regarding an emergency and minimal understanding of the response will serve as a tool to save oneself from chaos situation during onset of disaster.

2. Session Objective:

The main objective of this thematic session is to discuss on current status of response mechanism, the Hindrances and challenges in the past 3 Decades in Disaster Risk Reduction, disaster preparedness and response during Gorkha Earthquake 2015 by different organizations. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

3. Participating institutions/ Experts

- a. Ministry of Home Affairs (MoHA)
- b. Nepali Army
- c. Nepal Police
- d. Armed Police Force
- e. Kathmandu Metropolitan City
- f. Lalitpur Metropolitan City,
- g. Institute of Medicine, Tribhuvan University Teaching Hospital
- h. Community-based organizations and NGOs/INGOs working in the field of disaster risk reduction and disaster management will also be supporting.
- i. National Association of the Physical Disabled-Nepal (NAPD-Nepal)
- j. Nepal Red Cross Society
- k. National Society for Earthquake Technology (NSET)
- l. Chhetrapati Free Clinic
- m. Kirtipur/Thankot Women Network





- n. National Reconstruction Authority
- o. Department of Education
- p. Department of Archaeology
- q. Bhimeshwor Municipality
- r. World Bank
- s. Japan International Cooperation Agency(JICA)
- t. Housing Reconstruction Recovery Platform(HRRP)
- u. National Society for Earthquake Technology (NSET)

4. Focus

This Session will focus on current response mechanism and strategy for strengthening disaster response system in the new federal system based on the lessons learned from Gorkha Earthquake.

5. Parallel Session

1) Topic: Learning from the experience of past 3 decades

Speaker: Dr. Daya Ram Shrestha, Information Officer, National Emergency Operations Center, Ministry of Home Affairs (MOHA)

Duration: 15 min

Beginning with the risk profile of Nepal and account of hazards in Nepal he says, Nepal is vulnerable because of its geographical topography. Along with this, people are very conservative in acknowledging the fact that the disaster event is a natural event rather they adamantly believe that its gods' creation and they be more focus in pleasing gods by offerings.

After occurrence of disaster, government formulated an act basically from the lesson learnt. Existing legal acts which were developed addressing Disaster Management are 11 acts documented. Legal process and System for Disaster Risk Reduction (DRR), includes Right to live, Right to shelter and Right to urbanization of Natural Resources.

Nepal government has made International, Regional and Bilateral Treaties. The five-flagship program includes, School and hospital safety, Emergency Preparedness and Response Capacity, Flood Management in Koshi River Basin, Integrated Community Based Disaster Risk Reduction and Policy and institutional Support for Disaster Risk Management.

He explained about the emergency response mechanism of Government of Nepal (GoN), humanitarian coordination structure and coordination structure during Mega Disasters. He further states that the new DRR and Management Act of 2018 is a milestone and still there are various needs to be fulfilled like: Dedicated training center/s, policies, trained and equipped SAR teams and strengthen collaboration with other national and international stakeholders.

Summary:

- Existing 11 policies and acts which covers all about Disaster Management.
- Government coordination mechanisms during disasters/emergencies, i.e. with local levels and with the international community
- The new DRR and Management Act of 2018 is a milestone
- Present needs:

- Dedicated training center/s
- Policies
- Trained and equipped SAR teams
- Strengthen collaboration with other national and international stakeholders

2). Topic: Disaster Preparedness and Response of Nepal Army

Speaker: Lt Col Roj Pratap Rana, Nepal Army

Duration : 15min

Nepalese Army, since historic times, has remained a cohesive institution mandated to preserve territorial integrity, independence and sovereignty of the nation. Playing an instrumental role in the national development efforts and has been supporting various plans and programs of the government. Disaster Management is one of the major tasks, Nepalese Army (NA) is performing during the time of crisis. Leadership, reach, crisis resilient, organization, Niche capabilities, ethics and values, HADR Exercises are some of the strengths of NA. Whereas, absence of critical equipment, esp. SAR , very minimal Aviation Assets(AA), infrastructural vulnerabilities of army barrack, lack of formal national mechanisms are underprivileged area.

Four prolonged approach to preparedness that NA is following are: organizational preparedness, pre stocking of relief stores, and inclusion of disaster management training in all military courses. Disaster Management Training Center (DMTS) and DM battalions conduct various training and almost 540 personnel are trained through these training centers.

While concluding the presentation Lt Col Rana stated the way forward where NA had planning to develop own training school as “Center of Excellence”. Priority is to develop own Search and Rescue Team and capabilities. Plans to launch more public awareness programs and campaign.

Summary:

- Gaps:
 - SAR Hi-tech equipment
 - Poor aviation assets
 - Vulnerable barracks
- Recommendations:
 - Organizational preparedness
 - Pre-stocking of supplies
 - Sustained trainings

3) Topic: Disaster Preparedness and response of Nepal Police

Speaker: DySP Samir Chandra Kharel, Nepal Police

Duration: 15min

Guided by Nepal Police Act 1955 and Police Regulation, Nepal police (NP) act as a Human resource, communication network and local tools. We are presence in different response and relief committees as directed by “Natural Calamity Relief Act “says DySP Kharel. As per the Memorandum of Understanding (MOU) signed with NSET/PEER in 2003 since then Nepal





police is doing partnership with PEER for capacity building. Specialized rescue courses (MFR, CSSR, Firefighting, Rope Rescue, Dead Body Management, Vehicle Extrication, and Swift Water Rescue) are some of the trainings which are done through NSET.

1071 personnel are dedicated for disaster management division. As a role of NP in response, planning, training, information, coordination and awareness is done pre disaster whereas during disaster command post formation, coordination, media liaison, protecting property of victims, maintaining public order, information management, search & rescue, damage assessment and as the first officer at the Scene, Scene Management and Evacuation is also under NP responsibilities. Along with this in post disaster situation Nepal Police is involved in information, assist in rehabilitation, patrol, picket, crime control and to manage relief supplies.

During 2015 Earthquake, Nepal Police was actively engaged in rescue operation. The experience which NP felt were highlighted. Arrow and inaccessible roads in city and insufficient means of transportation made difficult to reach the site. Limited number of Hi-tech SAR equipment and coordination among various organizations were notable shortcomings. Moreover, dead body management was not done, absence of onsite prehospital medical treatment and triaging of the houses was not seen. However, this experience has also given opportunities in learning by doing. Rise in the sense of national unity, enhancement of coordination and collective effort among organization, efficiency test and experience of crisis management, realization of strengthening disaster response capacity of the country, working experience with other agencies (national and international SAR Team) are some of the positive outcome.

In future NP is dedicated towards setting disaster response units up to the state level, dedicated rescue force is a must, establishment of disaster response training center, enhancement of standard response capabilities, to acquire disaster response tools and improvement in coordination with other sector by sharing knowledge and skills.

Summary:

- 2015 Earthquake, an opportunity for mending coordination among organization
- The trial of preparedness was done on the response field post-Earthquake
- Realization for the need of specialized SAR team is a key.
- In future NP is planning to setup disaster unit in every province.

4) Topic: Disaster Preparedness and Response of Nepal Armed Police Force

Speaker: DSP Jeevan KC, Nepal Armed Police Force

Duration: 15min

Armed Police Force(APF) was established in 2001 especially for the Peace keeping and security of the country. Disaster management is a mandatory task for APF. During disaster response APF is always the first responder, search, rescue and relief operations are their prime concerns apart from that observation, reporting, damage assessment, opening road and bridges. Debris management and also to provide medical services are some of the major work areas. To obtain these responsibilities APF train their staff in Disaster Management Training Center (DMTC) in Kurintar, which is basically the first training school in Security forces. DMTC was established in 2011 where 1 dedicated PEER building is constructed, where modern DM equipment are stored, and this training center occupies around 125 trainees at once.

From the Experience of Gorkha Earthquake, DySP KC shared, APF responded more than 70% of total victims, and was working in coordination with Urban Search and Rescue (USAR) Teams. The learnings from the earthquake includes developing comprehensive disaster response plan, to develop enough number of dedicated SAR teams in Central/Provincial/District/Local Levels, prepositioning of enough relief materials in regional warehouses and to enhance the sound inter-organizational cooperation and coordination mechanism. However, by 2030, APF have planned to strengthen overall DM capacity, to establish DM center in each province and to develop USAR team within APF, Nepal.

Summary:

- First to have Disaster oriented training school
- Plan to have training schools in every province
- Plan to dedicate SAR team from APF and also to develop USAR team within APF.
- Prepositioning of enough relief materials in regional warehouses.

5) Topic: Disaster Preparedness and response of NRCS

Speaker: Mr. Bhoj Raj Ghimire, NRCS

Duration: 15min

Established in 4 September 1963 with the affiliation to international Federation of Red Cross and Red Crescent Societies (IFRC), NRCS is actively working on Disaster Management since then. During the evolution NRCS has shifted from Areas of Work during 1963-1990 it was Relief focused (live saving and support through Blood and Ambulance service, support to Tibetan refugee), and during 1990-2000 it shifted its focus to relief and Community Based Disaster Preparedness (VCA, preparedness and mitigation), only during 2000-2010 it began to work for Disaster Risk Reduction and since then until 2020 it has come up with Resilience Program. By now there are total 1060123 members of NRCS. It is working in 14 projects of Disaster Risk Reduction.

It works in coordination with many organizations like UN agencies, civil societies, theme-based stakeholders, local government, line ministries and security forces. While sharing the achievement of NRCS, he pointed the figures towards 412974 are direct beneficiaries, regular relief services beneficiaries are 24480 people including cold wave and flood response. In addition to this, indirect beneficiaries would be around 4423098 through different programs and services. It has a significant contribution to government as an auxiliary for National Strategy action plan for disaster risk reduction, National Strategy for resilience local community, Dead Body Management guideline and Revision of Assessment guideline (IRA).

Further in the future it is focused to promote the cash program and establish the mechanism at all level, Increases the number of its community first responders, with response equipment and effective skills & knowledge. Strengthen the information management system (including early warning, emergency communication, Assessment and coordination), Dissemination and promotion of its work.

Summary:

- Consider the rights of victims in disasters. Only when we ensure the dignity and rights of disaster victims then we can expect their participation in DRR efforts.





6) Topic: Experiences and lessons learned from past 3 decades in the field of Disaster Preparedness and Emergency Response by NSET

Speaker: Aditya Tamang, Civil Engineer/Training Course Materials Specialist, NSET

Duration: 15min

Mr. Tamang was mainly focused in the post disaster response where learning from Gorkha Earthquake showed Community people were the first responders then National responders and later International Responders join the Response. According to the data gathered by NSET, Search and Rescue (SAR) Team searched 6553 victims, International SAR team found 154 victims, whereas community people rescued 24875 number of victims dead or alive. With these findings NSET believed that with the awareness, education and training we can build the safer communities. NSET has also been conducting PEER trainings in both national and regional level. There are all together 2654 trained personnel in region and 1216 trained personnel in Nepal. Also, Hospital preparedness for Emergency (HOPE) course under PEER has 367 graduated in Nepal and similarly community-based course (CADRE) has also 197 trainees in Nepal. Earthquake Risk Reduction and Preparedness Orientation Program, Community Search and Rescue (CSAR), Basic Emergency Medical Response (BEMR), Damage Assessment Training (DAT), Developing Emergency Response Plan (ERP), Pre-positioning Emergency Supplies are some of the program which are designed for enhancing disaster preparedness at community level.

Similarly, Pre-positioning of Emergency supplies like Earthquake GO Bag, Household (HH) Emergency Kit, Community Search and Rescue (CSAR) kit, Pre-Positioned Emergency Rescue Store (PPERS) are the promotions made by NSET. By now NSET has oriented almost 22659 from 2001 to 2017, CSAR training is provided to 1721 community people, BEMR training is provided to 610 graduates.

NSET has estimated 200 CSSR squad and 15000 CSAR Squad required for 30000000 population of Nepal.

In future NSET plans to have a long-term sustainable strategy, dedicated Training Academy/Institute, timely training with refresher courses and coordination/networking, system of monitoring and most importantly database/inventory management.

Summary:

- Preparation made difference
- Community search and rescue trainings is very useful as the community people are the first responders.
- Half of the total population are aware of Earthquake.
- 200 CSSR squad and 15000 CSAR Squad required for 30000000
- Dedicated Training Academy/Institute is required for specialized trainings.

7) Topic: Preparedness for Effective post-disaster Medical Response

Speaker : Dr. Sanjay Karki, Head of Emergency Department, Nepal MEDICITI Hospital

Duration : 15 min

Along with the natural disaster Nepal has also frequent man-made disaster where there is equal requirement of rescue and response. One good example of such event is US-Bangla Plane

Crash. In such event Nepal has witnessed, many chaos situations and in this case if hospitals are not prepared then the scenario will get worse. With the hope of serving Nepalese, a newly developed hospital MEDICITY is focused to address all the emergency requirement and are fully equipped to respond to emergency at the quickest.

Following the national policy, Nepal MEDICITY is under the hub of Patan hospital. The facilities enlisted by Dr. Karki in the hospital is 23 bedded emergency department, Triage area having the capacity of: 10 Red, 15 Yellow, 25 Green cases, it has separate pharmacy with all the required drugs and equipment, and proper communication system like Mobile, landline, radio system.

This hospital is self-sufficient and well prepared for disaster as they have allocated commander's rooms and equipment, and the buildings which is Earthquake Safe. One-way entry and exit make the flow of people manageable. Manpower supply system, food supply system, neighbor contacts, neighborhood plans makes the hospital even more prepared. Also, they conduct trainings and drills for the capacity buildup of the in-house staffs along with this monthly in-house seminar is conducted to address the changes. They also include neighbor in neighborhood plans so that the local people will have ownership and they can actively participate during disaster.

Key notes:

- Trained and equipped teams on standby for any need; quick response is crucial.
- Nepal ambulances must be Advanced Cardiac Life Support (ACLS) compliant
- Nepal MEDICITY incorporates neighborhood plans

6) Q&A (Interaction with Audiences)

What is the present capacity of fire brigades in Kathmandu? Any future plans to improve the capacities of fire brigade and road networks in Kathmandu?

- NP: All security forces have their own fire brigades. These fire brigades support the fire brigades that are main under the authority of local government units.
- Prof. Sharma (India) shared the good practices of Sikkim. Sikkim is geographically located close to Nepal and may accord fire suppression assistance to adjacent areas of Nepal that may be hit by fire incidents (cross-boundary assistance). One local adaptation is procuring motorbikes that can be mobilized in narrow road networks. The motorbikes are custom-designed having the basic equipment for firefighting. Consider needs-based approach and as per local setting. India will soon have a National Emergency Response System (NERS) – a unified national contact number for responding to all incidents (medical emergencies, fire, crime, disasters, SAR, etc.)
- NA: At the individual level, basic awareness like using the fire extinguisher is important.

Participant from Malaysia:

- Suggested that a civil-military coordination and exercises may help strengthen networking and collaboration of security forces with the civil sector/public; regional hub for disaster monitoring and coordinated humanitarian response and disaster relief; a national hospital emergency management systems in place; and trainings for communities led by the Red Cross/Red Crescent.





7) Major Highlights of TS 4:

- Preparedness bridges the gap for the possible need in external help, such as in the area of advanced rescue and relief.
- Existing capacities at the national and local levels helped in coping with the immediate needs, but the lessons learned may serve as takeoff points to:
 - Strengthen the capacity building of professional responders;
 - Scale up community level trainings, including volunteer's development
 - Improve communication and coordination systems
 - Craft appropriate action plans that would address the national and local needs.
- Consider the rights of victims in receiving assistance, dignified shelter, etc.; only then that disaster victims' active participation can be expected in return, in DRR efforts.
- Institutional commitment to create the synergy in DRR towards national resilience.

Time/ Day Day 2 : Tuesday, June 19, 2018 (Asad 5, 2075) Theme: Understanding the Present

11:00- 12:40 Technical Session (TS) 5 SFDRR Priority 1: Understanding Disaster Risk
(Hall: Olive Garden)

SESSION OBJECTIVES 1. Critically look back what we all collectively have accomplished in the past 3 decades in Disaster Risk Reduction in Nepal and what were the hindrances and challenges. 2. Looking forward to the opportunities in accelerating and improving Disaster Resilience in Nepal

- 11:00- 11:05 Chair: Prof. Dr. Tara Nidhi Bhattarai, Tribhuvan University
- 11:05-11:20 "Soils of Kathmandu" - Dr. Narayan Marasini , Sr. Manager, NSET
- 11:20-11:35 "Contribution of Nepal Geological Society in Disaster Risk Reduction in Nepal in the Past 3 Decades" - Dr. Kabiraj Paudel, President, Nepal Geological Society
- 11:35-11:50 "Architectural Structural Survey for Restoration of Historical Construction Damaged - Nepal Earthquake of 2015" - Prof. Toshikazu Hanazato, Mie University, Japan
- 11:50-12:05 "Scientific Evidence for DRM in Nepal and the Lessons from Gorkha Earthquake: What has been done, What remains to be done" - Dr. Rabindra Prasad Dhakal, Nepal Academy of Science and Technology
- 12:05-12:20 "GeoHazard Risk Assessment of earthquake affected settlements" - Mr. Steven Revill, Department of Mines and Geology and National Reconstruction Authority
- 12:20-12:35 "Contribution of Geological and Seismological Researches to DRR in Nepal" - Dr. Sudhir Rajaure, Deputy Director General, Department of Mines and Geology
- 12:35-12:45 Q/A

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS Rapporteur: Mr. Prayash Malla, Structural Engineer, EERT, NSET

Details of TS5

Session Chair: Prof. Dr. Tara Nidhi Bhattarai, Tribhuvan University

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS

Rapporteur: Mr. Prayash Malla, Structural Engineer, EERT, NSET

Allocated Durations: 15 min for each paper

Objective of the Session:

1. Critically look back at what we all collectively have accomplished in the past 3 decades in Disaster Risk Reduction in Nepal and what were the hindrances and challenges.
2. Looking forward to the opportunities in accelerating and improving Disaster Resilience in Nepal

Key Ideas Issued from the Presentations:

In total 6 presentations were delivered,

1. Soils of Kathmandu – Dr. Narayan Marasini, Sr. Manager, NSET

- Presents what our understanding is on the dynamic characteristics of the soil in Kathmandu based on the past record and what is carried out in this study (laboratory test) to update our knowledge regarding it.
- Backing literatures show sediment deposit as deep as 600m extended to the bed rock and mineralogical composition of soil.
- Mineralogical composition- High Mica content in the soil.
- Shaking record of Kathmandu valley depicts higher PGA (0.24g E-W) at the Kirtipur station and around 0.15g (N-S) in other centrally located stations.
- Soil samples collected from 5 sites in the valley.
- In-situ and dynamic laboratory Tests carried out especially on sandy soil.

Results/Conclusions

- Deep soil profile up to 600m study showed sand/ gravel deposit on the northern part of the valley and clay deposit on the southern part
- Soil in Kathmandu very weak i.e., the shear modulus very low as compared to that of soil found in USA and in Japan (about 4 to 5 times lower). However, soil in Kathmandu is found to be more elastic i.e., the higher shear strain.
- Generally, with density increase, cyclic resistance ratio increases however in the case of Kathmandu soil no significant increase in this ratio is seen with density increase. This indicates that the soil in Kathmandu is very weak caused by structural breakdown of the soil particles.
- High mica content can be speculated for the weakness of soil.
- Shaking level of soil decreases as the earthquake waves travel to the center of the valley.
- This study shows soil in Kathmandu have de-amplifying characteristic as opposed to the previous understanding.

Needs:

- Ground assessment method established in other part of the world may not be suitable for Kathmandu valley.
 - Urgent need for defining dynamic properties of soils in Kathmandu and ground assessment methods in our context.
- ### 2. Contribution of Nepal Geological Society in DRR in Nepal on the past 3 Decades – Dr. Kabiraj Paudel, NGS
- Brief background and introduction of NGS (Nepal Geological Society)

List of NGS activities:





- Organizing national and international scientific events mainly themed with disasters in Himalaya, Natural Hazards.
- Publishing journals, bulletins and booklets focused on geo-scientific research, disaster related information dissemination to public.
- Raise awareness programs in collaboration with Gov. and INGOs.
- Rapid assessment in EQ affected 18 districts in collaboration with MoHA and ICIMOD.
- In joint partner with other societies carried out evaluation of houses in Kathmandu valley.
- Pre-conference and Post-conference excursions to address information on geology of Himalaya and disasters associated on different parts of the country.

Priority areas:

- core geology, mineral resources, understanding and mitigating disasters and interdisciplinary linkages.

Future Plans:

- Advocate on the role of geo-scientists in Local Bodies, Road Dept. and National Armed and Police Force for better disaster management.
- Strong request with government to establish geological council to monitor and control the geo-scientist's responsibility.

3. Architectural Structural Survey for Restoration of Historical Constructions Damaged by Nepal Earthquake of 2015 – Prof. Toshikazu Hanazato, Mei University, ICOMOS Japan

- Study inherent potentialities of architectural heritages that survived against earthquakes- Horyu-ji Temple, Nara and Nyatapole Temple, Bhaktapur.
- Survey of heritage structures in Nepal before earthquake- Microtremor measurement in Radha Krishna Temple in 2009 (in corporation with NSET and IOE).
- Microtremor measurement of Five-storied pagoda of Kumbeshwor temple in 2009
- Technology transfer and capacity building activities.
- Establish multi-disciplinary expert team for restoration plan (Japan-Nepal)

Data collection and analysis:

- Structural characteristics of traditional constructions in Nepal and follow international principle of structural restoration of architectural heritages (minimum intervention, conserve authenticities and multi-disciplinary approach with safety of human lives as priority).
- Structural data of damaged heritages before earthquake (Microtremor measurements, NDTs were performed before and after earthquake)- for designing structural restoration.
- Structural health monitoring at damaged monuments- Low cost and high-performance accelerometers developed and installed in Nyatapole temple.
- Improvement of seismic safety utilizing wooden members- laboratory test and structural analysis performed.
- Architectural and historical survey- Literature survey, measurement of structure with 3D laser scanning.

