Safer Society

NSET Report 2018

NSET
Earthquake Safe Communities in Nepal

National Society for Earthquake Technology-Nepal (NSET)

Safer Society
Annual Report 2018

National Society for Earthquake Technology-Nepal (NSET)

Cover Photo (Front)
Maya Pariyar and her two kids standing in front of her newly constructed house in Nalang, Dhading, her house was completely damaged by 2015 Gorkha Earthquake

Cover Photo (Back)
NSET team of trained rescuers involved in search & rescue operation in Kathmandu together with security personnels during 2015 Gorkha Earthquake

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National Society for Earthquake Technology-Nepal (NSET)

Message from the President

Mr. Varun Prasad Shrestha

NSET was conceived on June 18, 1993 and this year 2018 has been momentous in the sense that NSET completes the 25 years of collaboration, commitment and actions in Earthquake Risk Management in Nepal and the Region. Now, we are celebrating Silver Jubilee Year of NSET journey. Safer Society 2018 takes account of major accomplishments, key milestones and the lessons from NSET's endeavors during past 25 years.

NSET strongly believes that the earthquake resilience of communities can be achieved through enhancing awareness and building capacity by helping them to understand seismic risk and providing them with simple and practical methods in mitigating the risks.

In the aftermath of 2015 Gorkha Earthquake, Nepal has a big responsibility to rebuild a big number of residential buildings, schools, hospitals, public buildings and heritage sites. Reconstruction is progressing appreciably well and that is credited to good start country could make with globally recognized better policies, systems and approaches on reconstruction. Need is to continue technical assistance for Build Back Better. We, from NSET, reiterate our commitment to continue support in reconstruction process to help ensure earthquake resilient reconstruction of houses and other structures.

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 (MoHA), National Reconstruction Authority (NRA), Nepal Academy of Science and Technology (NAST), and National Society for Earthquake Technology-Nepal (NSET) jointly organized the conference in association with various partners. This conference was focused on reviewing the actions and experiences of implementing various earthquake risk management and disaster risk management efforts during the past 25 years and identifying key lessons for the future.

On behalf of the NSET Board, I would like to thank all Government Agencies, Civil Society Organizations, International Agencies and individuals for their initiatives and partnerships with NSET.

At last but not the least, I would like to commend all the staff at NSET for their hard and dedicated work throughout the two-and-half decade journey of NSET. With continued and sustained efforts, I'm sure we can achieve NSET Vision of 'Earthquake Safe Communities in Nepal'.

Thank you!

Message from the General Secretary

Dr. Amod Mani Dixit

NSET was founded during the study on a comprehensive assessment of earthquake hazard and risk in Nepal that would go as the basis to define the acceptable level of risk for the formulation of the National Building Code of Nepal. That way, the birth of NSET in a way coincided with the start of national efforts towards understanding and reducing earthquake risk in the country. This resonated well with the increased global awareness and campaign for natural hazard risk reduction under the aegis of the United Nations. Nepal made great strides in disaster risk reduction under the leadership of the government. NSET became one of the visible organizations in Nepal, and also in the region, in blending global knowledge to local wisdom and conditions, and successfully implementing earthquake vulnerability prevention and reduction initiatives using local resources. Naturally, the successes influenced the entire hazard risk reduction landscape through the development of appropriate national strategies and policies. A recent international conference, Risk to Resilience (R2R), that brought together all major national actors, and also individuals and institutional representatives, who contributed significantly to enhancing Nepal's capacity in disaster risk reduction and preparedness, thankfully appreciated the work of the Government of Nepal and the Nepalese people for responding to the 2015 Gorkha Earthquake with dignity, landing into the task of recovery and reconstruction confidently and implementing it realistically. The conference also collectively concluded on priority actions for future considering the capacity and inertia generated nationally and the conducive environment generated internationally due to the promulgation of global frameworks: SFDRR, SDG, Paris Agreement, WHS etc.

This issue of Safer Society brings about stories that provide a bit of evidence to the great saga on Disaster Risk Management in Nepal in the past decades, tells stories on efforts made by the people of Nepal in a three-decade period between two earthquake events that shook the country. This is a story on success achieved with all adversities around.

With this sense of accomplishment and pride, NSET renews through this issue of Safer Society, our pledge to continue serving the people, the nation and the region, in enhancing safety of people and safety of their livelihoods from natural hazards in future also.

Thank you

Message from the Executive Director

Surya Narayan Shrestha

We are very happy to have completed the very active, intense, thoughtful, collaborative and challenging 25 years journey of NSET. During this period, NSET has been able to mark key milestones in reducing disaster risks and building community resilience. Safer Society 2018 is a window to look back NSET journey in brief and view way ahead.