Results/ Impacts:

- Contribution to practical restoration plan of damaged/ destroyed architectural heritages.
- Data sharing with Nepalese experts.
- Building capacity/ Technology transfer.

Needs:

- Extend present research program.
- Research on earthquake disaster mitigation of existing buildings- Technological and Community-based approach.

4. Innovative Technologies for Various Hazard Mitigation Initiative to make the Resilient Communities – Dr. Rabindra Prasad Dhakal, NAST

Key activities done:

- Damping earthquake impact- dry stone filled trench in the periphery of the structure.
- EEW system installation covering nearly 400 KM- data sharing/ flow
- Demonstration of Fire-Resistant house for Technology Transfer- thatch with mud patch.
- Awareness regarding cause of self-firing of settlement.
- Landslide inventory preparation and early warning system installation- Sealing the tension cracks which is the cause of landslide.
- Lightening related activities- real time monitoring of lightening, public awareness campaign, orientation and technical session on lightening.
- Waste plastic management on the spot with consultation to Eco Party Japan and community uplift through music.
- Meet scientist on regular basis.

Needs:

- More research on fault line identification to reveal land vulnerabilities. Sustainable structural engineering for resilient housing.
- Early Warning Sensors installation in whole country.
- Satellite launching initiative, science-based information has to be added for multi hazard mitigation.
- Institutional collaboration needed.
- Lack in Human Resource.

5. NRA Post- Earthquake Geo-Hazard Assessment Data – Dr. Steven Reville, UNOPS

- Durable Solutions- Phase II: facilitating the implementation Government Policy for households displaced by earthquake induced geo-hazards by providing technical support.
- Geo-Hazard Assessment- Current Status: 863 surveys conducted as of May 2018 in 16 districts, current NRA figures- 3168 households recommended for relocation for category 3 communities. 749 relocated till date.
- Data management
- Understanding Risk and Prioritization- More risk, more household needs to be relocated such as in Liping, Tatopani.

Conclusion:

- Level of confidence depends on degree of interpretation required.
- Ground conditions probably altered since assessments were conducted.





- Initiative for local authorities and others to identify risk areas, plan resources and communicate risk in lead up to monsoon.
- Field verification required.
- Development of long-term risk management strategy- risk assessment methodology, incorporate scientific research.

Needs:

- Implementation
 - Monsoon emergency plan with Gaupalikas.
 - Development of durable solutions website and public dashboard with update on relocation process.
 - Ongoing facilitation of the relocation process.
- Geo-hazard
 - Continuous geo-hazard assessments of new sites and integrated settlement locations.
 - Sharing of landslide risk scoring and prioritization with Gaupalikas; Landslide messaging.
 - Development of Long-Term Risk Management Strategies- links with scientific research.
- Policy
 - Policy discussions on category -2 mitigation works, integrated settlements and rights of landless populations through DS-II Steering Committee.

6. Ground Response of Kathmandu Valley Sediments during 2015 Gorkha Earthquake Sequence – Dr. Sudhir Rajaure, Deputy Director General, Department of Mines and Geology

- Aftershock Distribution (MoHA, ISC)– Before and After Gorkha Earthquake.
- Earthquake occurred on Main Himalayan Thrust (MHT)
- Density plot of Earthquake- more density indicates more slipping.
- Ground Response- Amplitude, Frequency and Duration
- Five accelerometers (4 Mitsuyo JEP-6A3-2 and 1 GEOSIG-NetQuakes) produced acceleration history.
 - Rock site has small long period energy acceleration.
 - Soil sites depleted acceleration in high frequency energy.
- Acceleration – High frequency characteristics and Velocity – Low frequency characteristics, so tall buildings were more affected by Gorkha Earthquake.
- Fourier Spectra- High frequencies damped during large earthquake is the reason for:
 - Small intensities.
 - Survival of small story buildings.
- Comparison of observed accelerations with GMPEs- for large earthquake (Mw 7.8) observed accelerations are smaller than that of GMPEs whereas for smaller earthquakes they are nearly equal.
- Amplification- No azimuthal effect, Non-linear behavior.

Conclusions:

- Earthquake characterized in depletion of high frequency energy even at risk site possibly because of source process.
- Kathmandu valley sediments damped the high frequency energy further.
- Most traditionally built houses destroyed in hilly rural area.
- Most engineered houses resisted/ survived collapse.
- Site response almost similar at all soil sites for the frequency range 0.1-2.5Hz, interpreted as the deeper layers in the basin.
- Response in the frequency range greater than 2.5Hz varies across sites observed, possibly due to variation in geology of shallow sub-surface.
- Depleted high frequencies- small storied (engineered) buildings less affected.
- High frequencies damped during Mw 7.8 earthquake in comparison to other strong aftershocks in Kathmandu.
- Low frequency dominance of sediment sites responsible for the suffering of tall buildings in Kathmandu.

Q and A session

- a. Air pollution, a major problem. Is there any addressing of it in DRR? – Dr. Rabindra Prasad Dhakal
 - Air pollutants measured in stratosphere and lower layers of atmosphere by German Scientist.
 - Plastic pollution, a serious problem- so needs to be addressed and resilient techs to be installed.
- b. EWS- how much time does it take to notify the public? – Dr. Rabindra Prasad Dhakal
 - Depends on the position of epicenter. Maximum of 20 sec for data flow and response, which is quite enough for ensuring life safety.
- c. Are Ground Motion Data compiled and its availability? - Dr. Sudhir Rajaure
 - GM data of Main shock available at strongmotioncenter.org
 - Other data can be accessed with request to Central Geology Department.
- d. Extremely high discriminate road construction practice observed with disregard to Geotechnical Risk. Any comments.
 - Agreed, needs to be addressed

Time/ Day Day 2 : Tuesday, June 19, 2018 (Asad 5, 2075) Theme: Understanding the Present

11:00-12:40 Technical Session (TS) 6 SFDRR Priority 2: Strengthening Disaster Risk Governance to Manage Disaster Risk (**Hall: Gosaikunda**)

SESSION OBJECTIVES

1. To discuss on the pertinent issues, challenges and opportunities towards disaster resilient communities to minimize the future impacts of large-scale disaster in Nepal. 2. To find out a common understanding among the major stakeholders on current status of Disaster Risk Governance (DRG) in Nepal by considering the Federal System of government. 3. To share the impact of NSDRM 2009 and DRRM Act 2017 in the response and recovery of Gorkha Earthquake 2015. 4. To provide a critical look to the existing national capacity of response and recovery from mega disasters and lessons from Gorkha Earthquake 2015. 5. To share the current status of Mainstreaming Disaster Risk Reduction in the health sector development plan. 6. To share the experience of





mainstreaming disaster risk reduction and climate change adaptation in the municipal planning system. 7. To find a common understanding on way forward.

11:00-11:05	Chair: Dr. Ganga Lal Tuladhar, Former Minister of Education
11:05-11:20	"Lessons from Gorkha Earthquake on Mainstreaming DRR and CCA in the Municipal Governance of Nepal" - Mr. Rishi Acharya, Under Secretary, Ministry of Federal Affairs and General Administration
11:20-11:35	"National Capacity for Responding to Mega Disasters with Reference to Gorkha Earthquake 2015 and Reconstruction" - Mr. Sushil Gyewali, Former CEO, National Reconstruction Authority
11:35-11:50	"Mainstreaming DRR in the Health sector, Success and Challenges as Learned from Gorkha Earthquake Response and Recovery" - Er. Subash Kumar Bhattarai, Policy Development Advisor (Health Infrastructure), Nepal Health Sector Support Programme
11:50-12:05	"How does the provisions of DRR and Management Act 2017 ensure disaster resilience at the three level of federal governance in Nepal including the grassroots communities" - Dr. Ganga Lal Tuladhar, Former Minister of Education
12:05-12:20	"Nepal's Stride in DRM since 1990: A Neutral overview from a Regional Observer" - Mr. Loy Rego, Former Deputy Executive Director, Asian Disaster Preparedness Center
12:20-12:30	Q/A

Session Coordinator: Mr. Bijay Krishna Upadhyay, Director, NSET Rapporteur: Ms. Aparajita Gautam, Communication Officer, NSET

Outcome of Technical Session 6

Strengthening Disaster Risk Governance to manage disaster

1. Finalize the rules and regulations on DRR at all levels for effective implementation of DRR and CCA mainstreaming in all development works at all the three levels of Federal Government of Nepal.
2. Formulate policies, rules regulations and directives for an effective implementation of reconstruction and recovery at all levels of Federal Nepal. The financing system have been established for the reconstruction the new area of work should be to
 - Establish the loan delivery system
 - Construction Materials supply chain
 - Mass training of construction force
 - Training of Engineers for the rural technology implementation
3. Commit Only those that can be done and develop an incremental process
4. Establish Public Health Service delivery mechanism for Federal, Provincial and Municipal level of Governance.
5. Strengthen inter-ministerial coordination and implement.

6. Improve and incorporate traditional knowledge and coping mechanism existing in various communities.

Chair: Dr. Gangalal Tuladhar,

Speakers: Mr. Jiblal Bhusal Under Secretary MoFaGA

Mr. Sushil Gyawali, Former CEO NRA

Er. Subash Kumar Bhattarai, Policy Development Advisor NHSSP

Dr. Gangalal Tuladhar, Former Ministry of Education

Mr. Loy Rego, Former ED ADPC

Coordinator: Mr. Bijay Krishna Upadhyay, Director NSET

Moderators: Ms. Omkala Khanal and Aparajita Gautam, NSET

TS6-1 Lessons from Gorkha Earthquake, on mainstreaming DRR and CCA in the municipal governance of Nepal, Mr. Jiblal Bhusal, Under Secretary MoFaGA

- Policy and guidelines on DRR to be finalized after the new federal structure in the country as mainstreaming DRR is very important
- Risk Informed Planning is the best strategy to decide how to allocate the National Budget
- to integrate Disaster Risk Reduction into Annual Development Plans and periodic plan
- to minimize the adverse impacts of disasters in development
- Various challenges exist when it comes to mainstreaming such as Disaster management not being a priority for anyone, lack of coordination among the concerned bodies
- Currently, development and disaster management have been turning in the opposite direction, rather than being taken together
- Harmonization among Climate Change Adaptation and DRR needs to be done
- Risk Sensitive Land Use Planning And its Implementation
- Disaster Learning Centers
- Capacity building of the community for sustainability

TS6-2 National Capacity for Responding to Mega Disasters: Learnings from Gorkha Earthquake, Mr. Sushil Gyawali Former CEO NRA

- The approach for reconstruction and recovery for Gorkha earthquake included the development of PDNA
- NRA established after eight months of Gorkha earthquake
- National reconstruction policies, rules, and special fast track guidelines prepared within four months of NRA establishment
- However, some gaps existed such as delayed establishment of NRA became debatable, negative impact of political transition - reconstruction become as agenda for government change (Govt. instability and change of CEO), Lack of elected political representatives at





LGs - even secretaries not posted for long time, Non-functioning of 'reconstruction fund' as provisioned in the act – fund transfer and budget decision similar to the regular process of government, Lack of enabling an environment to private housing reconstruction

- As way forward, reconstruction Fund to be established and made functional as provisioned in the act Authority on supervision, technical assistance and grant disbursement to be delegated to LGs for housing reconstruction along with strong monitoring mechanism by FG/NRA (reconstruction action plan for each Local Governments should be in place),
- Leadership to the communities wherever possible is important

TS6-3 Mainstreaming DRR in the Health Sector, Success and Challenges, as learned from Gorkha Earthquake Response and Recovery, Er. Subash Bhattarai Policy Development Advisor (Health Infrastructure) NHSSP

- There have been a lot of DRR-related Initiatives in the health sector. A lot of immediate response post-quake was conducted.
- For the recovery, Detailed Engineering Assessment (DEA) to derive detailed engineering data to plan for repair and reconstruction works.
- Standard guidelines, type designs, technologies and specifications for pre-fab health facilities have been developed
- Nepal Health Infrastructure Development Standards 2017 developed
- Greater attention in Mitigation measures such as structural, non-structural, and functionality needs to be implemented
- Prevalent DRR arrangements need to be updated
- Development of health sector preparedness and response plans need to be strengthened
- Multi-hazard resilient health infrastructure needs to be constructed

TS6-4 Provisions of DRRM Act 2017 for DRR Governance at all levels and Community Resilience, Dr. Gangalal Tuladhar, Former Minister for Education

- September 25th, 2017, was a Historical day of the Endorsement of “Disaster Risk Reduction and Management Act 2017” from the Parliament of Nepal
- Good practices of Disaster Management Law seen from other Asian countries

TS6-5 Nepal's Strides in Disaster Risk Management since 1988 - & needs for next 30 years - a neutral overview by a regional partner & observer, Loy Rego, former Dy ED/Director, Asian Disaster Preparedness Center(ADPC) 1999 -2011 and Technical Advisor, MARS Practitioners Network since 2012

- Valuable efforts of Govt & concerned stakeholders, & the 2015 earthquake led to passage of DRRM Act 2017 in a draft stage for over a decade
- Action needed by Government, development & implementing partners to detail Rules, create and support authorities under Act, operationalize at multiple levels & routinize preparedness & risk mitigation & have coordinated programs among all stakeholders

- More time, commitment, leadership and resources are needed for stabilization and integration into routine systems of governance, and then in preserving what is seen as routine
- SFDRR Actions to be done for next 12 years during SDG target period till 2030
 - Recognize the interconnectedness, & real possibilities of making good progress on integrating resilience in key parts of SDG agenda
 - Make Earthquake Vulnerability Reduction a key theme and basis for specific targets
- Planning for actions by the earthquake centenary in 2034
 - Aim to limit and end fresh disaster risk creation and move towards all fresh infrastructure being appropriately risk resilient.
 - Assess the vulnerability of people and past/ existing infrastructure & continued unsafe construction practices & address phasing out a large part
- Suggested overall steps to be taken- Maintain and expand the existing stakeholder group collaboration and have concrete targets

Time/ Day Day 2 : Tuesday, June 19, 2018 (Asad 5, 2075) Theme: Understanding the Present

11:00-12:40 Technical Session (TS) 7 SFDRR Priority 3: Investing in DRR for Resilience (**Hall: Begnas**)

SESSION OBJECTIVES

1. To share past experiences on Disaster Risk Governance in Nepal.
2. Critically review the accomplishments and consolidate lessons.

11:00-11:05	Chair: Mr. Surya Bhakta Sangache, Sr, Technical Advisor, NSET
11:05-11:20	"Wishes of a Mayor to Make The Municipality Earthquake/Disaster Resilient" - Mr. Chitra B. K.C., Mayor, Sainamaina Municipality
11:20-11:35	"Lessons of NBC implementation as revealed - Gorkha EQ" - Mr. Manoj Nakarmi, Senior Division Engineer, Department of Urban Development and Building Construction
11:35-11:50	"DFID/UK Government's Support for Resilience and Reconstruction: Results, Impacts and Lessons" - Mr. Magnus Wolfe Murray, Reconstruction Adviser, DFID
11:50-12:05	"USAID/OFDA's contribution towards Resilience and Disaster Risk Reduction in Nepal" - Mr. Santosh Gyawali, AID Development Program Specialist, USAID Nepal
12:05-12:20	"Experience of Addressing Disaster Risk in the Past in Nepal and How It Helped Nepal" - Mr. Ramraj Narsimha, CDRMP, UNDP Nepal
12:20-12:35	"Addressing Disaster Risk in the Past and How It Helped to respond during Gorkha Earthquake: Lessons from DIPECHO Programs" - Ms. Kiriti Ray, Program Coordinator, Care Nepal (DIPECHO)
12:35-12:45	Q/A

Session Coordinator: Ms. Nisha Shrestha, M&E Manager, NSET Rapporteur: Mr. Nirajan Budathoki, Data Analyst, NSET





TS-7: SFDRR Priority 3: Investing in DRR for resilience

Summary Points

- Joint work of nearby municipalities for disaster preparedness
- Maintain quality and consistency of actions, standard training courses
- Enhancing coordination among government, development partners, civil society for reducing gaps and improving complementarity
- Government has been doing quite good but scaling up is needed

1. Chitra Bahadur Karki

- Sainamaina municipality is quite confident to enhance the capacity for respective group of people and implement the building code effectively
- Wants to produce volunteers in city and train them as responders when disaster occurs
- Sainamaina wishes to make safer community
- Sainamaina municipality is collaborating with 3 other boundary VDC for disaster risk management(firefighter) **One municipality +3 rural municipalities (to procure fire engine)**
- Collaboration with 3 other boundary VDC for disaster risk management(firefighter)

2. Bibek Sigdel

- Present status(problem in construction practice)
- Activities implemented by DUDBC
- Lessons learnt
 - Role of public, bank, insurance company, academia etc.
 - State wise expert review panels
 - Orientations in municipalities regarding updated codes
 - Monitoring medias

3. Magnus Wolfe

- Lesson learnt
 - Survey all affected areas at the same time
 - Anticipate indebtedness
 - Nepal now a case study in good practice of resettlement and landless case load
 - 40% of earthquake damage is partial, Retrofitting should be part of reconstruction from beginning
 - Insufficient resources for research

4. Ramraj Narshimhan

- Capacity strengthen, CBDRM to be promoted
- Nepal Government introduced new strategy of DRM for next decade
- EBPS replication in 4 municipalities (shift of technology)
- Institutionalizing DIMS, damage and loss database system
- Starting point for local representatives is to understand how disaster has affected in past and how to move forward accordingly

5. Kirti Ray

- Bottom-up approach for success and replication of reconstruction action plan
- Vertical and horizontal mix in Risk to Resilience framework
- Reconstruction action plan
- Awas Nirman Sathi
- Safer construction clinics and hardware shop
- Gaps and Needs
 - Community level convergences and at planning level
- Standardization and no duplication in terms of program, co-ordination Mechanism
- Municipality seeking technical support rather than funding

Time/ Day	Day 2 : Tuesday, June 19, 2018 (Asad 5, 2075) Theme: Understanding the Present
11:00-12:40	Technical Session (TS) 8: SFDRR Priority 4: Disaster Preparedness for Effective Response, Build Back Better (BBB) in Recovery, Rehabilitation and Reconstruction (Hall: Rara)

SESSION OBJECTIVES

1. To discuss on current status of response mechanism, the hindrances and challenges in the past 3 decades in Disaster Risk Reduction.
2. Disaster preparedness and response during Gorkha Earthquake 2015 by different organizations.
3. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

11:00-11:05	Chair: Brig. Gen Jit Gurung, Nepal Army
11:05-11:20	"Lessons, Partner Coordination, Communication; Effectiveness in Gorkha EQ (Cluster Coordination, Logistic, NEOC)" - Mr. Shankar Hari Acharya, Under Secretary, National Emergency Operation Center, Ministry of Home Affairs
11:20-11:35	"Private Sector Preparedness" - National Business Initiatives (NBI)
11:35-11:50	"Importance of Hospital Preparedness as Revealed by the Gorkha Earthquake and the Need of BBB of Health Facilities in Nepal" - Prof. Dr. Pradeep Vaidya, Institute of Medicine
11:50-12:05	"Addressing People with Disabilities issues in Disaster Risk Management" - Mr. Kiran Shilpakar, President, National Association of Physical Disabled
12:05-12:20	"Experiences in preparedness and Response from Chhetrapati Clinic - Ward No. 17" - Dr. Kulesh Thapa, Chhetrapati Clinic
12:20-12:35	"Empowering Community for Earthquake Risk Reduction" - Ms. Sunita Shakya, President Kirtipur women Network
12:35-12:45	Q/A

Session Coordinator: Mr. Ganesh Kumar Jimjee, Director, DPER Division, NSET Rapporteur: Mr. Sanju Sharma, Training Coordinator, DPER Division, NSET





Note taking

1) Background:

NSET on the occasion of 25th anniversary is initiating an **International Conference “RISK2RESILIENCE”**. This is mainly to formulate the future direction (strategies and plans) in Disaster Risk Reduction based on Nepal's three decade of collective experience. The conference will follow the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), which is the first major agreement of the post-2015 development agenda, with seven targets and four priorities for action. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR). The participation will be seen from organizations and institutions of all sectors.

This session is one of the 4 parallel sessions of R2R on SFDRR Priority 4. (Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction)

Disaster can occur suddenly and the knowledge to respond it can minimize the loss of both life and property. In a disaster-prone countries like Nepal, disaster can damage brutally as is also timely noted in the frequent cases like Gorkha Earthquake 2015. The primary task after disaster is response and if respondents are trained from community than the loss of lives can be minimized immensely. **Priority 4** along with the concept of recovery and reconstruction also focuses on the technical and materialistic preparedness to respond post disaster situation. The basic level of rescue and medical response training for the end users will suffice any community to be disaster prepared. Along with this, the basic knowledge regarding an emergency and minimal understanding of the response will serve as a tool to save oneself from chaos situation during onset of disaster.

2) Session Objective:

The main objective of this thematic session is to discuss on current status of response mechanism, the Hindrances and challenges in the past 3 Decades in Disaster Risk Reduction, disaster preparedness and response during Gorkha Earthquake 2015 by different organizations. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

3) Participating institutions/ Experts

- a. Ministry of Home Affairs (MoHA)
- b. Nepali Army
- c. Nepal Police
- d. Armed Police Force
- e. Kathmandu Metropolitan City
- f. Lalitpur Metropolitan City,
- g. Institute of Medicine, Tribhuvan University Teaching Hospital
- h. Community-based organizations and NGOs/INGOs working in the field of disaster risk reduction and disaster management will also be supporting.
- i. National Association of the Physical Disabled-Nepal (NAPD-Nepal)
- j. Nepal Red Cross Society
- k. National Society for Earthquake Technology (NSET)
- l. Chhetrapati Free Clinic
- m. Kirtipur/Thankot Women Network
- n. National Reconstruction Authority

- o. Department of Education
- p. Department of Archaeology
- q. Bhimeswor Municipality
- r. World Bank
- s. Japan International Cooperation Agency(JICA)
- t. Housing Reconstruction Recovery Platform(HRRP)
- u. National Society for Earthquake Technology (NSET)

4) Focus

This Session will focus on current response mechanism and strategy for strengthening disaster response system in the new federal system based on the lessons learned from Gorkha Earthquake.





5) Topic : Lessons, Partner coordination, communication; effectiveness in Gorkha Earthquake

Speaker: Shankar Acharya (Cluster coordination, Logistics, NEOC)

Duration: 15min

Mr. Acharya briefed on National Emergency Mechanism and existing Cluster Coordination system of Nepal. He explained about the structure of Nepal Emergency Operation Center (NEOC) for the disaster response system. He outlined the coordination mechanism during mega disaster where the main incident command system will be held by NEOC, MOHA. The response process will be immediate with the Government Authority Activation (GAA), after declaration of emergency, appeal for International Assistance will follow along with the Search and Rescue team along with all clusters will be activated. NEOC works in four different phase, Normal Phase, Alert phase, response phase and Recovery Phase.

Information coordination is divided into two phase in which Pre-disaster phase includes early warning system and GLOF warnings to EOC Network whereas During and Post disaster phase includes Incident Reporting System via EOC network and situation report sharing.

Upon the experience of response and recovery of 2015 Gurkha Earthquake the major noted shortcomings were:

Lack of search and rescue team and equipment, lack of preparedness, coordination among all national security forces and multinational civil and military search and rescue teams and difficulty in relief distribution. Furthermore, the learnings from the event includes, developing comprehensive Disaster Response Plan , develop dedicated SAR team in security agencies with enough equipment, protect the open spaces, enhance inter organizational cooperation and coordination mechanism, importantly, allocation of fund for preparedness is less than recovery

Summary:

- Discussed Nepal Government's National Emergency Response Mechanism, including the network of Emergency Operations Centers (EOC) and phases of NEOC coordination (normal, alert, response and recovery phases)
- Future plans include:
- Establishment of National Disaster Risk Reduction and Management Authority as the main government agency to handle all matters related to DRR.
- Expand the scope of authority of local governments that will reach out to the ward and community levels.
- Studies show that donor financing is bent more towards response and lesser on preparedness and prevention.
- Need to strengthen the use of disaster management information systems (DIMS) as common platform for coordination and communication.

6)Topic: Disaster Preparedness and the private sector of Nepal: Achievements and Future Perspective

Speaker: Kush Kumar Joshi, Vice President NBI

Duration: 15min

Survived 10 year-long armed conflict but legacies remain. Forced donation, Smuggling, Money laundering, Irresponsible business practices, short-termism in doing business despite of these hurdles, surprisingly just within 3 years of disaster, economy has rebounded, and Nepal has seen unprecedented economic growth, Says Mr. Joshi. Nepalese private Sector is resilient, they can survive disaster and grow back promptly. During 2015 Earthquake only 35% damage occurred in economic (productive and infrastructure) sectors. Most of the damage was in social sector.

Enlisting many problems, he says, “We have developed and implemented building codes for decades but there are still many problems at contractors and worker levels. Tourism is core component of our economy, but safety of tourists is still not a top priority. Trading is where most of the largest business of Nepal are located but the essential infrastructure like roads, airports, storage houses, etc. are not protected at all. Financial access and services have proliferated but yet people’s money and security documents are not protected enough from disaster. “

In collaboration with NSET, NBI conducted a dedicated session for Disaster Preparedness in Responsible Business Summit. Six easy steps Emergency Planning Tool is designed where building management commitment will be the first step and helping community is at the sixth step. Concluding the presentation, he said, “Enrolling, engaging and participating business companies and their associations in preparedness measures will certainly help in making economic sectors resilient.

Summary:

- Build management commitment to help community.
- Future plans include social marketing of disaster preparedness.
- Inclusion of Business companies in preparedness measures

7)Topic: Importance of Hospital Preparedness as Revealed by the Gorkha Earthquake and the Need of BBB of Health Facilities in Nepal

Speaker: Dr. Pradip Vaidya, TUTH

Duration : 15min

Dr. Vaidya is the course Coordinator of the Hospital Preparedness for Emergencies (HOPE) since 2004 which is implemented by NSET with the funding partner USAID. HOPE course is very effective in the preparedness of the hospital for emergency. He says, “Hope training is essential for Doctors, nurses, administrative and management staffs to function effectively in a coordinated manner to respond a disaster. Under his chairmanship of Disaster Committee Teaching Hospital (TH) is conducting HOPE training in every six months and has developed a working plan as well. He emphasized on preparation of Hospital which includes Structural assessment or retrofitting, nonstructural components and identification of Triage area within the hospital.

Sharing his experience of 2015 Gorkha Earthquake he says, “Teaching hospital functioned very well during 2015 earthquake in Nepal”. Hospital evacuation was not required in teaching hospital because the structure was safe and was partially retrofitted. Existing building were used for emergency treatment of the victims. No outside tent was required to be installed for treatment of the victims.





Most of the hospital have hospital emergency plan but they are not used at needed time. He stressed, “Hospitals can be partially retrofitted for the reduction of cost for most important places like Operation theatre, ICU, CCU where there are critical patients so that they are not required to evacuate during earthquake. All hospitals should have proper signage/maps/hospital plans indicating with different colors/pictorial so that everybody visiting the hospitals can understand. Hospital should be built strong following all the norms/guidelines prepared by the government and should be monitored properly and should have proper on-site management during emergency when there is influx of effected person from the disaster.

Summary:

- Administrative and management staff must be involved also in disaster preparedness, in addition to medical staff.
- Experience during 2015 Gorkha Earthquake reveal that Civil Hospital and Tribhuvan University Teaching Hospital (TUTH) had effective disaster preparedness and response plans.
- TUTH was able to function despite the influx of patients.
- Stable, safe structure to work is important during disasters. Therefore, assessment, planning and disaster drills are necessary during lean times (pre-disaster).
- Tents may be good as alternate for wards; but these are costly, time consuming to put it up, need additional manpower to install, may need additional equipment for ventilation, etc., which are not feasible during disasters.
- In Kathmandu, health emergency operations are sub-divided into hubs, where private and public hospitals are grouped according to location. An organized coordination system is also in place for carrying out a coordinated response.
- Nepal has varied topography and has communities in the hilly region which are remote and access to health services can be difficult. To ease and reduce travel time for the villagers, the community/municipality administrative and health services should be established in one location (one-stop location for all services).
- Maximize the power of information-communication technology ICT in delivering trainings, meetings, coordination. For example, Institute of Medicine-TUTH conducts/participates/facilitates trainings through video conferences (live streaming of DRM trainings, conferences).

8)Topic: NSET Initiations on DRR

Speaker: Bishal Raj Gurung

Duration: 15 min

National Society for Earthquake Technology (NSET) has been continually working on Disaster Management as it is very important to reduce loss of life and properties after mega earthquake. Disaster management includes Mitigation, Preparedness, Response and Recovery. NSET has been organizing mass orientation program in every Earthquake Safety Day which is organized in 16 January every year in remembrance of 1994 Bihar Earthquake. On this day various programs like walkathon, shake table demonstration, staged drama, exhibition etc. is done to sensitize people about the earthquake awareness.

NSET has been implementing Program for Enhancement of Emergency Response (PEER) under which it has been training security forces as major participants also including some from Nepal Red Cross Society and community. The trainings like Medical First Response (MFR), Collapsed Structure Search and Rescue (CSSR). Since these trainings are similar to the international rescue course it enables our security forces to work collaboratively with international rescue teams during mega disaster.

Swift water Rescue (SWR) is the newly designed course which was imparted to the regional participants from 5 different countries, Namely: India, Pakistan, Afghanistan, Bangladesh and Nepal. This is to help rescue the near drowning victims and to bring the victims from one end to the other end of river.

NSET is also providing other trainings for the communities like Community Search and Rescue (CSAR), Basic Emergency Medical Response (BEMR), Fire Response Training (FRT), Mason training for both male and females for enabling them to understand the basic of construction so that they can build their houses Quake-Safe.

Post 2015 Gorkha Earthquake Number of live and Dead victims rescued by community were 24875 and number of live and dead victims rescued by National and international SAR Squads were 6707.

Summary:

- Training and awareness made difference and many volunteers were seen on site for the rescue.
- People were at least alert and knew basic safety behaviors to follow during Earthquake.

9)Topic: Experiences in Preparedness and Response from Chhetrapati Community, Kathmandu

Speaker: Dr. Kulesh Thapa, Medical Director, CFC

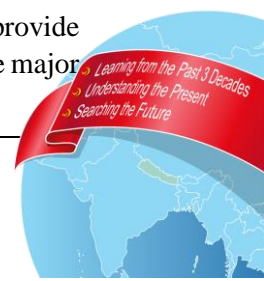
Duration: 15 min

Chhetrapati Free Clinic (CFC) has been working over 60 years, it started as a small clinic in a small building and now has grown up to occupy bigger area with a retrofitted buildings. CFC has grown as one of the fastest growing clinics, in terms of building, medical facilities, and popularity for its great works, proudly says, Dr. Thapa. Along with the medical specialties it has also strengthen itself in disaster preparedness as it has prepositioned the emergency rescue store nearby, it provides emergency response trainings to its volunteers and post 2015 earthquake it has mobilized its volunteers to rescue in nearby areas.

It conducts public awareness activities, sensitization workshop, conducts different training on Basic Emergency Medical Response (BEMR), Basic Relief Management (BRM) for housewives, basic Disaster Management (DM) trainings and basic Search and Rescue (SAR) trainings. Beside these it is giving regular free medical treatment to the local people who are poor and moderately poor.

As a medical clinic it is well equipped with all the medical facilities and also during disaster aftermath not only it functioned well but also it treated around 1120 victims.

Dr. Thapa also mentioned few challenges in which the retention of the trained volunteers is difficult therefore they have now targeted housewives and students from 7 -10 class to provide trainings. Furthermore, the lack of budget and coordination from other organization is the major





challenges which might hinder the functioning of the Clinic, added Dr. Thapa. Further he says, “we must always remember the YOYO (You’re On Your Own) principle during emergencies and disasters. This principle means that we must do something for self-reliance/self-help as it will take some time for additional help to arrive during emergencies and disasters.”

Summary:

- Chhetrapati Clinic begun its disaster preparedness measures early on and has retrofitted its buildings since 2000.
- Chhetrapati Clinic’s preparedness trainings and initiatives emphasize on retrofitting, use of personal protective equipment (PPE) by the responders, regular disaster drills, involvement of youth and housewives in the trainings, conduct of community disaster management volunteers’ trainings, sensitization workshops and basic relief management for housewives.
- It has become a trend that the youth leave their communities for jobs, education and migration; therefore, it is important to engage also the housewives in disaster preparedness and response initiatives because the housewives generally are the ones who will step up for the family during emergencies and disasters.
- Main challenge is that people tend to forget the lessons learned from emergencies/disasters, therefore, regular awareness raising, sensitization, trainings, pre-disaster/planning workshops and other related DRR activities must be sustained.
- Documentation is very important for institutional memory.
- Continued financing to sustain efforts.

10)Topic: National Network of Women for Community Resilience (NNWCR): A Collaborative Initiative

Speaker : Sunita Shakya, Kirtipur Women’s’ Network

Duration : 15 Minutes

International Conference, which was held in 2011 was very effective as the main discussion of the topic was about the women’s involvement in the development sector. Since then the development of women’s network was initiated. Eight different female organizations are involved in this network. Ms. Sunita adds, this network is to develop the women’s involvement in development trainings, various programs related to disaster management are conducted within the network which is also providing partial jobs for the females.

Major activities like general awareness , Trainings for Teachers(TOT), Earthquake “Go Bag”, Nonstructural mitigation and overall Emergency Preparedness are conducted by these women to the general population.

Ms. Sushmita says Door-to-Door Campaign is very successful program of awaking people by going to their house. They have already conducted and covered almost 2876 houses in Thankot, 2100 houses in Kirtipur and 1215 Houses in Lalitpur.

Under the Go Bag distribution program, they have mended and sold almost 90 bags to the community. Females have done nonstructural mitigation in schools and doing this 32 females were earning partial wages. Through this network many women are being directly or indirectly benefited. The lesson learnt from the Gorkha Earthquake were that if the communities become resilient the country itself can be disaster prepared.

Summary:

- Door-to-door campaign
- Designed and developed a calendar with key information on disaster preparedness
- Reached out to approximately 7,000 households until date
- Earthquake Go-Bag making become a form of engagement and livelihood for the housewives. The Go-bags were used during earthquake
- Local government has provided some incentives to households that have undertaken non-structural mitigation
- Housewives are also engaged in other socio-civic/community activities, e.g. river clean-up drives
- NNWCR/Kirtipur Women's Network recommends the national government to strengthen support to this organization and other similar organizations

11) Major highlights of the Session TS8:

- Responsibility and accountability by each organization/institution are important.
- Multi-stakeholder cooperation and coordination are important to address the needs. A single organization cannot work alone.
- Need to sensitize all government levels from local to national; and all stakeholders.
- Continue enforcement of building code.
- Continue capacity building in terms of software (trainings) and hardware (equipment).
- Prioritize mitigation and preparedness. Cost analysis show that for every \$ spent on preparedness, \$ 7 will be saved from response expenses.
- Promote role of women and housewives in the DRR processes.

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

13:30-15:30 Technical Sessions (TS) 9 SFDRR Priority 1: Understanding Disaster Risk

(Hall: Olive Garden)

SESSION OBJECTIVES 1. Critically look back what we all collectively have accomplished in the past 3 decades in Disaster Risk Reduction in Nepal and what were the hindrances and challenges. 2. Looking forward to the opportunities in accelerating and improving Disaster Resilience in Nepal.

13:30-13:35 Chair: Prof. Narendra Khanal, Tribhuvan University

13:35-13:50 "GEM – A Global Model for Local Collaboration with NSET and Nepal" - Dr. Anselm Smolka, Advisor, Global Earthquake Model

13:50-14:05 "Current Status on the GMPE for Nepal and the Needs to further Research" - Mr. Surya Narayan Shrestha, Executive Director, NSET

14:05-14:20 "2017 Update of the JICA study on the Earthquake Risk of Kathmandu Valley from 2002: Major Findings and the Next Steps" - Mr. Ram Prasad Bhandari, Program Manager, JICA





- 14:20-14:35 "Monitoring Landslides after the 2015 Gorkha Earthquake: perspective on future risk:" - Prof. Dr. Nick Rosser, Durham University, UK
- 14:35-14:50 "Living with landslide risk citizen science for decision-making in post-earthquake Nepal:" – Dr. Katie J. Oven, Durham University, UK
- 14:50-15:05 "Flood Risk Assessment and Mitigation" - Dr. Mandira Shrestha, ICIMOD
- 15:05-15:20 "Distribution Characteristics of Seismic Hazard and Its Influence on Railway Location of Dujiagnyan-Four Girls Mountain Area, in Sichuan, China and Its Implication on Nepal's Infrastructure Development" - Mr. Chunwei Sun, PhD Candidate, Faculty of Geosciences and Environmental Engineering, Southwest Jiaotong University, Chengdu, Sichuan, China.
- 15:20-15:30 Q/A

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS Rapporteur: Mr. Prakash Guragain, Structural Engineer, ESS

Details of TS9

Session Chair: Prof. Dr. Tara Nidhi Bhattarai, Tribhuvan University

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS

Rapporteur: Mr. Prakash Guragain, Structural Engineer, ESS

Allocated Durations: 15 min for each paper

Session 1 : GEM – A Global Model for Local Collaboration with NSET and Nepal

Presenter : Dr. Anselm Smolka, Advisor, Global Earthquake Model

Key Words : Global Earthquake Model (GEM) , Modelling Exposure Through Earth Observation Routines(METEOR)

- Established in 2009 A.D.
- NSET joined in 2014 as public sponsor
- Public Private Partnership Approach ,NSET is a public sponsor
- Open Quake is result of technical output of GEM

Beneficiaries : Structural Engineers ,Risk Modelers etc.

End Product : Global Earthquake Risk Model

Summary /Way Forward:

- Long-standing relationship between NSET and GEM
- Gorkha earthquake 2015 has not resulted in tangible collaboration projects (except METEOR), but local work on new hazard model
- GEM products/experience mature for application to DRR
- GEM ready for collaboration with NSET and any other local partners as well as international organizations – funding to be secured
- METEOR Exposure project up and running

- India risk model project (5 IITs + GEM): replication for Nepal?

Session 2 : PSHA: Current Status of GMPE for Nepal and the Needs to Further Research

Presenter : Mr. Surya Narayan Shrestha

Key Words : Probabilistic Seismic Hazard Assessment (PSHA) ,Ground motion Prediction Equations(GMPE)

- Nepal Building code is based on 1994 PSHA .
- Another PSHA was conducted in 2002 A.D. but was not reflected in Building Codes
- Some efforts have been made to incorporate PSHA in the building code
- GMPE are used from the other sources but not verified in context of Nepal.
- No GMPE are there specific to Nepal or the Himalaya region.
- The calculated PGA values by using various GMPE is 0.5 g but varied as the actual PGA for Gorkha earthquake measured was 0.15g-0.16 g
- So, the uncertainties in the values affect the disaster management and in the design values when used by the designers, thus affects the building cost . Hence it also has the socio economic ,political effect

Way Forward

- PSHA- social and Political issue
- Rigorous discussion among professionals and experts to have consensus in each stage of PSHA development
- Need of a forum with experts to research ,discuss for PSHA

Session 3 : 2017 update of the JICA study on the Earthquake Risk of Kathmandu Valley

Presenter : Mr. Ram Prasad Bhandari , Japanese International Cooperation Agency (JICA)

Key Words : Peak Ground Acceleration (PGA) ,Disaster Risk Reduction (DRR)

Conduction of Earthquake Risk Assessment in two phases

2001-02 Study

- Helped raising awareness, generating discussions, framing of DRM strategies

2015-18 Study

- Rapid changes in the landscape
- Designed before Gorkha EQ, implementation immediately after
- Input: damage characteristics, comparison of PGA, more attention
- Output: RRP, SOPs





Took three scenario Earthquake and two verification Earthquakes , M8.6 for western Nepal ,M7.8 for Central Nepal ,M8.3 for Eastern Nepal

Key findings

Major shock was $\frac{1}{4}$ of the calculated

Major after shock was $\frac{1}{2}$ of the calculated

Opportunities and Challenges

- New governance structure, legislation, policy, strategy has DRR acts.
- Memory of 2015 Gorkha EQ helped to motivate and in advocating DR in the policy.
- Global commitments with set targets (SFDRR, SDG)
- National aspirations – prosperity, LDC graduation, middle-income country
- Growing DRR actors – Courses in academic institutions, More NGOs
- Institutionalization of the outputs/disaster knowledge (huge challenge)

Summary /Way Forward

- EQ disaster risks are certain to occur and high in damage/losses
- Strengthening of DRRM has good national and global Opportunities
- The outputs of risk assessments of Kathmandu Valley can be used to whole Nepal and directly contribute to 2020 target of SFDRR (the national and local DRRM Plans) but if the realistic GMPEs are found the risk assessment data are changed.
- Understanding risk is the minimum, but not sufficient condition in the DRRM Journey
- Good Leadership with Authority is needed for DRRM .

Session 4 : Monitoring Landslides after the 2015 earthquake perspective on future risk

Presenter : Prof. Dr .Nick Rosser , Durham University ,UK

Key Words : Earthquake Triggered Landslides, Spatial Database, Susceptibility

- The earthquake triggered landslides were monitored using spatial database and GIS mapping .
- Rasuwa and Sindhupalchok were the places of the monitoring
- The 2015 earthquake equivalent to ca. 200 years of land sliding; each year since has experienced ca. 20 years of land sliding
- Since the earthquake there has been a net reduction each year in landslide susceptibility, but:
 - a. susceptibility is very variable between districts, and
 - b. susceptibility remains > 50% higher than pre-earthquake
 - c. impacts likely to remain for ca. 10 yr.

- Very small distances have dramatic impacts on landslide hazard; neighboring buildings can have very different levels of risk.
- House-level analysis: 1.5% of buildings below active landslides
- Landslide styles are very different to pre-earthquake
- New landslides are still developing; earthquake impacts are lagged:
- Landslides → debris flows → terrace destabilization & slumps

Session 5 :Living with Landslide risk, citizen science for decision making in post-earthquake – Nepal

Presenter : Dr . Katie J. Oven , Durham University ,UK

Key Words : Citizen Science, Landslide Monitoring

- Landslide hazard is pervasive & spatially diffuse
- c. 35 fatal landslides & c. 200 deaths / year
- Typically, < 10 fatalities per event
- Highly seasonal
- Difficult to predict (d & T) with multiple contributing factors
- Landslide early warning is NOT well developed
- In many cases landslides cannot be stopped

Why citizen Science is Required ?

Local people are the experts:

- High awareness of environment
- BUT exposure to new hazards & risks e.g. EQ-triggered landslides

Why systematic observations are important:

- Scientists do not know how slopes will behave after EQ
- Hazard assessments commonly just a record of the past
 - Lack detail & not always available
 - Everywhere is steep / wet but not all slopes fail.

Two Case study was done 1) Chintang VDC ,Dhankuta (Non-Earthquake Triggered Landslide)
2) Sindhupalchok (Earthquake Triggered Landslide)

Outputs :

- Simple tool kit is developed for monitoring landslide using local communities' approach as they have good past knowledge .
- Posters with simple drawings and warning about landslide hazard is developed

Three simple quick rules to help identify the safest locations in the landscape:





- Minimize the angle from your current location to the skyline
- Avoid steep channels with steep hillsides upstream
- Minimize local slope OR exposure to steep channels
- Identifying locations for houses or key infrastructure

Session 6 :Flood Risk Assessment and Mitigation

Presenter : Dr . Mandira Shrestha ,ICIMOD

Key words: Flood Early Warning System (FWES)

Issues :

- More than 50 % of the people are affected and has high recurring economic loss more than any hazards in Nepal and in this region.
- Increasing trend of economic damage due to disasters: climate change, population increase, haphazard urbanization, lack of implementation of policies and plans and many other factors.
- Lack of investments and technologies, weak institutions and governance arrangements, lack of preparedness
- Need to address Resilience and adaptation
- Women and children are the ones who are mostly affected during any disasters.
- Flood early warning system is developed and supported by ICIMOD along with hydromet monitoring in DHM website.
- New technologies such as satellite communication used in Early warning system (EWS)
- A flood observation network has been established in the Hindukush region with many hydrometeorological stations

Way forward :

- Integrating risk information into Early Warning Systems
- Improving institutional mechanisms to enhance coordination and communication between institutions and concerned stakeholders
- Innovation in technology to improve flood forecasting
- Education, increased awareness, capacity building,
- Land use planning and zoning
- Implementation of policies & plans and investments

Session 6 : Railway location in central area of Wenchuan earthquake in China and its implication on Nepal's post-earthquake reconstruction in mountain area Risk Assessment and Mitigation

- **Presenter :** Chunwei Sun Ph.D. Candidate ,Department of Geological Engineering, Southwest Jiaotong University, Chengdu, China

Key Words :Co-Seismic hazards, Traffic Lines

- Wenchuan earthquake (2008) in China caused high physical and economic loss.
- The people in rural areas were more affected by the earthquake than the urban ones.
- The establishment of new railway network in central area of Wenchuan was a challenge due to existence of co-seismic hazards
- The challenges of this area can be a lesson for constructing any infrastructure in mountainous country like Nepal.

Due to the existence of co-seismic hazard ,following are the noteworthy points

- Detailed, systematic investigation and evaluation of GeoHazards in mountain area need to be done, especially along the traffic lines and in areas where the population is concentrated.
- Study on the possible secondary geohazard and its impact on traffic lines or residential area and identify a long-term effective measure such as long tunnel, slope control with monitoring and early warning.
- On the premise of security and environment-friendly, the tourism natural landscape resources in the Himalayan region should be exploited appropriately in order to increase the income of the people in the earthquake disaster area.

Q.A. Session

Four Questions :

1. Rural Mapping is developed in sub-continent /Africa .How is citizen science different from rural mapping?

Katie J Oven : Yes, there are similarities . Science does have something to tell . It should bring two technologies together and co-producing a good knowledge base to lessen the hazard risk

2. Why do people undervalue their knowledge ?

Katie J Oven : There is something in the system that they believe that new education is based in science and technology and their knowledge is not good enough .

3. How you communicate the PSHA to non-scientists ?

A Smolka :You might have to relate to by saying that something might happen in certain interval of time .

Surya N. Shrestha : Scientific work is required for planning purpose. It needs adaptation and modification to communicate with the non-science communities .

For example, the risk and hazard studies in past were communicated by developing the narratives in simple language. The publication on EQ scenario of Kathmandu Valley doesn't talk about PGA, rather, it talks about the level of damage to buildings out of all Kathmandu Valley like 10 % of the buildings may be damaged or number of casualties or





amount of loss of property etc. So, it has to be in simple language to communicate to people and the decision maker as well .

4. Is ICIMOD building up the EWS for the region or the respective ministries are building ?

Dr Mandira Shrestha :

It is DHM or National Authority. ICIMOD is trying to foster collaboration and trying to bring new technologies and tools in the system modernization of Hydromet Network ,what are those sensors, data acquisition ,and how to make use of the data in terms of modelling . It also provides flood outlook of river basins to support to tune the forecasting by the authority

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

13:30-15:30 Technical Session (TS) 10 SFDRR Priority 2: Strengthening Disaster Risk Governance to manage Disaster Risk **(Hall: Gosaikunda)**

SESSION OBJECTIVES

1. To discuss on the pertinent issues, challenges and opportunities towards disaster resilient communities to minimize the future impacts of large-scale disaster in Nepal. 2. To find out a common understanding among the major stakeholders on current status of Disaster Risk Governance (DRG) in Nepal by considering the Federal System of government. 3. To share the current state of Knowledge on DRG in Nepal. 4. To make conceptual clarity and refinement of DRG approach in Nepal. 5. To understand the challenges and constraints to strengthen the DRG to manage the disaster risk in the context of Nepal. 6. To find a common understanding on way forward.

13:30-13:35 Chair: Mr. Kedar Neupane, Joint Secretary, Ministry of Home Affairs

13:35-13:50 "LDCRP Guideline: Updating Policies, Federalization and Development of DRM Responsibility to The Local Governments" - Mr. Suresh Adhikari, Joint Secretary, MOFAGA

13:50-14:05 "DRM in National Development Planning in Nepal" - Mr. Shiva Ranjan Paudyal, Director, National Planning Commission

14:05-14:20 "Adaptation of Banking Policy for Enhancing Disaster Resilience of Nepalese Housing" - Mr. Upendra Poudyal, Director Nabil Bank Limited/ Director National Banking Institute/ Regional Representative for Asia Pacific - Global Alliance for Banking on Values, Netherlands

14:20-14:35 "Current States of Insurance Proliferation in Commercial and Individual Schemes and Needs for Improvement" - Mr. Bhoj Raj Sharma, Expert in Insurance Business, Insurance Board

14:35-14:50 "Comprehensive School Safety Master Plan" - Mr. Meghnath Sharma, Under Secretary, Ministry of Education, Science and Technology

14:50-15:05 "Overview of Disaster Risk Governance in Nepal" - Mr. Vijaya P. Singh, Environment, Energy and Disaster Reduction Unit, UNDP Nepal

15:05-15:30 Q/A

Session Coordinator: Dr. Narayan Marasini, Senior Manager, NSET

Notes of TS10

Session Summary

SFDRR Priority 2;

- New DRR Policy & DRMM Act aligned with the New Constitutional Mandates.
- DRM Act is an opportunity to implement recovery strategy and resilience framework
- A Strict Compliance to and Implementation of Building Code is needed

SFDRR Priority 3;

- Insurance requirement to be made mandatory

SFDRR Priority 1;

- Multi-hazard risks with the principle of *No One is Left Behind* is required to make Nepal a resilient nation.

Details of Session

- Nepal needs to move from a 'Risk-first' approach to 'Managing risk' by working 'from within' development and putting people at the center which will help deal with the underlying causes of disaster and climate change risk. In addition, an all-stakeholder approach is required with effective leadership, deliberate engagement of new actors and behavioral change across the board.
- The key gaps in risk governance are that Lines of accountability are unclear and there is a blurred coordination which is not geared to results Reactive and response focused Emphasis on symptoms of risks; not root causes Disaster statistics not adequately utilized Investments not informed by risks
- DRM needs to be done through a platform approach by combining Government DRM Institutions, private sectors, civil society and academia. Whole of society approach for
- The banking scenario at the time of Gorkha earthquake 2015, did not have much planning when it came to disaster preparedness, there was confusion and infrastructure problems, and there was panic and confusion everywhere. Later, after a series of stakeholder consultations, banking policies were adopted via board meetings and consultations with the government. \
- Despite government interventions in the area with required policies, there have been a few gaps such as Modalities for distribution of Support to the Victims, delays in Relief Package to the Businesses, Delayed Distribution of funds, Lack of Understanding between the Bureaucracy and other stakeholders and Very weak Insurance Awareness
- Developing awareness is the most important component for way forward.
- A Strict Compliance to and Implementation of Building Code is needed
- Government and Private Sector to learn and develop its mindset to work together. Need be more decisive.
- Regulators including Municipal Corporation and Land Revenue offices to be made more accountable
- School safety in Nepal reflected in recent policies and plans such as School Sector Development Plan (SSDP) and Comprehensive School Safety Master Plan





- Objectives of the CSS Master Plan are to ensure safe physical infrastructure through construction, reconstruction or retrofitting with due consideration to risks from various hazards, To institutionalize disaster risk management in school education at federal, local and school levels and to integrate comprehensive school safety and DRR into school curricula and teacher professional development and to disseminate it to students, teachers, SMC members and communities
- National as well as International DRR related Frameworks, Conventions, Accords & Development Agenda
- Enabling Rapid Recovery
- Beyond Government Recovery Programs (affected communities, NGOs, CSOs, private sector)
- Balancing Household with Infrastructure Recovery (targeting the most vulnerable)
- Recovery process aimed at reducing pre-crisis vulnerabilities including broader progress in achieving the SDGs

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

13:30-15:30 Technical Session (TS) 11 SFDRR Priority 3: Investing in DRR for Resilience (**Hall: Begnas**)

SESSION OBJECTIVES 1. To share past experiences on Disaster Risk Governance in Nepal.

2. Critically review the accomplishments and consolidate lessons.

13:30-13:35 Chair: Dr. Bishnu Hari Pandey, Faculty, Civil Engineering, BCIT

13:35-13:50 "Improving Seismic Performance of Public Buildings in Nepal" - Ms. Hima Shrestha, Director, NSET

13:50-14:05 "DRM in the Higher Technical Education of Nepal - Achievement, Challenges and Opportunities" - Prof. Nagendra Sitaula, Centre for Disaster Studies, Institute of Engineering, Tribhuvan University

14:05-14:20 "Earthquake Engineering Education, Research in Nepal: Achievement and Challenges" - Prof. Kamal Bahadur Thapa, Institute of Engineering, Tribhuvan University

14:20-14:35 "Lessons from 1995 Kobe Earthquake Implemented in Nuwakot Post 2015 Gorkha Earthquake Through Disaster Risk Reduction Education by Team Hyogo, Japan" - Prof. Seiji Suwa & Genta Nakano, Team Hyogo, Japan

14:35-14:50 "School Construction as Catalysts for Community Change" - Dr. Rebekah Paci-Green & Dr. Bishnu Hari Pandey

14:50-15:05 "Experimental Study on Seismic Retrofitting of Masonry with Reinforced Coating" - Mr. Kenjiro Yamamoto, University of Tokyo

15:05-15:20 "DRM in Education Research in Nepal"

15:20-15:30 Q/A

Session Coordinator: Ms. Nisha Shrestha, M&E Manager, NSET Rapporteur: Ms. Priyanka Singh, Civil Engineer, TSBCIN, NSET

Technical Session 11: SFDRR Priority 3; Investing in DRR for resilience

Summary Points:

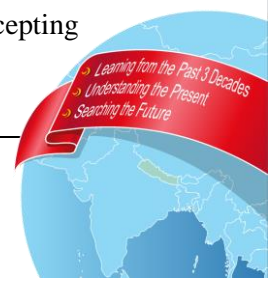
- The focus should be now on community knowledge retention. Need to identify factors for success in rural/remote communities
- There is a big challenge to establish Earthquake Research Centre at least one Centre per state so that sufficient data could be gathered for better decision making in the future.
- Need to Make a Framework of Disaster Education by MOE and DOE- Top-Down initiatives necessary to expand a new type of education
- There is a need of Establishment of research laboratory and testing in each state (quality assurance of construction work).
- Experience is limited to retrofitting of school buildings and not the hospital buildings

Challenges

- Community knowledge of retrofit techniques stronger than application to new construction
- In rural/remote sites, lack of continued application
- Memory fade & attrition
- Retrofitting: Slow than new construction
- Experience is limited to retrofitting of school buildings and not the hospital buildings
- There are no experimental works on earthquake engineering research at IOE/Requirement of Earthquake engineering Laboratory
- An accurate database of all infrastructure components is lacking within the earthquake engineering community

Next Steps

- The focus should be now on community knowledge retention. Need to identify factors for success in rural/remote communities
- Need of implementation of non-structural vulnerability measures in other health facilities for continuous service
- Implementing gadgets (NSM) can be prepared by locally available materials and can be implemented and not costly
- Retrofitting: Slow than new construction
- Experience is limited to retrofitting of school buildings and not the hospital buildings
- There is a big challenge to establish Earthquake Research Centre at least one Centre per state so that sufficient data could be gathered for better decisions making in the future.
- Separate Seismic Design Codes should be developed for Nepal.
- Need to develop and use new emerging materials and innovative structural systems with design tools for the increase of earthquake resilience of infrastructures
- There is restriction from code but assessment is very thin, different grade should be assessed regularly, there must be chemical test reports for construction site
- Identification of potential improvements to existing code for reduced risks of accepting lower quality materials.





- Need to Make a Framework of Disaster Education by MOE and DOE- Top-Down initiatives necessary to expand a new type of education
- To Co-Evaluate Practices and Accumulate Good Practices - Bottom-up accumulation of good practices by teachers will help more teachers start disaster education and enrich disaster education.
- Establishment of well facilitated constituent Engineering campuses (at least one in each state).
- Establishment of research laboratory and testing in each state (quality assurance of construction work).
- Funding scheme for research in higher education
- Linkage of academia research with Government Priorities and Industrial Priorities

TS (11)

Hima Shrestha, Director, NSET

- 300 school buildings were retrofitted before Gorkha Earthquake which were not harmed due to earthquake. Now, the scaling up of the implementation of retrofitting techniques should be initiated in various sector like hospitals etc.
- Need to more focus on NSM.

Prof. Nagendra Sitaula, IOE

- Till now 70 students are graduated in DRM as IOE started Master's level in 1996 but lack of proper infrastructure graduated course has been running in undergraduate infrastructure. So, there is a need of separate facilitated well-equipped infrastructure to learn graduate course.

Kamal Thapa, IOE

- There are different curricula on B.E course regarding to earthquake engineering, but it is not sufficient; separate well equipped laboratory for testing and many research work should be conducted rather than theoretical thesis for students who are graduating in structural engineering or earthquake emergency in Nepal. NSET, ESS has also involved in this from its inception period.

Prof Seiji Suwa & Genta Nakano, Team Hyogo, Japan

- Numbers of students and teachers are being trained from the schools of Nuwakot as part of the Disaster Risk Reduction Education project by team Hyogo, Japan. After realizing the effectiveness of the program, this methodology has to expand to all Nepal and also the framework of Disaster Education should be prepared.
- Secondly, co-evaluating the practices and accumulating of the good practices.

Dr. Rebekah Paci-Green & Dr. Bishnu Hari Pandey

- RPG and BHP had conducted the paired sample assessment (standard construction, technical intervention and technical+ community engagement, NSET) in the buildings retrofitted by NSET. Among three of the methods used for retrofitting, the third one

(technical+ community engagement) is found very effective and can lead to the safer construction practices in the future.

Mr. Kenjiro Yamamoto, University of Tokyo

- He addressed the new retrofitting technique for masonry buildings using reinforced coating which has been successfully experimented at lab. This technique has been used in Japan and this also have huge market for applicability at Nepal. But the question on its exact cost and durability has not been answered properly.

Anand Nepal, Jagadamba Steels

- Chemical composition of rebars was highlighted and there is necessary of regular assessment for quality checking of different grades of rebars availability at market.

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

13:30-15:30 Technical Session (TS) 12 SFDRR Priority 4: Disaster Preparedness for Effective Response, Build Back Better (BBB) in Recovery, Rehabilitation and Reconstruction
(Hall: Rara)

SESSION OBJECTIVES

1. To review the achievements on Build Back Better and on the overall dimensions of ongoing reconstruction.
2. To review overall reconstruction progress, deterrents faced and major steps which should be taken in coming days to achieve timely success as well as institutionalization of the achievements.

- 13:30-13:35 Chair: Dr. Hari Ram Parajuli, Executive Member, National Reconstruction Authority
- 13:35-13:50 "Experience of Earthquake Reconstruction - What was right and What went wrong?" - Mr. Manohar Ghimire, Under Secretary, National Reconstruction Authority
- 13:50-14:05 "Reconstruction of Heritage" - Mr. Suresh Suras Shrestha, Under Secretary, Department of Archeology
- 14:05-14:20 "Housing Reconstruction Progress and Lessons" - Dr. Youb Raj Poudyal, Project Director, CLPIU, National Reconstruction Authority
- 14:20-14:35 "Experience from Pakistan" - Ms. Maggie Stephenson, DRR Expert, UK
- 14:35-14:50 "Reconstruction Coordination Efforts" - Mr. Loren Lockwood, Housing Reconstruction and Rehabilitation Platform
- 14:50-15:05 "Lessons on Technical Support for Earthquake Reconstruction" - Ranjan Dhungel, Program Manager, Baliyo Ghar, NSET
- 15:05-15:20 "Lesson learnt, Best Practices of Reconstruction Through the Eyes of the Communities" - Ms. Bronwyn Russel, Project Manager, Inter Agency Common Feedback Project, United Nation
- 15:20-15:45 Q/A

Session Coordinator: Mr. Ranjan Dhungel, Program Manager, Baliyo Ghar, NSET





Summary of TS12_ Reconstruction

SFDRR Priority 2:

- Deadline has accelerated the reconstruction rate but has somehow questioned on the resilience.
- Earthquake Resistant Buildings will only not guarantee the resilience, but the achievements should be institutionalized.

SFDRR Priority 4:

- Innovations and strengthen with the help of traditional materials should also be done in reconstruction.
- The three pillars of Technical Assistance, Social Mobilization and Trained Masons engagement should also be focused.
- A paradigm should also be focused on the social mobilization.
- Learnings from other countries like Pakistan and Gujarat should be followed in order to sustain the development. For e.g. Use of Water Harvesting and Promotion of alternative Technology should be done.
- Proper coordination should be there with POs in order to aid the beneficiaries.
- Mobile Technical Assistance is also worthy, economic and can contribute towards sustainable reconstruction.

Details of the presentation Sessions TS12

Manohar Ghimire, Under Secretary, NRA

Experiences of Earthquake Reconstruction

1. Reconstruction Needs
 - Approximately 8 million people affected
 - 1/3rd population affected in 31 districts
 - 8790 people lost their lives
 - 23000 people injured
 - Total loss of 706 million
2. Earthquake Losses
 - 5 categories identified (58% social sector, 25% productive sector, 10% infrastructure sector, 7% cross cutting)
 - In social sector, 86% is covered by housing
3. Sendai Framework for DRR priority 4 depicts for enhancing disaster preparedness for effective response and to Build Back Better
4. Reconstruction Act was effective after 9 months of earthquake. In Gujarat, within one week, Reconstruction Authority was activated. Dec 25, 2015 with a tenure of 5 years.
5. Mandate of NRA: Reconstruct, retrofit and restore damaged infrastructure

Suresh Suras Shrestha

Challenges:

1. Lacking provisions in the existing legislations

Several challenges in the reconstruction of heritage buildings, however,

Dr. Youb Raj Poudyal, Dy. Director, MoUD CLPIU

1. Owner Driven Construction:
 - a. Minimize Cost, Maximize Ownership and Sustainability, Strengthen for achieving goal.
2. Design catalogue for reconstruction to act as guidelines for the beneficiaries to support them in reconstruction.
3. Cost sharing and labor sharing modalities of the community mobilization program.

Are toilets still mandatory for the third tranche?

The comprehensiveness of the three pillars (Er, Social Mobilizer and Masons) is seen to bring about good progress in reconstruction. Why wasn't this model adopted by the government?

Maggie Stephenson

1. Change→Technological, Social and Land Use Changes
2. Transferring ERRA into
3. Materials got reused post-earthquake, but technologies were improved.
4. Blocks became common after the earthquake. Quick, simple, low costs.
5. Challenge→Proper Detailing
6. Improvements: Rainwater Harvesting
7. Joint families with larger houses before the earthquake now desegregated into smaller houses.
8. The roles of women in reconstruction identified as the main change.
9. Community based building improvement not only during a crisis but also in regulation time.

Mr. Loren Lockhood

1. Need behind the coordination in reconstruction
2. Lots of partners with different approaches and priorities, which can create unharmonized response.
3. 150 in the housing sector
4. HRRP is supporting the coordination that the government does.
5. Adapting and changing how our coordination looks for the partners and the government.
6. Effort into implementation through partnerships
7. Physical presence in NRA offices in 14 districts, working remotely in 18 districts
8. International partners and NGOs winding up their programs
9. Working in areas without any partners
10. Focus will shift towards localizing HRRP work in the local and provincial level.
11. Huge increase in capacity in the local and district level within the NRA
12. How do we leverage of the work that has gone in until this point?
13. Socio Technical Assistance→7 TA components→4.5% of the areas only covered with full coverage of TA
14. Interest rates on loans are increasing, making it difficult for vulnerable people to take out the loans
15. Houses are getting smaller→large families will tend to use the damaged house for fulfillment→not disaster resilient





16. Now the paradigm should be focused on the Capacity Development, Helping Provincial Government to take over the task and development of online databases.
17. Likewise, focus now is to be shifted towards promoting the alternative materials too rather than the traditional ones.

Mr. Ranjan Dhungel

1. Description on major TA Components, Intervention on different layers in coordination with other PO's organizations.
2. A comprehensive technical assistance of Engineers, Social Mobilizers and Construction Technicians.
3. A common approach of System, Capacity Development and Awareness is to be created.
4. In an average Mobile Clinic would cost NPR 254 per Household based upon the Rough Calculation i.e. in overall it would cover 5 % only of the total grant.
5. Policy level documents would have high impact.
6. Capacity development of Partner Organizations should be done.
7. Trained Masons should be overlooked and are to be engaged in the construction works. Proper strategy should be adopted in order to retain the trained masons.
8. Radio and Television would be good sources for the dissemination of the communication.
9. Urban issues are to be considered different than the rural approach.

Ms. Bronwyn Russel

1. Performed Findings on survey performed at different earthquake affected districts.
2. Many respondents were found to be unknown regarding the finance and debt.
3. Many had feelings such that they had to reconstruct their home only based upon the 17 models.
4. An interesting finding such that the deadline accelerated the reconstruction rate by 36-38%

APPENDIX 5: SUMMARY OF PANEL DISCUSSION SESSIONS

Time/ Day Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past

16:00 -17:30 Panel Discussion (PD) 1 SFDRR Priority 1: Understanding Disaster Risk (Hall: Olive Garden)

SESSION OBJECTIVES 1. Critically look back what we all collectively have accomplished in the past 3 decades in risk identification and loss estimation in Nepal and what were the hindrances and challenges. 2. Looking forward to the opportunities in accelerating and improving risk identification and loss estimation in Nepal.

Key Questions 1. What has been done as a research in the field of hazard, vulnerability and risk and loss estimation? What is the status of these works? 2. There are many risk assessments done by many organizations. Is it necessary? Which agency is responsible for standardizing it? 3. There are lots of hazard maps prepared by different organizations. This creates confusion to the users. In this context, is there any standard procedure laid by the Nepal Government for standardization of this work? And how reliable those maps are? 4. Is there any standard guideline to use those maps by the local government? 5. How these maps are helpful to policy formation and planning the risk reduction strategy? How helpful for actual risk reduction? 6. How local government can contribute to improve those maps? 7. The research that is done during the past decades has been translated to the action or not? What shall be done so that research done can be translated into action? 8. What should be done by different stakeholders (researchers, academia, central government and local government for better understanding the risk and act accordingly.

Moderator: Dr. Ramesh Guragain, Deputy Executive Director, NSET

Panelists: 1. Mr. Dwarika Shrestha Joint Secretary, Ministry of Urban Development

2. Mr. Rabindra Lal Mul, Engineer, Vyas Municipality

3. Mr. Rudra Tamang, Joint Secretary, Ministry of Federal Affairs and General Administration

4. Mr. Janak Raj Joshi, Joint Secretary, Ministry of Agriculture, Land Management and Cooperatives

5. Mr. Rajendra Khanal, Director General, Department of Mines and Geology

6. Prof. Kimiro Meguro, Director, ICUS, IIS, University of Tokyo

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS Rapporteur: Mr. Aashis Tiwari, Engineer, NSET

Summary

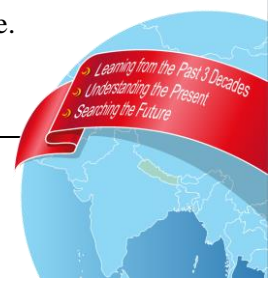
Note taking: Panel Discussion (PD1)

Achievement

1. There was significant progress in last two decades in seismic monitoring.
2. Ministry of Agriculture, Land Management and cooperatives has prepared risk sensitive land use maps which consider different type of risks. For this, Ministry of Agriculture, Land Management and cooperatives has also referred to seismic hazard map and major fault line map prepared by DMG. This risk sensitive land use maps have categorized residential zone, agricultural zone, industrial zone and so forth.

Challenges

1. Ministry of Agriculture, Land Management and cooperatives also works to maintain the standards, specifications and other formats regarding the maps and database but there is some loopholes due to which it is difficult to have consistency in maps and database.
2. Risk sensitive land use maps are hard to find outside the capital city, Kathmandu.





3. As per law, any organization publishing maps without the consent of Ministry of Agriculture, Land Management and cooperatives will be penalized; however, due to lack of ample human resources, such laws are not implemented well.
4. Professionals of earthquake engineering, seismology, etc. feel glad when they come to know about the availability of ample data, different scenarios. Meanwhile, it creates confusion regarding the selection of standard data, scenario.

Way Forward

1. Available information has not been exploited for the sake of preparedness
2. The coordination among different organizations and various tiers of government is crucial to set out standard procedures for risk identification and loss estimation
3. Hazard related data and then proceeded works such as different maps are fundamental and form the base for upgradation.
4. It is utmost necessary to develop a comprehensive system to determine the most effective alternative for risk identification and loss estimation. In addition, this system helps to prepare standard maps and checks repetition of works and hence prevents wastages of fund, time, resources and so forth
5. At local level, it is necessary to carry out trainings which encourage the engineers to initiate the works in the field of risk identification and loss estimation.
6. Efforts should be kept developing standard methodology which reduces lots of potential damages.

Key Questions

Key Discussions

1. There was significant progress in last two decades in seismic monitoring. However, available information has not been exploited for the sake of preparedness.
2. The coordination among different organizations and various tiers of government is crucial to set out standard procedures for risk identification and loss estimation.
3. Hazard related data and then proceeded works such as different maps are fundamental and form the base for upgradation.
4. It is utmost necessary to develop a comprehensive system to determine the most effective alternative for risk identification and loss estimation. In addition, this system helps to prepare standard maps and checks repetition of works and hence prevents wastages of fund, time, resources and so forth.
5. At local level, it is necessary to carry out trainings which encourage the engineers to initiate the works in the field of risk identification and loss estimation.
6. It is necessary to aware the public about the casualties and losses due to disaster which could be done by **disaster imagination**. People shall be aware about the different methods to cope with the consequences of disaster: self-help assistance, structural measures, non-structural measures, preparedness, prediction, emergency responses, reconstruction and so forth.
7. What has been done as a research in the field of hazard, vulnerability and risk and loss estimation? What is the status of these works?
8. There are so many risk assessments done by so many organization. Is it necessary? Which government agency is responsible for standardizing it?

9. It is observed that there are lots of hazard maps prepared by different organizations. This creates confusion to the users. In this context, is there any standard procedure laid by the Nepal Government for standardization of this work? And how reliable those maps are?
10. Is there any standard guideline to use those maps by the local government?
11. How these maps are helpful to policy formation and planning the risk reduction strategy? How helpful for actual risk reduction?
12. How local government can contribute to improve those maps?
13. The research that is done during the past decades has been translated to the action or not? What shall be done so that research that is done can be translated into action.
14. What should be done by different stakeholders (researchers, academia, central government and local government for better understanding the risk and act accordingly.
15. Local government can use cautions while developing infrastructures based upon the seismic hazard maps prepared by Department of Mines and Geology (DMG). However, these maps are of small scale and less legible, thus concerned municipalities can coordinate with DMG to prepare large scale maps at free of cost.
16. Ministry of Agriculture, Land Management and cooperatives also works to maintain the standards, specifications and other formats regarding the maps and database but there is some loopholes due to which it is difficult to have consistency in maps and database.
17. As per law, any organization publishing maps without the consent of Ministry of Agriculture, Land Management and cooperatives will be penalized; however, due to lack of ample human resources, such laws are not implemented well.
18. Ministry of Agriculture, Land Management and cooperatives has prepared risk sensitive land use maps which consider different type of risks. For this, Ministry of Agriculture, Land Management and cooperatives has also referred to seismic hazard map and major fault line map prepared by DMG. This risk sensitive land use maps have categorized residential zone, agricultural zone, industrial zone and so forth. However, such maps are hard to find outside the capital city, Kathmandu.
19. Professionals of earthquake engineering, seismology, etc. feel glad when they come to know about the availability of ample data, different scenarios. Meanwhile, it creates confusion regarding the selection of standard data, scenario.
20. Efforts should be kept developing standard methodology which reduces lots of potential damages.
21. It is recommended to concerned national body to conduct peer review before implementing any types of maps.

Time/ Day Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past

16:00 -17:30 Panel Discussion (PD) 2: SFDRR Priority 2: Strengthening Disaster Risk Governance to Manage Disaster Risk (**Hall: Gosaikunda**)

SESSION OBJECTIVES 1. Share past experiences on Disaster Risk Governance in Nepal.

2. Critically review the accomplishments and consolidate lessons.

Key Questions: • What are the main efforts on Disaster Risk Governance in the past 3 decades? • What are the major accomplishments? • What went well and what needs improvement? - What are the strengths? What are the gaps identified? What could be the remedies? - What are the major lessons?

Chair : Mr. Prem Kumar Rai, Secretary, MOHA





Moderator: Mr. Jagadish Kharel, Journalist, Media Helpline

Panelists: 1. Hon Ram Narayan Bidari, Member, National Assembly 2. Mr. Shiva Hari Sharma, Director General, Department of Urban Development and Building Construction (DUDBC)

3. Dr. Hari Lamsal, Joint Secretary, Ministry of Education 4. Dr. Dipendra Raman Singh, Chief, Hospital Emergency Operation Center HEOC, Ministry of Health 5. Prof. Dr. Meen B. Poudyal Chhetri, President, Nepal Centre for Disaster Management 6. Mr. Ram Prasad Bhattarai, Vice Chair, Disaster Preparedness Network Nepal (DPNet) 7. Dr. Brian E. Tucker, President, GeoHazards International, USA 8. Mr. Surya Narayan Shrestha, Executive Director, NSET

Session Coordinator: Mr. Khadga Sen Oli, Advocacy and Outreach Manager, NSET Rapporteur: Mr. Mahananda Timalisina, Sr. Communication Officer, NSET

Summary

Note Taking: Panel Discussion (PD2)

Panel Discussion

SFDRR Priority 2: Strengthening Disaster Risk Governance to manage Disaster Risk

(Session Coordinator: Khadga Sen Oli, Rapporteur: Mr. Mahanand Timalisina)

Key points:

1. Problem is in implementation, not in policy.
2. Comprehensive Land Use Plan should be the priority.
3. Good works on DRR happening; in Schools, Communities, Municipalities, Security Forces but need is to scale up.

Key messages of Speakers

A. Hon. Ram Narayan Bidari, Member, National Assembly

1. Outdated Act replaced by new DRR&M Act in consistence with updated global DRR policy
2. DRR&M Act ensured mechanism and fund for DRR activities
3. DRRM Act outlined responsibility in regard to DRR activities of all three tier of governments
4. Land Use Planning should be the top priority for safer settlement.
5. Parliament needs to make 143 Laws and there is no deeper understanding, engagement and analysis. Things are moving superficial and fast.

B. Dr. Hari Lamsal, Ministry of Education

1. Three types of school buildings:
 - -Post 1990 constructed Schools infrastructures are earthquake resistant but buildings constructed prior to that not, and private schools has another category
 - - Not enough fund to replace old buildings by new ones

- - A directive issued to private schools for ensuring structural safety
- 2. Lot of positive thing happening but not enough
- 3. Need of accelerate monitoring compliance

C. Dr. Hemant Chandra Ojha, Ministry of Health and Population

1. Not exact numbers available regarding hospitals having Emergency Preparedness and Response Plan
2. Easy to implement and enforce the disaster safety measures in new hospitals but not easy for already existed hospital, timeline has been given to ensure minimum safety measures
3. MOHP does not enforce NBC, engineering part of hospital safety issues is taken care by DUDBC.
4. Hospitals are both responders and victims.

D. Mr. Ram Chandra Dangal, DUDBC

1. NBC implementation responsibility is divided between DUDBC and Municipalities, important role is of Municipalities.
2. NBC not fully implemented in many Municipalities
3. MoHP grants license for hospital only after approval from DUDBC
4. Felt Need of enhancing capacity of Municipalities

E. Dr. Meen Bahadur Poudyal Chhetri

1. Nepal's disaster management efforts should be internally guided but not guided by others and must be taken forward on our own.
2. We have policy in consistence with international standard but poor implementation status
3. DRR efforts must be avoided donor driven tendency, should be self-reliance

F. Surya Narayan Shrestha, NSET

1. NSET providing support to ensure houses built are safe – guided by policy. Model works are needed but replication is important.
2. NBC implementation is not possible unless the municipalities and VDC are capacitated.
3. DRR activities should be a mission, not just a program or project.
4. Big changes take time and do not happen overnight.
5. Detailed planning is must for effective implementation.
6. Political willingness must be increased, politics should take the lead.

G. Ram Prasad Bhattarai, DPNet Nepal

- Without assistant of donors, DRM activities not possible as it requires huge resources.
- Collaborative efforts among all the stakeholders is must.
- Problem is not in policy but in implementation.





Time/ Day Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past

16:00 -17:30 Panel Discussion (PD) 3: SFDRR Priority 3: Investing in DRR for Resilience (**Hall: Begnas**)

SESSION OBJECTIVES The session aims to answer the following questions: 1. What were the challenges and opportunities in the past 3 decades in Disaster Risk Reduction in Nepal? 2. What could be the way forward for the strategic Investment in DRR by different stakeholders in Nepal?

Key Guiding Questions: 1. What has been done so far in DRR across sectors and across time? For example,; • For disaster risk reduction measures in critical facilities, in schools and hospitals and physical infrastructures. • For risk reduction activities at the local level, provincial level, central level. • For revision of existing or the development of new building codes and standards and rehabilitation and reconstruction practices at the national or local levels. • For mainstreaming of disaster risk assessments into land-use policy development and implementation. • For the allocation of the necessary resources for the development and the implementation of disaster risk reduction strategies, policies, plans, laws and regulations in all relevant sectors.

Moderator: Sunil Koirala, Journalist, All 3 Media

Panelists: 1. Mr. Mani Ram Gelal, DDG DUDBC 2. Mr. Min Man Shrestha, GS, NLHDA 3. Mr. Bidhya Sunder Shakya, Mayor, KMC 4. Mr. Deepak Sharma, Director, DOE 5. Mr. Gehendra Gurung, Team Leader, Practical Action 6. Mr. Anand Nepal, CEO, Jagadamba Steel 7. Mr. Hare Ram Shrestha, President, NEA

Session Coordinator: Ms. Nisha Shrestha, M&E Manager, NSET **Rapporteur:** Mr. Kapil Bhattarai, Civil Engineer, NSET

Summary

Note taking: Panel Discussions 3

SFDRR Priority 3: Investing in DRR

Panelists:

Prabin Pyakurel; KMC

Ananda Nepal; Jagadamba

Gehendra Gurung, Practical Action

Hare Ram Shrestha, NEA

Deepak Sharma; DOE

Summary Points

- Professional organizations like NEA shall take the lead to train human resources to match the demand of technical resources
- Research and development on different construction materials is a must for quality construction. Government should subsidize on such issues.
- The Local government should take the responsibility of education sector for its sustainability
- University courses/ Engineering curricula must incorporate DRR and earthquake subjects (BC, retrofitting)
- There is a need to develop Culture of Safety in our private/construction sector

- Disaster Management Committee (DMC) needs to be formed at each Local Level and separate fund needs to be allocated for the operation of the DMC
- There has to be an effective coordination among the local level building code section and disaster management division

Challenges

1. Lack of technical human resources
2. NGO/INGOs are involved for implementation. They do not hold a major position while drafting policies. Policies shall be drafted with the involvement of various stakeholders.

Way Forward

1. Resources from all levels shall be properly utilized
2. Risk understanding is a must among all stakeholders
3. Research and development on different construction materials is a must for quality construction. Government should subsidize on such issues.
4. Engineering curricula must incorporate DRR and earthquake subjects
5. Mitigation of structural and nonstructural components to reduce the risks from earthquakes
6. Allocation of funds, Investments from all three levels of governments on Disaster Risk Reduction
7. Mainstreaming DRR issues on governance
8. Continuous professional development to the engineers working on the field of disaster risk reduction
9. Professional organizations like NEA shall take the lead to train human resources to match the demand of technical resources
10. Preparedness and response plans of big projects and industries needs to be prepared
11. Monitoring and supervision are necessary to maintain the quality of construction and the implementation of policies

Present Situation

1. Awareness, capacity enhancement programs are bringing positive changes
2. Municipalities are establishing Disaster risk management committees at municipal and ward levels. Proper working mechanism of disaster risk management committees are even a challenge.
3. Huge loss of lives and economy due to multi hazard Nepal is facing.
4. Retrofitting of school buildings now is carried out by government of Nepal
5. Comprehensive School safety masterplan prepared.
6. Disaster risk management is identified as one of the core issues for school safety
7. NGO/
8. Early warning system for floods installed at some places. Need to scale up.

Prabin Pyakurel, Kathmandu Metropolitan City

1. Present Situation
 - Disaster Risk Management department was under different section which now turned on an individual unit.
 - Awareness, Capacity enhancement program bringing positive change





- Disaster risk management committee now is formed on all 32 wards, but the budget is allocated and mobilized through central level. Budget allocation and mobilization is planned from every ward.

2. Challenges

- Coordination and collaboration between Building Code and Disaster Risk Management Section is necessary who don't exist in present situation
- Monitoring and supervision of construction of buildings and on implementation of policies is necessary.

Deepak Sharma, Department of Education

1. Present Situation

- Retrofitting of school buildings was not a critical issue before earthquakes which now is taken as hot issue. Retrofitting of school buildings is of prime concern.
- Comprehensive School Safety masterplan drafted
- 10 areas of result-based planning is identified among which disaster risk management is one.
- Safe learning classroom, disaster risk management are pointed on school safety guidelines.
- Safe School Policy to be finalized by government

2. Challenges

- Lack of technical human resources (If we see the timeline lack of human resource will be a big issue. Trainings and capacity enhancement are a prime concern.)
- Smooth and effective implementation of policies are a big concern

Gehendra Gurung, Practical Action

1. Present Situation

- Investment in disaster risk reduction is effective if we see long run return.
- Marginalized groups are under great threat from disasters (flood victims are generally marginalized groups living on the banks of river)
- If we consider multi hazard, there is lack of resources compared to demand of work.
- NGO/INGOs are involved for implementation. They don't hold a major position while drafting policies. Policies shall be drafted with the involvement of various stakeholders.

Hare Ram Shrestha, President, NEA

1. Present Situation

- We Nepalese have trend to compromise safety
- Owners don't keep engineers or make supervisions of construction from engineers because of extra cost they need to bear.

Ananda Nepal, Jagadamba Steels

1. Present Situation

- No damage due to Gorkha Earthquake at industries
- Market was closed due to aftershocks

- Quality of materials, workmanship and technology only safeguards quality of construction
- Continuous Professional development shall be carried out to engineers working on the field of disaster risk reduction
- Disaster risk reduction works now is carried out as piece cake which needs to be a continuous process to get the results
- Human resource planning is must and the courses should be revised incorporating issues on disaster risk reduction
- Research and development for quality construction is a must. Courses shall be updated with incorporating such issues.

Time/ Day Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Past

16:00 -17:30 Panel Discussion (PD) 4: SFDRR Priority 4: Disaster Preparedness for Effective Response, Build Back Better (BBB) in Recovery, Rehabilitation and Reconstruction (**Hall: Rara**)

SESSION OBJECTIVES To discuss on:

1. Current status of response mechanism, the hindrances and challenges in the past 3 decades in Disaster Risk Reduction.
2. Disaster preparedness and response during Gorkha Earthquake 2015 by different organizations.
3. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

1. Accomplishments in the past 3 decades in the field of DRM • What have we done to reduce disaster in past 3 decades? • Which areas were mainly focused for DRM, if any? • Are you satisfied with the accomplishment on DRM? 2. Hindrances and challenges in the past 3 decades in DRM • What were the challenges in the past three decades? • What became the main obstacles in the path of DRM? • Which was the most difficult sector to work with during DRM planning? 3. Opportunities in accelerating in DRM • What were the emerging areas that you encounter in the way to DRM? • What can be the opportunities which can be used as sources of DRM? • Who were mostly benefitted other than the local population during steps to DRM? 4. Future strategies for making Nepal disaster resilient • What should we do to make Nepal disaster-safe? • How can we solve the shortcoming that were noticed during DRM? • Which sector should be more active in making Nepal disaster resilient?

Moderator: Mr. Kalpana Bhandari, Journalist, Watch Dog Media

Panelists 1. Mr. Kedar Neupane, Joint Secretary, Ministry of Home Affairs 2. Mr. Jit Gurung, Brig Gen, Nepali Army 3. Mr. Thule Rai, DIG, Nepal Police 4. Representative, Armed Police Force (APF), Nepal 5. Mr. Dharmaraj Pandey, NRCS 6. Representative, Social Welfare Council 7. Prof. Vinod Kumar Sharma, Hon. Vice Chairman, Sikkim State Disaster Management Authority (SSDMA), India

Session Coordinator: Ms. Maritess Tandingan, Dy. COP, PEER Program, NSET Rapporteur: Ms. Manisha Pantha, Course Material Development Specialist, NSET

Summary

Note taking: Panel Discussion 4

1. Background:





NSET on the occasion of 25th anniversary is initiating an **International Conference “RISK2RESILIENCE”**. This is mainly to formulate the future direction (strategies and plans) in Disaster Risk Reduction based on Nepal’s three decade of collective experience. The conference will follow the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), which is the first major agreement of the post-2015 development agenda, with seven targets and four priorities for action. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR). The participation will be seen from organizations and institutions of all sectors.

This session is one of the 4 parallel sessions of R2R on SFDRR **Priority 4. (Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction)**

Disaster can occur suddenly and the knowledge to respond it can minimize the loss of both life and property. In a disaster-prone countries like Nepal, disaster can damage brutally as is also timely noted in the frequent cases like Gorkha Earthquake 2015. The primary task after disaster is response and if respondents are trained from community than the loss of lives can be minimized immensely. **Priority 4** along with the concept of recovery and reconstruction also focuses on the technical and materialistic preparedness to respond post disaster situation. The basic level of rescue and medical response training for the end users will suffice any community to be disaster prepared. Along with this, the basic knowledge regarding an emergency and minimal understanding of the response will serve as a tool to save oneself from chaos situation during onset of disaster.

2. Session Objective:

The main objective of this thematic session is to discuss on current status of response mechanism, the Hindrances and challenges in the past 3 Decades in Disaster Risk Reduction, disaster preparedness and response during Gorkha Earthquake 2015 by different organizations. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

3. Participating institutions/ Experts

1. Ministry of Home Affairs (MoHA)
2. Nepali Army
3. Nepal Police
4. Armed Police Force
5. Kathmandu Metropolitan City
6. Lalitpur Metropolitan City,
7. Institute of Medicine, Tribhuvan University Teaching Hospital
8. Community-based organizations and NGOs/INGOs working in the field of disaster risk reduction and disaster management will also be supporting.
9. National Association of the Physical Disabled-Nepal (NAPD-Nepal)
10. Nepal Red Cross Society
11. National Society for Earthquake Technology (NSET)
12. Chhetrapati Free Clinic
13. Kirtipur/Thankot Women Network
14. National Reconstruction Authority
15. Department of Education
16. Department of Archaeology

17. Bhimeshwor Municipality
18. World Bank
19. Japan International Cooperation Agency(JICA)
20. Housing Reconstruction Recovery Platform(HRRP)
21. National Society for Earthquake Technology (NSET)

4. Focus

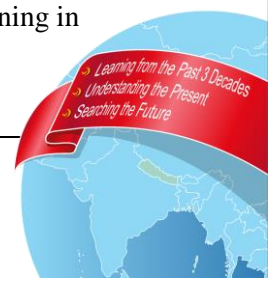
This Session will focus on current response mechanism and strategy for strengthening disaster response system in the new federal system based on the lessons learned from Gorkha Earthquake

5. Key Questions for Discussion:

1. Accomplishments in the past 3 decades in the field of DRM
 - What have we done to reduce disaster in past 3 decades?
 - Which areas were mainly focused for DRM, if any?
 - Are you satisfied with the accomplishment on DRM?
2. Hindrances and challenges in the past 3 decades in DRM
 - What were the challenges in the past three decades?
 - What became the main obstacles in the path of DRM?
 - Which was the most difficult sector to work with during DRM planning?
3. Opportunities in accelerating in DRM
 - What were the emerging areas that you encounter in the way to DRM?
 - What can be the opportunities which can be used as sources of DRM?
 - Who were mostly benefitted other than the local population during steps to DRM?
4. Future strategies for making Nepal disaster resilient
 - What should we do to make Nepal disaster-safe?
 - How can we solve the shortcoming that were noticed during DRM?

6. Panel Discussion:

1. Accomplishments in the past 3 decades in the field of DRM
 - The management in disaster section including preparedness, hazard mapping, mitigation, response is now most talked topic with in NEOC and relating to this many significant achievements among which the formulation of the act “National Disaster risk reduction and management act” is major.
 - NRCS - where it was only focused in relief distribution- now has developed as one among the agencies which work for Disaster Risk Reduction. In 1997 NRCS established Community preparedness program and since then it is actively working for training volunteers for Disaster management and as a result it has fully trained above 32000 DM volunteers.
 - As Nepal army has the key responsibility in involving in response post disaster, now they have form separate directorate and squads separated and dedicated only for disaster management. Schools of disaster management trainings are running in





different location within and outside Kathmandu valley. Above 2000 soldiers are trained for disaster response.

- As Nepal police is first responders, they have formulated their own Standing Operation Procedures (SOP) to be self-sufficient in managing the chaos after disaster. They have stand by force comprising 50 police in every region and 25 responders in general level. Along with the required tools and equipment for the rescue operations they have also pre-positioned Fire Truck for emergency.
- APF was the first to establish the response training center from which they train 100 staffs in every 3 months. Also has 1200 experts in the field of response.
- There is tremendous change in the level of awareness and disaster knowledge. Disaster management is institutionalized, and this topic is gaining importance. Many colleges have adopted this subject in Masters, diploma and even bachelors. Government is fully sensitized.
- PEER has done a remarkable jobs in training the responders as the security forces have adopted the course and institutionalized so that the rescue process will be in line to the international standards.

2. Hindrances and challenges in the past 3 decades in DRM

- Community understanding about disaster that this is god's creation, has made this area overlooked and very less were interested in preparedness.
- Community rescuers are emotion-driven so they risk self-life while rescuing.
- Lack of coordination among organization is another loophole where government does not know the capacity of organizations to mobilize accordingly.
- Geography and lack of communication which made very difficult in knowing the status of disaster and rescue operations. Lack of inventory to search for the information and no database to track responders and of course lack of skilled rescuers were major challenges.
- The combined force of rescuers from Security forces, volunteers, NRCS, NSET which was absent previously and also the knowledge and availability itself of the Tools, equipment and Accessories were challenges.
- Also, there were no trainings being conducted as today so responders barely knew about the international standards and modern techniques in response and rescue.
- There was no culture of quick response and the direction from the higher authorities. No dedicated teams for Disaster Response like NDRF team, India.

3. Opportunities in accelerating in DRM

- During disaster all national parties came together for single cause, united for single cause of response and also formation of act "disaster prevention and management Act" brought new directions in disaster management. Learning from the shortcomings during 2015 Gurkha Earthquake helped and will help in future as a tool in developing DM policies.
- NRCS Developed their SOP and Earthquake contingency plan was updated with the learnings from 2015 Gurkha earthquakes
- National council meeting for the first time which was held was itself a big step towards resilient society as this might bring collaborative approach in making our country disaster prepared. Along with this the various workshops, seminar, trainings are certainly opening the new insight into sustainable development.
- Government has approved the concept of National Disaster center which was overlooked since many years.

- Provincial government system has also brought new hope in decentralizing the disaster management system in other regions. Coordination between national, provincial and local government will surely strengthen the Disaster management system.
4. Future strategies for making Nepal disaster resilient
- All parties should come together when it is about disaster preparedness, and it should be talked and worked unanimously. Disaster preparedness plan of NEOC and DEOC should be formulated and regularly revised. Awareness raising programs should be encouraged and conducted. National initiatives in implementing science and technology in disaster management should be introduced.
 - National disaster policy plan should be formulated and should be circulated to everyone from the decision makers to the grassroots populations.
 - Organization like NDRRN and various others working in the field should play their role responsibly. Every year 1500 skilled manpower should be targeted to train for disaster response.
 - Most importantly Hospitals, Barracks for security forces, schools, health post, and various other essential structures should be Earthquake safe.
 - Upgrading the knowledge in Search and Rescue and introducing the modern TEAs should be purchased.
 - Procurement rights should be given to security forces to buy the essential rescue supplies as it is very essential in strengthening the rescue abilities.
 - Strengthening the community capacities by encouraging volunteerism and also Nepal is doing lots for reconstruction but doing very less recovery therefore Recovery should not be overlooked while developing policies for resilient societies.

7. Summary of Panel Discussion No. 4:

Lessons from the past

- Focus from relief to preparedness to disaster risk reduction
- Focus from single event to multi-hazard

Understanding the Present

- New DRR & Management Act will pave the way for action plans
- Existing capacities are in place but insufficient

Hindrances

- Equipment and trainings can be costly
- Country geography
- Common people's belief that hazards, risks, vulnerabilities are God given
- Retention of trained responders, including volunteers

Opportunities

- Disasters created opportunities to unite stakeholders and citizens
- Capitalizing on fora, sharing events for lessons learnt and promote networking





- Present government structure an opportunity to sensitize all levels (national/central, provincial, all stakeholders, bureaucrats, etc.)

Future Strategies

- Proper funding to sustain development efforts
- Role of academe to formalize trainings, certification of trainings, post-graduate courses on DRM (Priority 1: education on DRR); linkage of research, science and technology on the ground and vice-versa.
- Further intensify public awareness
- The new Nepal DRR and Management Act of 2018 will provide for an NDRRN Action Plan covering all aspects of disaster management.
- Organizations and all other stakeholders in DRR/DRM/emergency response should responsibly carry out their roles (transparency and accountability)
- Vulnerability is reduced by capacity building. Community empowerment must be basic to promote and develop culture of resilience. Sound policies and action plans properly implemented will help develop culture of preparedness.

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

16:00- Panel Discussion (PD) 5 Cause of Death due to Gorkha Earthquake : Lessons on Duck
17:30 Cover and Hold on (**Hall: Olive Garden**)

SESSION OBJECTIVES To share the findings of research on the causes of deaths and injuries (CDI) in the 2015 Gorkha Earthquake Nepal.

This research was conducted by Save the Children in cooperation with Health Research and Social Development Forum with support from Red Cross, National Society for Earthquake Technology-Nepal (NSET), RiskRed and Nepal Risk Reduction Consortium (NRRRC) during 2016-2017. On the backdrop of national debate triggered by some reported observations that conventional drop-cover-hold (DCH) method of emergency procedure to be followed during the earthquake event prescribed by national and international agencies did not work effectively and in some incidents, became counter-productive. This panel discussion will provide a platform to share the issue among policy makers, disaster risk management (DRM) professionals and educators based on factual data collected in course of research. The panel discussion will also provide an opportunity to walk through the report that does not only present the findings of field-based survey on CDI but also recommends course of actions by individuals, communities, agencies and government for effective preparedness and emergency procedures.

Chair: Mr. Shiva Prasad Upreti, Former Under Secretary, DOE

Panelist:

1) A joint presentation on research by : Dr. Bishnu Hari Pandey, British Columbia Institute of Technology
Dr. Sushil Chandra Baral HERD International 2) Comments and review by:

Mr. Ganesh Kumar Jimée, Director, DPER Division, NSET

Dr. Rebekah Paci-Green, Co-Director, Risk Red Mr. Kiran Nepal, Editor Himal Khabar Patrika, Mr. Rajendra Dahal, Editor Shikshak Masik Mr. Saroj Khadka, Survivor of Gorkha Earthquake by DCH Mr. Udhav Risal, Parent

Session Coordinator: Mr. Bijay Krishna Upadhyay, Director, NSET Rapporteur: Ms. Omkala Khanal/
Sushil Pandit , Social Development Officer, NSET

Note taking: Panel Discussion 5

1. The main solution to the death due in an earthquake is to make the buildings safer.
2. Making the Classroom furniture robust may help

3. Drop cover needs to be practiced but with detailed situational analysis based on the building type.
4. The fourteen recommendations made by the report are very good, but a clear direction should be derived for immediate practice.

Dr. Bishnu Hari Pandey

- To share the findings of research on the causes of deaths and injuries (CDI) in the 2015 Gorkha Earthquake Nepal.
- To walk through the report that does not only present the findings of field-based survey on CDI but also recommends course of actions by individuals, communities, agencies and government for effective preparedness and emergency procedures.

Mr. Saroj Khadka

- 2 persons death in neighbor
- Furniture must be strong
- During earthquake unable to run and not to run

Mr. Uddhav Rijal

- Training obtain on DPSS program
- Among 4 members of in family 1 daughter died because she was in neighbor house
- 4 friends are in house 3 able to survive with minor injuries, she died because she hides herself under the weak furniture
- Among 60 members, 1 of them jumped from the floor and unfortunately, he lost his both legs and one hand

Rameshwor Bohora

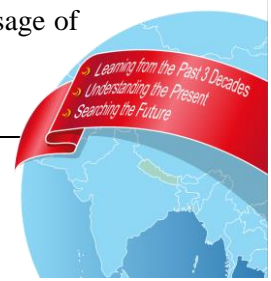
- Research conducted in earthquake prone area (Gangabu, Bishnumati....)
- 12 members were died within same house because of weak structure
- Haphazard construction of building without following the policy
- Recommendation:
- To do DCH geographical diversity must be identified at first; location of houses, school, urban and rural areas

Ganesh Kumar Jimée

- Death due to panic and run
- Stay in the safe place within house
- Use of effective communication
- Convey Complete and correct message

Rebekah Paci-Green

- Students within school are from different localities so it is difficult to convey message of DCH





- Some Students within school are physically disable and some are too young to understand the message
- Need to be well construction of school building

Questions from the floor and response from the panelists

Garry de Pomerai

- It may take time to construct and retrofit the building so the furniture must be strong in school

Shree Ram Singh Basnet

- Convey Complete and correct message about DCH
- Better to involve medical doctor in panel discussion
- To identify whether the research is conducted on mental disorder like DCH by other institution or not?
- Require situational awareness for mental disorder

Response by Bishnu Hari Pandey

In comparative study of Research conducted on Japan and Iran with large sample survey and In Nepal with small sample survey of 14 district show that type of mortality and injuries are same.

Loy Rego

- Do not spend more time in educating children

Srijana Shrestha

- The finding of this research must be conveyed in school and communities

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

16:00- Panel Discussion (PD) 6 Need for national programs on CO-seismic hazards/landslide
17:30 /floods

(Hall: Gosaikunda)

SESSION OBJECTIVES • To discuss on the pertinent issues, challenges and opportunities towards earthquake induced landslide, debris flow to minimize the future impacts of its large-scale especially in hilly and mountainous region. • To find out a common understanding on way forward for national program on assessing and managing the risk of geohazards.

• serve as a basis for convening series of discussions, workshops and press releases as part of common course of action on need of Nepal's national program on co-seismic hazards.

Key Questions: • What are the main geohazards induced by the 2015 Gorkha Earthquake and its level of impact? • How they carried out their study/restoration project including damage assessment, documentation of existing condition? • What is the best method in our context to conduct the detail geohazards mapping and risk assessment? • How can we involve all key stakeholders in the process of identification and implementation of effective mitigation measures? • Is there any national standards and guidelines exist for assessing the geohazards risk in Nepal? • How can we strengthen the national capacity for assessing and managing the risk of geohazards? The topics for discussion • Approach, Modality and time frame for detail mapping of geohazards and assessment of risk in Nepal. • National

program for identification and implementation of effective mitigation and adaptation measures on co-seismic hazards.

Chair: Prof. Dr. Megh Raj Dhital

Panelists: 1. Dr. Netra Prakash Bhandary, Associate Professor, Ehim University 2. Dr. Rishi Ram Sharma, Director General, Department of Hydrology and Meteorology 3. Dr. Katie J. Oven, Durham University 4. Prof. Nick Rosser, Durham University 5. Prof. Hari Krishna Shrestha, NEC 6. Prof. Dr. Tara Nidhi Bhattarai, Tribhuvan University 7. Dr. Soma Nath Sapkota, Deputy Director General, Department of Mines and Geology

Session Coordinator: Dr. Narayan Marasini, Sr. Program Manager, NSET Rapporteur: Dr. Sweata Sijapati, HRRP

Summary

Note taking: Panel Discussion 6

Session Summary

SFDRR Priority 3;

- Development of an Apps to identify the hazard/input of the information through the local people directly from the field can be useful for knowing the scale of the disaster immediately after the event.

SFDRR Priority 2;

- Need of strong technical team and GON representative for the disaster event

SFDRR Priority 4;

- empowering the local leader and communities is essential for dealing with the disaster event and early warning system

SFDRR Priority 1;

- CO-seismic issues of the structural damage in mountain needs to be studied rather than just focusing on the landslides event.

Key Questions

- What are the main geohazards that induced by the 2015 Gorkha Earthquake and its level of impact?
- How they carried out their study/restoration project including damage assessment, documentation of existing condition?
- What is the best method in our context to conduct the detail geohazards mapping and risk assessment?





- How can we involve all key stakeholders on the process of identification and implementation of effective mitigation measures?
- Is there any National standards and guidelines exist for assessing the geohazards risk in Nepal?
- How can we strengthen the National capacity for assessing and managing the risk of geohazards?
- The topics for discussion
- Approach, Modality and time frame for detail mapping of geohazards and assessment of risk in Nepal.

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

16:00-17:30 Panel Discussion (PD) 7 Private sector in DRR: Opportunities and Realities
(Hall: Begnas)

SESSION OBJECTIVES • To provide a forum for professionals working in disaster risk reduction to discuss on the private sectors' accomplishment, hindrances, challenges, and opportunities in the past three decades in Disaster Risk Reduction. • To find out a common understanding on way forward for making private corporate sector disaster resilient by 2030.

Key Questions: • What are the private sector accomplishment in the past three decades (2045-2075) in Disaster

Risk Reduction and Management? • What are the hindrances and challenges faced by private sector in past three decades in DRR &M? • What are the opportunities in accelerating DRR in private corporate sector? • What should be improved for making private sector Disaster Resilient?

Chair: Mr. Kush Kumar Joshi, NBI

Moderator: Mr. Rajesh Thapa, Sr. Architect, President SCAEF

Panelists: 1. Mr. Om Rajbhandari, Chair UDC, Federation of Nepalese Chamber of Commerce and Industries 2. Mr. Naresh Shrestha, Vice-President Nepal Chamber of Commerce 3. Mr. Bhoj Raj Sharma, Insurance Expert, Insurance Board of Nepal 4. Mr. Rajesh Thapa President, Society of Consulting Architectural and Engineering Firms 5. Mr. Dev Maharjan, Chief Executive Officer, Earthquake Safety Solution 6. Dr. Anselm Smolka, Advisor, Global Earthquake Model, Italy
7. Mr. Pavitra Bajracharya, President Nepal Retailer Association

Session Coordinator: Surya Bhakta Sangachhe, Sr. Technical Advisor, NSET Rapporteur: Ms. Aditi Dhakal, Urban Planner, NSET

Summary

Note taking

Major discussion points:

1. Insurance is the most essential tool of risk transfer but is usually given least priority. Hence awareness on insurance policies shall be increased among public.
2. The clauses mentioned in the insurance policies are complicated and demotivating for general public including private sectors. Hence it is advisable to make it simpler and user friendly.
3. The pace of development of insurance companies are slow. However as of now, Insurance companies are going to almost every provinces, schools and colleges to promote education on insurance policies.

4. Structural and non-structural mitigation for private sector should be done for disaster risk management. In this regards, building and workplace should be disaster resistant and well equipped with physical infrastructure.
5. The escalated price of the food after Gorkha earthquake 2015 was one among the issues but was sincerely managed by the retailer association Nepal by disseminating proper message during the time of Gorkha earthquake 2015 as a result of which the food demand was balanced and not escalated unnecessarily.
6. Lack of awareness, seriousness and preparedness regarding disaster preparedness can be felt among every sector including general public. Thus, public awareness on such issues is recommended.
7. Sendai framework of action and recent act on disaster risk management should be properly followed to manage disaster risks.
8. People should be aware on the difference between CSR (Community social responsibility) and charity.

Prepared by:

- Aditi Dhakal (Urban planner, NSET)
- Rashmi Dahal (Urban planner, ESS)

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the Present

16:00-17:30 Panel Discussion (PD) 8 Lesson learned and not learned from Gorkha Earthquake
(Hall: RARA)

SESSION OBJECTIVES 1. To discuss on current status of response mechanism, the hindrances and challenges in the past 3 decades in Disaster Risk Reduction.

2. Disaster preparedness and response during Gorkha Earthquake 2015 by different organizations.
3. Strengthening the existing capacity of the rescue force like Nepal Army, Nepal Police and Armed Police Force.

Chair: Mr. Tapendra Bahadur Khadka, Project Director, CLPIU, NRA

Moderator: Mr. Sunil Koirala, Journalist, All 3 Media

Panelists: 1. Mr. Tapendra Bahadur Khadka, Project Director, CLPIU 2. Mr. Loren Lockwood, Housing Recovery and Reconstruction Platform 3. Mr. Ram Bhandari, Program Manager, JICA 4. Ward Chief, Malu 5. Dr. Ramesh Guragain, Deputy Executive Director, NSET 6. Ms. Maggie Stephenson, DRR Expert, UK

Session Coordinator: Mr. Ranjan Dhungel, Program Manager, Baliyo Ghar, NSET Rapporteur: Mr. Manish Raj Gouli, Civil Engineer, NSET

Summary of Panel Discussion PD08_ Reconstruction:

1. Culture of Eq. resistant construction has been establishing and need to initialization in local governance system.
2. Capacity enhancement of local authorities is necessary for nationalization and sustainability of reconstruction achievements and learnings.
3. Categorize NGOs and INGOs as per their work and output rather than putting in same basket
4. Temporary shelter could have been made better. It should be considered as transitional shelter and it could have been built in stronger way.

Details of Panel Discussion:





Panelists:

- Mr. Tapendra Bahadur Khadka, Project Director, CLPIU, MOUD(Chair)
- Mr. Loren Lockwood, HRRP
- Mr. Ram Bhandari, JICA
- Bharat K.C, Mayor Bhimeshwor Municipality
- Dr. Ramesh Guragain, NSET
- Maggie Stephenson, DRR Expert

A panel discussion on lessons learnt and not learnt in the aftermath of earthquake was held at R2R conference Panel discussion session 8. Pertinent professionals and concerned authorities were part of the session. Experiences, achievements, hurdles and learnings were presented in the session. Some key findings are presented below:

Good findings and Major learnings of reconstruction:

- Community based workings are found to be good in the case of the reconstruction to boost its pace. Community based programs and Community participation in reconstruction is the major aspect that needs to be considered.
- Build back better and construction of earthquake resistant houses. A feeling has been developed such that the houses are constructed for ensuring our future safety.
- Capacity enhancement of local authorities is necessary for institutionalization and sustainability of reconstruction achievements and learnings.
- Relating reconstruction works to livelihood and social development.
- Engaging masons in construction works to eradicate unemployment and foreign employment.
- Categorize NGOs and INGOs as per their work and output rather than putting in same basket.
- Reconstruction deadline helped to accelerate the reconstruction rate, but the number of single room houses has increased.

Hindrances/ What we missed in this reconstruction:

- Restrictions like age, single women, disable for single room house missed. Most people are constructing single room houses just to get government grants.
- Technical support center for reconstruction and Community Reconstruction Committee, if made in action in proper way in initial phase of reconstruction the achievement would have been far better.
- Modal house/ catalogue: dissemination and communication gap. Most beneficiaries got stuck in the models given by government. The technology was given but there was gap in transferring to the field.
- Intergraded settlement plan and land pooling
- Preserving traditional vernacular architecture
- Temporary shelter could have been made better. It should be considered as transitional shelter and it could have been built in stronger way.
- Can the learnings of reconstruction be institutionalized?

Day 3: Wednesday, June 20, 2018 (Asadh 6, 2075) Theme: Searching the Future

11:00-12:30 Panel Discussion (PD) 9 Enhancing close links among research, education, implementation and local agencies (**Hall: Olive Garden**)

SESSION OBJECTIVES 1. To identify the gaps in communication among institutions/sectors. 2. To determine the effective coordination mechanism among the stakeholders.

Moderator: Mr. Jeevan Baniya, Social Science Baha

Panelists: 1. Prof. Dr. Prachanda Man Pradhan, Kathmandu University (KU) 2. Mr. Chandra Bahadur Shrestha, Nepal Reconstruction Authority (NRA), 3. Mr. Madan Sundar Shrestha, Mayor, Madhyapur Thimi Municipality 4. Mr. Suraj Shrestha, Senior Engineer, Dharan Metropolitan City 6. Dr. Katie J. Oven, Durham University 7. Dr. Ravindra Dhakal, Nepal Academy of Science and Technology (NAST) 8. Mr. Shanmukhesh C. Amatya, Department of Water Induced Disaster Management(DWIDM)

Session Coordinator: Mr. Dev Kumar Maharjan, CEO, ESS Rapporteur: Ms. Rashmi Dhal, Urban Planner, ESS

Summary

Note taking

Panel Discussion PD9

Major points:

1. In context of Nepal, most of the research data are dispersed and have no networking for disseminating data properly. In this regards, Nepal Academy of science and technology (NAST) can play a role of facilitator for bringing the scattered data/research works into one single umbrella.
2. There is no such authorized data management system, program or portal from where authentic data can be extracted in Nepal. However, it is recommended to have such system to organize research data as well as take the accountability of the research documents collected from all over the country and universities.
3. The research should be done for the welfare of public, not only to obtain the degrees and also it should be implementable.
4. There is lack of institutional capacity such as lack of resources to support NRA in the reconstruction projects as well as to carry out the research projects as required. Hence strengthening comprehensive and capable institutions is essential.
5. Research which can be better delivered to society is recommended. There are resources that have to be properly used for the purpose.
6. Not only writing papers but they shall also be brought to discussion for better result.
7. Evidence based policy is essential for creating a trustworthy relationship with the local communities.
8. It is also recommended that building codes/bylaws shall be practical and can be modified or contextualized based on the requirement and need of the local community.





Day 3: Wednesday, June 20, 2018 (Asadh 6, 2075) Theme: Searching the Future

11:00-12:30 Panel Discussion (PD) 10 Problems of DRR in infrastructure and critical facilities and W

Session Objectives:

To assess the present institutional preparedness of different governmental organizations for possible disasters

To discuss the future plans governmental institutions to cope with disasters

To discuss the increasing complexity of infrastructures and their interconnectivity

Need for Standards and Code for all Infrastructure including Critical Facilities. • The increasing awareness of the importance of Critical Infrastructures for Disaster Risk Reduction (DRR). • To find a common understanding on way forward.

Key questions: • What are current practices of earthquakes consideration for seismic resilience infrastructure in the country? • What is the present institutional preparedness of different government organizations for possible disaster? • What is the future plan of governmental institution to cope with disaster? • Is there any urgent need of updating of current standards and code for infrastructure including critical facilities? Is there any initiation for this? • What are problems and challenges for DRR in infrastructure and what needs to be done for future? • How to update our infrastructure systems in the coming years that helps to improve the quality of life for future generation? • Is there any collaboration with international organization for Research and Development activities for resilience infrastructure? • Is there Emergency Plans, training of employees and emergency drills as well as back-up-system in case of disaster?

Chair: Mr. Saroj Kumar Pradhan, DOR Moderator: Dr. Mohan Prasad Acharya, Sr. Geotechnical Engineer, NEA Engineering company

Panelists: 1. Mr. Kulman Ghising, Director, Nepal Electricity Authority 2. Mr. Anand Raj Khanal, Director, NTA 3. Mr. Dilli Adhikari, Dy. Manager, NTC 4. Mr. Mani Raj Dahal, Chief Engineer, Clean Energy Consultants (Hydro power) 5. Engineer from KUKL (Narayan Sir) 6. Mr. Chhabhi Ram Khanal, Civil Aviation Authority, Tribhuvan International Airport

Session Coordinator: Ms. Kirty Tiwari Jaisi, Sr. Structural Engineer, NSET Rapporteur: Mr. Dipu Chapagain, ESS

Summary

Note taking

Panel Discussions 10

Summary

Panel discussion on **Problems of DRR in Infrastructure and Critical Facilities and Way for Enhancing Disaster Resilience** was conducted on 20th June 2018. The distinguished panelists from different governmental bodies related to infrastructure development were present. The discussions were mainly focused on current practices, policies and plans related to DRR in infrastructures like Road, Bridges, Telecommunication and Hydropower and electricity.

Bridges

- Bridges of Nepal have functioned well after Gorkha earthquake which indicates the codes and guidelines that are being used are good. However, defects on bearings of some of the bridges were prominent.

- The research conducted by JICA has concluded that 40% of bridges are damaged due to earthquake however the traffic obstruction was not observed.

Communication and networking

- Nepal Telecom has become the member of International Communication which are assisting in providing equipment like satellite phones in case of emergency.
- During the period of emergency, NTA encouraged to use SMS and Facebook instead of voice calls to avoid the network congestion. Free calls were provided to the costumers. To reduce the congestion due to voice calls, the system that allowed only 3 mins of call was made into action.
- National Telecommunication Emergency Plan was drafted in 2013 but has not been approved and implemented yet.
- Areas where telecommunication can be affected during disaster are
 1. Physical Infrastructure: BTS, Towers, cables
 2. Supporting infrastructure: access road, electricity
 3. Network congestion

Hydropower and electricity

- During 2015 Gorkha earthquake, power generation system didn't have much of the damage. There were some instances where transmission line was damaged. Most of the damage was on distribution system. Because of short supply of equipment during disaster repair works couldn't be done in time.
- The only hydropower system that was damaged severely during earthquake was 45MW Bhotekoshi hydropower.
- During earthquake there was not much damage in under construction power stations, however, on so many sites construction was delayed because of weak policies mostly related to force measure and due to damaged access roads.

Roads

- After earthquake 2015, design factors are being increased.
- Prevailing road guideline allows time extension but not cost extension. Hence, upgrading of prevailing guidelines are of much importance in regard to contract administration which is in process currently.

Challenges

Bridges

- Lack of research centers pertaining to bridges has affected in the design of earthquake resilient bridges. However, initiation has been taken to establish research centers as a branch of Department of Roads.

Communication and networking

- Tower and BTS standards are being developed which restrict to install towers on weak buildings.





- During 2015 Gorkha Earthquake, there was network congestion for 4-5 hours specially in pre-paid phones, however, post-paid phones, PSTN and internet services were working which helped in rescue process.

Hydropower and electricity

- Department of Electricity Development (DOED) is responsible for the quality checks by investigation, standardization, and quality assurance and monitoring.

Roads

- There are many old roads in Nepal and lacking design data and drawings of those roads have hindered the vulnerability of those roads.

Way Forward

Bridges

- After Gorkha Earthquake, the coefficients that were being used before in the design of bridges were increased by two folds to consider the effect of earthquake. However, it has chance to increase the cost of bridges significantly hence further study required in regard to increasing the coefficients.
- Currently design coefficients are taken from Indian codes. Research and development of coefficients on our own is very important. JICA, however, have developed general seismic spectrum in which detail study is underway.
- There has been provision of periodic inspection of bridges every 2 years and detail inspection every five years and the condition of bridges are updated in website every year.

Communication and networking

- Some of the ways to minimize damages during disaster are use of solar power system instead of electricity and installing RTT (Roof top tower) only in the buildings which are earthquake resistant.
- To minimize network congestion in case of emergency, mobile BTS and small GSM networks can be used in affected area. Apart from this, use of satellite phones can be very handy during rescue operations.
- Strong regulations and monitoring are required.

Present Situation

Bridges

- Currently design coefficients are taken from Indian codes. Research and development of coefficients on our own is very important. JICA, however, have developed general seismic spectrum in which detail study is underway.

Communication and networking

- In case of emergency, use of optical fiber is very effective as there won't be entire network failure if one link fails. Optical fiber is being used in Kathmandu, Butwal and Hetauda currently.

- Other alternative solutions in case of network failure during disaster can be microwave links and district satellite networks. Apart from this, mobile switching centers are installed in many places like Kathmandu, Biratnagar and Hetuda.

Roads

- There was initiation of road safety council which is not working effectively currently.

The panel discussion was concluded with notions that all the infrastructure requires strong plans and policies to operate easily during disaster and emergency. Strengthening of monitoring and quality assurance mechanism for safety is a must to cope with disasters in infrastructures. Similarly, enhancement of proper management system in infrastructure develop is also very important. Finally, profound research along with collaboration with relevant international agencies can be very effective.

Day 3: Wednesday, June 20, 2018 (Asadh 6, 2075) Theme: Searching the Future

11:00- Panel Discussion (PD) 11 Updating National Building Code: Factors to Consider,
12:30 Research to Undertake, Mechanism for Updating (**Hall: Begnas**)

SESSION OBJECTIVES To provide a forum for professionals to discuss on various attributes of building code update in Nepal. The specific objectives are • To share the current status of building code implementation in Nepal • To share the current process of building code update in Nepal • To share the international practice of building code update • To understand the challenges and constraints in the context of Nepal • To find a common understanding on way forward

Key Questions: 1. What factors need to be considered in updating building code? (From past earthquake experiences and revisions/practices/standards in other countries these include but not limited to seismic hazard, Soil condition, design standards, detailing requirements etc. 2. What kind /level of research is required and how these research result into input to the building code update 3. What are the key information and knowledge we need to update the code? 4. How does our current practice updating building code go with standard international practice addressing the challenges and constraint in the context of Nepal

Chair: Prof. Dr. Prem Nath Maskey, Institute of Engineering

Co-Chair: Mr. Dwarika Shrestha, Joint Secretary, Ministry of Urban Development

Moderator: Dr. Bishnu Hari Pandey, Faculty, Civil Engineering, BCIT

Panelists: 1. Dr. Richard Sharpe, Senior Technical Director, BECA, New Zealand

2. Mr. Jitendra Bothara, Technical Director - Seismic Engineering, Miyamoto International NZ Ltd.

3. Dr. Sanjeev Shah, President, SeaNep

4. Dr. Susan Hough, Seismologist, USGS

5. Dr. Youb Raj Poudel, Project Director, CLPIU, MOUD

6. Dr. Bishnu Hari Pandey, Faculty, Civil Engineering, BCIT

7. Dr. Deepak Chamlagain, Tribhuvan University

Session Coordinator: Ms. Hima Shrestha, Division Director, EERT/NSET

Summary

Note taking

Summary Discussion and Way Forward





1. Need of education and capacity development for designers and also for the approving authorities.
2. Regulation of licensing for designers.
3. Updating the building code should address high rise buildings and also should consider mechanism for their approval.
4. More focused research on low strength masonry building typologies
5. Socio economic issues should be considered in development of building code. Focus should not only be in increasing the design coefficients.

Side Events

Side Event 1: Side Event on Earthquakes in South Asia: Lessons from History

Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) 11:00-13:30

The purpose of the workshop is to facilitate productive conversation between academic historians and stakeholders in disaster management. The long-term goal is to help disaster managers and NGOs to understand the social and political aspects of earthquakes, particularly the historical causes of vulnerability, the long-term consequences of relief and reconstruction policies, and the potential of historical case studies to provide examples of best/worst practice.

SIDE EVENT OBJECTIVES:

1. To put forward the preliminary results of the Broken Ground project in a way that is relevant to DRR stakeholders
2. To give the participants an opportunity to feedback to the project team which aspects of historical research they will find useful
3. To facilitate networking among participants and the project team

Feedback that the participants give to the project team will feed into the project team's production of a Policy Brief, to be written in 2019, in a way that will be most beneficial to stakeholders.

It is hoped that working together on the workshop will consolidate the working relationship between NSET and the project principal investigator, Dan Haines. This could lay the groundwork for future collaborations.

11.00-11.10	Welcomes and brief on session
11.10-11.30	Presentation on background of project, including time for participants to ask questions for clarification: Project team
11.30-11.45	Presentation on initial ideas of how historical studies can inform DRR practice: Project team presents
11.45-12.15	Breakout groups: critique the presentation: - Which suggestions were useful? - How could they be improved? What other areas should the project team explore?
12.15-13.00	Open discussion
13.00-13.15	Participants to fill out questionnaire
13.15-13.30	Close of Session

Side Event 2: Young Scientists' Forum on DRR in Nepal

Day 3: Wednesday, June 20, 2018 (Asadh 6, 2075) Side Event 11:00-12:30

Chair: Dr. Han Qunli, Executive Director, IRDR Co-Chair: Prof. Alex Densmore, Durham University

Panelist: 1. Mr. Dipendra Gautam, Structural and Earthquake Engineering Research Institute (SERI)
2. Ms. Rita Thakuri, Executive Secretary, NSET 3. Mr. Kuber Bogati, Structural Engineer, HRRP/NSET

4. Mr. Kapil Bhattarai, Civil Engineer, NSET

Ignite Presentation (6 Nos) Poster Publication (10 Nos) (Jury: Chair, Co-Chair and Panelist)

Session Coordinator: Mr. Ranjan Dhungel, Program Manager, Baliyo Ghar, NSET

Summary





APPENDIX 6: THE MUSICAL SOIREE

The musical soiree

Vibe of Music

Presented by Friends of Sukarma

(In honor of the participants of the International Risk 2 resilience Conference: Nepal's Collective Journey towards a Safer Future, 18-20 June 2018, Kathmandu)

Music in Nepal: Music is a part and parcel of life of the Nepalese. They cannot conceive a life without music. From cradle to grave, from religious rites to seasonal festivals, music lends colors to all big and small events of Nepali life. Without the sound of music, the beats of drums, the clang of Cymbals or the blowing of Conch shell, a place is considered inauspicious and lifeless. There's hardly an aspect of human life which is not touched by the infinite scope of music. Thus, besides the means of entertainment, music is considered as one of the powerful tools to empower the society.

The event Vibes of Music: This program is designed by Sukarma (Redefining Nepali Folk and Classical Music) and its friends and presented in the evening of the opening day of the International Conference Risk 2 Resilience: Nepal's collective journey towards a safer future, which is devoted to examining Nepal's efforts in making Nepal safer against earthquakes in the past two and a half decades. Nepal started the journey after being devastated by the 1988 Udaypur earthquake, which itself reminded people of the great Nepal Bihar earthquake of 1934 reviving the faded memory of the past painful days. The group "Sukarma" – literary meaning humanly 'karma', is devoted to music as a source of harmony and as a medium to contribute to the wellbeing of society in the times of joy and in pains. While reposing its undying faith on the ragas and rhythms of the South-Asian musical tradition, Sukarma uses the indigenous folk music of Nepal blending it innovatively to relish and reflect the cultural life of the Nepalese society.

The program used various thematic compositions creating fusion of classical ragas with the folk traditions of Nepal to reflect the theme of the conference – progressive understanding of disasters and continuous efforts to win over the impact, relying on the inbuilt resilience of the Nepalese individual, family and society. The music being brought to this distinguished audience is rooted in Nepal's diverse ethnicities, cultures and musical heritages. This musical presentation is directed by Mr. Bharat Nepali and other friends of Sukarma under the special guidance of Dr. Dhrubesh Chandra Regmi, who recently departed for a month-long musical performance in European countries.

The artists presented the following four musical renditions based on various themes:

8. Sorrow and pain:

This musical rendition attempts to capture the normal life situation prior to the earthquake and the shocks that people had to face resulting in protracted sorrows and pains that appeared never-ending.

9. Hope and happiness

The composition in this part tries to capture the moments of transformation when the people impacted recomposed themselves, started helping each other, and rekindled their hope when

supportive hands of the heroes as well as the state, fraternity of individuals and institutions, from Nepal and abroad, came to help them. The music tries to capture the change in the air their family to come in the normal situation which was praiseworthy too.

10. Unity in Diversity (Garland of Nepal):

Music knows no territorial boundaries and is above race, nationality, caste and ethnicity. To say the least, music is the only language that needs no words to communicate, no matter how hard and soft they may be. Nepal is a land of diversity in terms of geography, religions, races, castes, culture, languages and dresses. The music indicates that our individual identity can be protected, preserved and spread only through our collective identity as a Nepali.

11. Beautiful world:

This composition spread the message that our world is beautiful, let's be happy and contribute through our knowledge and skills for the betterment of the environment of this earth for the sake of our future generation.

Participating Artists: The Vibes of Music was presented by following artists Friends of Sukarna.

Bharat Nepali (Sarangi): Multi-talented Bharat started playing sarangi in his early age in a traditional way. He is the most sought-after sarangi (typical Nepali violin) player in Nepal today who creates his own style of sounds. He has also been credited for modernizing and improvising sarangi. He has performed several concerts in Nepal as well as in various parts of the world that includes: many countries of Europe, China, Uzbekistan, India, Pakistan and Japan. Presently, he is teaching and conducting research as an Asst. Professor in the Music Department of Kathmandu University.

Yati Raj Adhikari (Violin): Recipient of Nepal Vidya Bhusan, Yati Raj received his initial training of violin from various gurus in Varanasi. He has completed his Bachelor and Master's degree from Bhatkhande Music University, Lucknow and Acharya degree in Sanskrit from Sampurnananda Sanskrit University of Varanasi. As an excellent solo performer and accompanying musical talent, he has been honored and recognized by various national and international artistes. He has also performed in various musical events in Nepal and India. Currently he teaches violin in Lalit Kala Campus of Tribhuvan University.

12. Dhan Bahadur Gurung (Flute and Sehnaï)

Dhan Bahadur started learning flute at his early age under the guidance of flutist Jeevan Ale in Nepal and Sehnaï with Pt. Sunil Prasanna of India. A bachelor degree holder in music from Lalit Kala Campus, Dhan Bahadur is considered one of the best melodist flute players of Nepal. Recipient of several prizes and awards, Dhan Bahadur has widely performed in Nepal and various part of the world. Currently, he works as a flute instructor in various institutions, performs in various events and has many of. His performances recorded.

13. Wenkatesh Dhakal (Tabla)

Wenkatesh Initially started learning tabla with late Atul Prasad Gautam and later on from various other teachers from Nepal and India. He received his bachelor and master's degree from Bhatkhande Music University, Lucknow. A recipient of Nepal Vidya Bhusan, Wenkatesh, currently works as a Tabla Instructor in Lalit Kala Campus, Tribhuvan University and Naad Music School. He has performed in various musical events as well accompanied with noted musical personalities of Nepal and India.





APPENDIX 7: NSET MARKS SILVER JUBILEE OF ITS JOURNEY



Right after the conclusion of International Conference “**Risk2Resilience**” on June 20, 2018, National Society for Earthquake Technology–Nepal (NSET) marked Silver Jubilee of its journey with a gala event. On the occasion, NSET organized various programs including 25th NSET Day Ceremony with cultural events at Radisson Hotel in Kathmandu. NSET, which was established in 1993 with its mission to enhance seismic safety of Nepal and the beyond, observes the day on June 18 every year as 'A Day to Reaffirm the Commitments to Earthquake Safety'.

The formal program had started with the National Anthem recited by NSET Troupe and joined in by all present.



Addressing the 25th Anniversary of **NSET**, **NSET Executive Director Mr. Surya Narayan Shrestha** welcomed all the guests and highlighted the NSET endeavors to help build communities resilient to disasters. “We decided to mark the NSET Day event as concluding event of Risk2Resilience Conference,” said Mr. Shrestha, adding, “we are happy to have completed active, intense, thoughtful, collaborative and challenging 25 years journey.” NSET Executive Director Mr. Shrestha further shared that NSET has been successful in training directly to over 40,000 persons in different disciplines including trainings to more than 17,000 masons, 2,500 engineers, 12,000 other stakeholders and more than 9,000 emergency responders as well as engaging directly with half a million people through house orientations, trainings, seminars and workshops and also worked with 200 organizations in 12 countries in the region.



25 years.

NSET General Secretary Dr. Amod Mani Dixit in his remarks briefed about the NSET’s 25 years’ journey. Presenting the various milestones of NSET’s 25 years history, Dr. Dixit contemplated the activities and efforts from past to present in disaster risk reduction. On the occasion, Dr. Dixit expressed sincere thanks to various personnel, organizations, staff members for their untiring efforts to bring the NSET thus far for the past



Addressing the Anniversary program, **Mr. Brian Tucker, President, Geo-Hazards International, California**, shared his experience of working together with NSET in first ever retrofitting project carried out at Bhuwaneshwori Lower Secondary Schools in Nangkhel, Bhaktapur.

On the occasion, Mr. Hareram Shrestha, President of Nepal Engineers' Association appreciated at NSET for leading a mission to help build earthquake resilient communities in Nepal. Mr. Shrestha added, "it has been very successful 25 years journey as NSET is leading the mission collaborating with

various stakeholders including government, non-governmental, private sectors and international agencies.

Mr. Rajendra Khanal from Department of Mine and Geology extended his wishes to NSET on the occasion of 25th NSET day appreciating its efforts in reducing great deal of risk posed by seismic hazards in the country.



At the program, **Mr. Varun Prasad Shrestha, NSET President**, Prof. Dr. Jibraj Pokhrel, Vice Chancellor of Nepal Science and Technology (NAST), Mr. Brian Tucker, President of Geo-Hazards International, Dr. Hariram Parajuli, Executive Member of NRA, Mr. Hareram Shrestha, President of Nepal Engineers' Association and Mr. Yogeshwor Krishna Parajuli, NSET Management Board Member jointly unveiled a publication: "Earthquake Scenario of Kathmandu Valley based on Post 2015 Gorkha Earthquake".

Total 500 people including Guests from various Government Offices, recently elected Local Governments, Security Forces, Diplomatic Missions, Bilateral/Multilateral Agencies, Donors/Partners, I\NGOs, CBOs, Professional Societies, Private Sector, Media, Local Communities and various DRR stakeholders as well as more than 250 NSET Staff and Members joined the ceremony





APPENDIX 8 KEY PHOTOGRAPHS OF THE CONFERENCE



Keynote session (go as 2nd photo)

Opening Session of Risk2Resilience Conference, June 18-21, 2018



Honorable Minister Mr. Ram Bahadur Thapa, Ministry of Home Affairs addressing during Opening Session of Risk2Resilience Conference.



Participants, Speakers, and Chief Guest during opening session







Insert photograph of parallel technical sessions (at least 4)





Insert photographs of Panel Discussion (at least four)



Inset photographs of side events at least two each)









Insert 3 Photographs of the field excursion

APPENDIX 9: CONFERENCE SPEAKERS

List of Conference Speakers

SN	Speaker	Organization	Email Address
1	Dr. Han Qunli	<i>Executive Director, IRDR, IPO c/o RADI/Chinese Academy of Sciences, China</i>	qunli.han@irdinternational.org
2	Dr. Franco Pettenati	<i>Geophysicist/Seismologist, National Institute of Oceanography and Experimental Geophysics OGS, Italy</i>	fpettenati@inogs.it
3	Mr. Aloysius Jayant Rego	MARS Practitioners Network, VERVE Volunteers Program India and Myanmar	regoloy@gmail.com
4	Dr. Anselm Smolka	<i>Senior Advisor, GEM Foundation, Italy</i>	anselm.smolka@globalquakemodel.org
5	Dr. Bishnu Hari Pandey	BCIT, Canada	bpandey@bcit.ca
6	Dr. Garry de la Pomerai,	<i>Project Manager, Solution System, Dubai</i>	soluzioninfo@aol.com
7	Dr. Katie J. Oven	IHRR/ Durham University, UK	k.j.oven@dur.ac.uk
8	Dr. Rebekah Paci-Green	Risk Red, USA	rebekah.paci-green@wwu.edu
9	Dr. Richard Sharpe	<i>Senior Technical Director, Earthquake Engineering, BECA, New Zealand</i>	richard.sharpe@beca.com
10	Dr. Susan Hough	<i>Seismologist, United States of Geological Survey, USA</i>	hough@usgs.gov ; se.hough@gmail.com
11	Dr. Brian E. Tucker	<i>President, GHI, USA</i>	tucker@geohaz.org
12	Dr. Carlos Villacis	<i>Director Applied Science Pacific Disaster Center, USA</i>	cvillacis@pdc.org
13	Dr. Chunwei Sun	Department of Geological Engineering Southwest Jiaotong University Chengdu, China	sunchunwei0310@qq.com
14	Mr. Genta Nakano	<i>PhD Student, Sakura Net, Kyoto University, Japan</i>	nakano.genta.68w@st.kyoto-u.ac.jp
15	Prof. Kenjiro Yamamoto	University of Tokyo, Japan	k-yama@iis.u-tokyo.ac.jp
16	Ms. Maggie Stephenson	<i>DRM Expert, University of London, UK</i>	maggie@mestephenson.org
17	Prof Dr. Binod Tiwari	California State University, USA	btiwari@exchange.fullerton.edu , btiwari@fullerton.edu
18	Prof. Alexander Densmore	<i>IHRR, Department of Geography, Durham University, UK</i>	a.l.densmore@dur.ac.uk
19	Prof. Dr. Netra Prakash Bhandary	<i>Associate Professor, Ehime University, Japan</i>	netra.prakash_bhandary.my@ehime-u.ac.jp ; netra@ehime-u.ac.jp





SN	Speaker	Organization	Email Address
20	Prof. Kimiro Meguro	Director, ICUS, IIS, The University of Tokyo, Japan	meguro@iis.u-tokyo.ac.jp
21	Prof. Nick Rosser	Professor, IHRR/ Durham University, UK	n.j.rosser@durham.ac.uk
22	Prof. Seiji Suwa	Team Leader Sakura Net Kyoto University, Japan	smtkmrczh@yahoo.co.jp
23	Prof. Toshikazu Hanazato	Mie University, Japan	hanazato@arch.mie-u.ac.jp
24	Prof. Vinod Kumar Sharma	Hon. Executive Vice Chairman, Sikkim State Disaster Management Authority (SSDMA), India	profvinod@gmail.com
25	Prof. Hongtao Liu	Associate Professor, Southwest Jiaotong University, Sichuan Province, China	bridge115@126.com
	Mr. Prem Kumar Rai	Secretary Ministry of Home Affairs	
	Mr. Kedar Neupane	Joint Secretary, Ministry of Home Affairs	kedarne@gmail.com ; kedarneupane123@hotmail.com
	Mr. Umesh Kumar Dhakal	Under Secretary, Ministry of Home Affairs	dhakaluk@hotmail.com
	Mr. Shankar Hari Acharya	Under Secretary, Ministry of Home Affairs	shankarhariacharya@gmail.com
	Dr. Daya Ram Shrestha	Section Officer, Ministry of Home Affairs	dr.dayars@gmail.com
	Mr. Shiva Ranjan Paudyal	Program Director, National Planning Commission	srpoudyal@npc.gov.np
	Dr. Hari Ram Parajuli	Executive Member, National Reconstruction Authority	hariparajuli@ioe.edu.np
	Mr. Manohar Ghimire	Under Secretary, National Reconstruction Authority	mghimire@nra.gov.com ; mgmanjit@gmail.com
	Dr. Chandra Bahadur Shrestha	National Reconstruction Authority	cbshrestha1961@gmail.com
	Dr. Yuba Raj Bhusal	Chief Executive Officer, National Reconstruction Authority	ybhusah@gmail.com ; ceo@nra.gov.np
	Prof. Dr. Jiba Raj Pokhrel	Vice Chancellor, Nepal Academy of Science and Technology	jibaraj.pokharel@nast.gov.np
	Dr. Rabindra Prasad Dhakal	Nepal Academy of Science and Technology	dhakalrabindra3@gmail.com ; bioenergy@nast.gov.np
	Dr. Hari Lamsal,	Joint Secretary, MOEST	hlamsal@gmail.com
	Mr. Meghnath Sharma	Under Secretary MOEST	meghnathsharma@gmail.com
	Mr. Janak Raj Joshi	Joint Secretary, Ministry of Agriculture, Land Management and Cooperatives (MOALMC)	bhatta07954@alumni.itc.nl

SN	Speaker	Organization	Email Address
	Mr. Jiblal Bhusal	Under Secretary, Ministry of Federal Affairs and General Administration	jiblala43@gmail.com
	Dr. Hemant Chandra Ojha	Joint Secretary, Ministry of Health	drojha@hotmail.com
	Mr. Dilip Shekhar Shrestha	Deputy Director, CLPIU, Ministry of Education	dilipstha@yahoo.com
	Mr. Tapendra Bahadur Khadka	Project Director, CLPIU, Ministry of Urban Development	tapendrabbk@yahoo.com
	Dr. Youb Raj Paudyal	Dep. Project Director CLPIU, Ministry of Urban Development	yrpudyal@gmail.com
	Mr. Rajendra P. Khanal	DG Department of Mines and Geology	rpkhanal03@hotmail.com
	Dr. Soma Nath Sapkota	DDG, Department of Mines and Geology	somanathsapkota@yahoo.com
	Dr. Sudhir Rajaure	DDG, Department of Mines and Geology	srajure@gmail.com
	Mr. Suresh Suras Shrestha	Under Secretary, Department of Archeology	sureshsuras@yahoo.com
	Mr. Deepak Sharma	Director, Department of Education	swdeepak@gmail.com
	Mr. Saroj Kumar Pradhan	Project Director (ADB)/Department of Road	pradhansaroj70@gmail.com
	Dr. Bijaya Jaishi,	SDE, Department of Road	bijayador@gmail.com
	Mr. Ram Chandra Dangal	DDG, Department of Urban Development and Building Construction	rcd.dangal@gmail.com
	Dr. Mahendra Subba	Former, Department of Urban Development and Building Construction	msubba@wlink.com.np
	Mr. Bibek Sigdel	Engineer, Department of Urban Development and Building Construction	sigdelbivek014@gmail.com
	Mr. Lok Bijay Adhikari	Chief, National Seismology Centre Department of Mines and Geology	lbadhikari@hotmail.com
	Mr. Reshmi Raj Pandey	Chief Secretary, Provincial Government, Province 3	reshmipandey@hotmail.com
	Hon. Mr. Ram Narayan Bidari	Member of Parliament, National Assembly	bidari.thaha1@gmail.com
	Dr. Ganga Lal Tuladhar	Former Minister of Education and DRR Expert, NCDRR	gangatuladhar@gmail.com
	Mr. Rishi Ram Sharma, DG	Department of Hydrology and Meteorology	dg@dhm.gov.np ; rishisharm@yahoo.com
	Mr. Shanmukesh C. Amatya	Department of Water Induced Disaster Management (DWIDM)	amatyasc@gmail.com
	Mr. Anand Raj Khanal	Director, Nepal Telecommunications Authority (NTA)	arkhanal@nta.gov.np
	Mr. Dilli Adhikari, Manager	NTC	dilli.adhikari@ntc.net.np





SN	Speaker	Organization	Email Address
	Brig Gen Jeet Gurung	Nepal Army	jeet1649@yahoo.com
	Lt. Col. Roj Pratap JB Rana	Nepal Army	rojrana@yahoo.com
	DSP Samir Kharel	Nepal Police	samirkharel@hotmail.com
	DIG Thule Rai	Nepal Police	rait22@gmail.com
	SSP Sanjay Bikram Rana	Armed Police Force	srana32@yahoo.com
	DSP Jeevan K.C	Armed Police Force	jeevan_kc929@yahoo.com
	Mr. Prawin Pyakurel	Senior Program Officer, KMC	prawinpyakurel@gmail.com ; kmc.disaster@gmail.com
	Mr. Madan Sundar Shrestha	Mayor, Madhyapur Thimi	madansundarji@gmail.com ; info@madhyapurthimimun.gov.np
	Mr. Bharat KC	Mayor, Bhimeshwor Municipality	kobharat651@gmail.com
	Mr. Suraj Shrestha, Senior	Engineer, Dharan Metropolitan City	surbitan@gmail.com
	Mr. Ravindra Lal Mul	Engineer, Vyas Municipality	ravindralalmul@gmail.com
	Mr. Baikuntha Neupane	Mayor, Vyas Municipality	mayors@vyasmun.gov.np
	Mr. Chitra Bahadur Karki	Mayor, Sainamaina Municipality	kcchitrabahadur95@gmail.com
	Prof. Prem Nath Maskey	Institute of Engineering, Tribhuvan University	pnmaskey@live.com
	Prof. Nagendra Raj Sitaula	Director, CDS/IOE	nrsitoula@gmail.com ; nrsitoula@ioe.edu.np
	Prof. Kamal Bahadur Thapa	Assistant Professor, IOE, TU	kamal.thapa@ioe.edu.np
	Prof. Dr. Pradeep Vaidya	Director of Information Technology Department /Department of Surgery TUTH	praidya@yahoo.com
	Prof. Dr. Megh Raj Dhital	Department of Geography, TU	medhital@gmail.com
	Prof. Dr. Narendra Raj Khanal	Department of Geography, TU	nrkhanal.geog@gmail.com ; info@cdgtu.edu.np
	Prof. Dr. Tara Nidhi Bhattarai	Department of Geology, TU	tnbhattarai@wlink.com.np ; tara@ndri.org.np
	Dr Deepak Chamlagain	Assistant Professor, Department of Geology Tri-Chandra Multiple Campus	deepakchaulagain73@gmail.com
	Mr. Dipendra Gautam	Researcher, Structural and Earthquake Engineering Research Institute (SERI)	dipendra.gautam.sen@gmail.com

SN	Speaker	Organization	Email Address
	Ms. Wenny Kusuma	Representative UN Women and Acting UN Resident Coordinator	registry.np@undp.org
	Mr. Vijaya P. Singh	Assistant Country Director, UNDP	vijaya.singh@undp.org
	Mr. Ramraj Narasimhan	Technical Specialist (DRM), UNDP	
	Ms. Bronwyn Russal	Project Manager, Inter-Agency Common Feedback Project, UN	bronwyn.russel@one.un.org
	Mr. Anthony De La Cruz,	DRR Specialist, UNICEF	adelacruz@unicef.org
	Mr. Santosh Gyawali	AID Development Program Specialist, USAID/OFDA	sgyawali@usaid.gov
	Mr. Magnus Wolfe Murray	DFID	m_wolfmurray@dfid.gov.uk
	Mr. Ram Prasad Bhandari	Program Manager, JICA	bhandariram.np@jica.go.jp
	Mr. Loren Lockwood	National Coordinator ,	info@hrrpnepal.org ; loren.lockwood@hrrpnepal.org
	Dr. Mandira Shrestha	Program Coordinator, ICIMOD	mandira.shrestha@icimod.org
	Ms. Kiriti Ray	Program Coordinator, CARE	kiriti.ray@care.org
	Ms. Pramila Subedi	Advocacy Coordinator, CCDRR	pramila.subedi@savethechildren.org
	Mr. Mani Raj Dahal	Chief Engineer, Clean Energy Consultant	cecpost@gmail.com ; manidahal@hotmail.com
	Mr. Dharmaraj Pandey	Head of Disaster Management Department, NRCS	dharmapandey@nrccs.org
	Mr. Bhoj Raj Ghimire	Senior Program officer, NRCS	bhoju1@gmail.com
	Mr. Gehendra Gurung	Head DRR, Practical Action	gehendra.gurung@practicalaction.org.np
	Dr. Kabiraj Paudyal, President	Nepal Geological Society	paudyalkabi1976@gmail.com
	Mr. Hare Ram Shrestha	President Nepal Engineers Association	hrs@sidef.com.np ; hareram.shrestha@neanepal.org.np
	Dr. Mohan Shakya	Deputy GS, Nepal Engineers Association	mohan196@yahoo.com ; mohanshakya1961@gmail.com
	Mr. Rajesh Thapa	President, Society of Consulting Architectural and Engineering Firms, Nepal	scaef@wlink.com.np ; rtacnepal@gmail.com
	Dr. Sanjiv Shah	President, Structural Engineers Association Nepal (SEANEP)	sanjiv@shahconsult.com





SN	Speaker	Organization	Email Address
	Mr. Ram Prasad Bhattarai	Vice Chairperson, DPNet Nepal	bhattarairamprasad@yahoo.com
	Dr. Meen Bahadur Poudyal Chhetri	DRR Expert, NCDM	chhetri1952@yahoo.com
	Ms. Sunita Shakya	Chairperson, Kirtipur Women Network	spshakya@yahoo.com
	Mr. Udhav Rijal	Parent of student who lost life in Gorkha Earthquake	
	Mr. Saroj B.K.	Survivor of Gorkha Earthquake by DCH	
	Er. Subash Kumar Bhattarai	Policy Development Advisor, NHSSP	subash@nhssp.org.np
	Mr. Jeevan Baniya, Assistant Director	Social Science Baha	jbaniya@soscbah.org
	Mr. Steven Reveal	UNOPS	revillsr@yahoo.com
	Mr. Sushil Gyewali	Former CEO, NRA	adviser.sushil@gmail.com
	Mr. Bal Krishna Kasula	Trained Mason & Petty Contractor	
	Ms. Reshma Shakya	NSM Womens Group	reshmashakya5@gmail.com
	Mr. Dev Kumar Maharjan	CEO, Earthquake Safety Solution	dmaharjan@eqsafety.com.np
	Mr. Bhoj Raj Sharma	Expert in Insurance Business Insurance Board	bhogend@hotmail.com
	Mr. Rameshwor Bohara	News Coordinator, Himal Khabar Patrika	ram.bohora@gmail.com
	Mr. Ananda Nepal, Director	Jagadamba	jsteel@wlink.com.np
	Dr. Kulesh Thapa	Kshettrapati Clinic	kbt kath@gmail.com
	Dr. Sanjay Karki	Nepal Medicity	sanjaya.karki@nepalmedicity.com
	Mr. Kush Kumar Joshi	Vice President, Nepal Business Initiative	
	Mr. Suresh Pradhan	Secretary, Nepal Business Initiative	tayeju@gmail.com
	Mr. Upendra Paudyal	Director, Nabil Bank	upendra.poudyal@nmb.com.np
	Mr. Naresh Shrestha	Vice President, Nepal Chamber of Commerce	nepalpavilion@gmail.com
	Mr. Kunda Dixit	Nepali Times	kunda.dixit@gmail.com
	Mr. Pavitra Bajracharya	President, Nepal Retailer Association	pv.bajra@gmail.com
	Dr. Amod Mani Dixit	General Secretary, NSET	adixit@nset.org.np
	Mr. Surya Narayan Shrestha	Executive Director, NSET	sshrestha@nset.org.np
	Dr. Ramesh Guragain	Deputy Executive Director, NSET	rguragain@nset.org.np

SN	Speaker	Organization	Email Address
	Mr. Surya Bhakta Sangachhe	Senior Technical Advisor, NSET	sbsangachhe@nset.org.np
	Mr. Shree Ram Singh Basnet	Board Member, NSET	shreerambasnet@nset.org.np
	Mr. Bijay Krishna Upadhyay	Director, CBDRM, NSET	bupadhyay@nset.org.np
	Mr. Ganesh Kumar Jimée	Director, DPER, NSET	gjimée@nset.org.np
	Ms. Hima Shrestha	Director, EERT, NSET	hshrestha@nset.org.np
	Dr. Narayan Marasini	Senior Manager, NSET	nmarasini@nset.org.np
	Mr. Ranjan Dhungel	Program Manager, Baliyo Ghar, NSET	rdhungel@nset.org.np
	Mr. Kuber Bogati	Structural Engineer, NSET	kbogati@nset.org.np
	Mr. Kapil Bhattarai	Civil Engineer, NSET	kbhattarai@nset.org.np
	Mr. Aditya Tamang	Civil Engineer, NSET	adityatamang@nset.org.np
	Mr. Bishal Raj Gurung	Training Course Development Specialist, NSET	bgurung@nset.org.np
	Ms. Rita Thakuri	Executive Secretary, NSET	rthakuri@nset.org.np





APPENDIX 10: FINANCIAL REPORT ON INCOME AND EXPENSES FOR THE CONFERENCE ORGANIZATION (SCHEDULE OF FINANCIAL RESOURCES AND EXPENDITURES)

The following provides the details of the expenses and the sources of income for organizing the conference.

APPENDIX 11: DIGITAL FILES OF PRESENTATIONS MADE AT R2R

Digital copies of presentations made at the R2R Keynote, Technical Sessions and Panel Discussions and the Conference Resolution are included in the Flash Drive attached and also made available online at <https://www.nset.org.np/r2r/>

Permission to publish the presentations was obtained from all authors during the conference.

The drive also contains a video/audio copy of the Nepali music recital made at the conference.

These materials can be used only for non-commercial purposes.



Conference Secretariat:



NSET
Earthquake Safe Communities in Nepal

National Society for Earthquake Technology-Nepal (NSET)

House 65, CR-13, Sainbu Awas, Bhainsepati
Lalitpur Metropolitan City-25, Nepal
P. O. Box No.: 13775, Kathmandu, Nepal
Tel: (977-1) 5591000, Fax: (977-1) 5592692, 5592693
E-mail: nset@nset.org.np, Website: www.nset.org.np