In 1999, NSET started implementing School Earthquake Safety Program (SESP). NSET was involved in retrofitting of almost 300 school building which was possible through collaboration among various government and non-government organizations and development partners. Over 200 engineers and 2000 masons trained, over 11,000 teachers, 5,00,000 students and 5000 community members got orientations on earthquake risk and safety measures. Notably, retrofitted school buildings didn't suffer any structural damage during 2015 Gorkha Earthquake. NSET, in 2003, had conducted seismic vulnerability assessment of all major hospitals of Nepal. And this was the first ever such work in the region. NSET has done few pilot-works on hospital preparedness since then. NSET has been implementing different community focused programs in rural and urban communities of Nepal.

NSET is working with many communities to help them develop local plan and strengthen local capacity on disaster risk management. More than 225,000 persons have been oriented, 2750 community first responders trained, 3800 social mobilisers trained. Under a regional program, NSET has been involved in developing national capacity on emergency response in South Asia and few South-East Asian countries. Total 7000 security persons, red cross volunteers and community volunteers have been trained on professional search and rescue operations. These are few examples. NSET has had much contributions on identifying and advancing traditional wisdom and practices, use of modern Science & technology, developing new approaches, methodologies and innovations on Understanding Risk, Earthquake Risk Reduction actions and Emergency Response Capacity. All the NSET activities consist of public awareness-raising components and that has helped raise significant awareness and disaster literacy among commoner people, policy makers and implementers. Awareness about disasters have raised, people are more aware now, capacities of people and professionals have been raised tremendously.

More than two-thirds of earthquake risks come from poorly constructed buildings. To address this huge risk, effective implementation of building code is one of the most effective ways. NSET has been able to work with more than 60 Municipalities so far on this, particularly providing technical assistance. Masons have been the backbone of resilient construction and NSET focused strengthening skills of masons. The Mason Training curricula for Earthquake Resistant Construction techniques have now been adapted by government. NSET has trained more than 19000 masons under various programs.

After the Gorkha Earthquake 2015 NSET is providing technical support for the safer reconstruction through USAID funded "Baliyo Ghar" program. The program aims to support the government led owner-driven

reconstruction approach to ensure earthquake safer construction. Baliyo Ghar provided technical support to NRA in developing guidelines and procedures of grant disbursement, correction manual, retrofitting and other manuals along with physical and intellectual support during enrollment processes. Now, Nepal has standard curricula for mason training which NSET developed based on past experiences of Nepal. Till June 2018, NSET has trained 5600 local masons, 1182 technical professionals and 506 social mobilizers involved in reconstruction activities. Total 99,500 earthquake beneficiaries have been oriented and 43,642 households have been provided with technical assistance directly in rebuilding their houses to resist future earthquakes. Besides these, 1600 more new masons have been produced with the implementation of on-the Job Training.

We have worked with more than 200 organizations in Nepal and also in more than 12 countries in the region. We worked with thousands of experts, professionals and people from various corners. All of you have been with us during the times of happiness and joy, and also during the difficult time. We are extremely grateful to all of you!

During this time, more than 400 professionals are associated with NSET, more than 250 are still working with us and many are now working in different organizations and in different countries, in different fronts but still supporting and guiding us. NSET always remembers their contribution during the work at NSET. We are not complete without acknowledging the contribution of all former staff of NSET.

The approaches and successes of the past had been tested by the Gorkha Earthquake sequence of 2015, and Nepal has learned rich but expensive lessons. It is with this desire to learn collectively from the past, especially the efficiency of our approaches, and then to chart out a future strategy for earthquake risk management in the country, and also to analyse the successes and the lessons of the reconstruction after Gorkha Earthquake and to critically evaluate the outcomes of the approaches adopted, Nepal organized 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 Conference Resolution: The Kathmandu Declaration 2018 has clearly given the future direction of Earthquake Risk Management in Nepal.

2015 Gorkha Earthquake has helped to raise our confidence on the solutions & ideas we developed together during this period. However, we still have significant risk due to vulnerable buildings and infrastructures, and low level of preparedness. Each and every corner of the society needs to implement organized efforts on disaster/earthquake resilience. Likewise, there is much larger risk due to various other types of hazards, and NSET plans to contribute towards multi-hazard risk reduction through more organized approaches and institutions. Towards achieving this, we continue working with all relevant stakeholders – communities and organizations. We continuously need encouragements, guidance and support from our partners.

Thank you!

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Section 1 About NSET

Introduction

NSET was established in 1993 by a group of professionals dedicated to reduce earthquake risk of Nepal. It was registered with the Government of Nepal in 1994 as a non-governmental organization. It is a multi-disciplinary professional society of professionals belonging to various physical and social sciences related with aspects of earthquake risk management. NSET is the national member of the International Association for Earthquake Engineering (IAEE), and it also sits in various regional and global networks on earthquake and disaster risk management.

Vision

Earthquake Safer Communities in Nepal by 2020

Mission

To assist all communities in Nepal to become earthquake safer by developing and implementing organized approaches to managing and minimizing earthquake risks

Objectives

NSET has a three-pronged strategy:

- To sensitize, educate and facilitate all institutions to undertake organized approaches to managing and minimizing earthquake risk by transferring information, technical knowledge and skills, and helping them to mobilize resources for this purpose.
- To advocate for favourable and supportive policies, legal mechanisms, increased investments and a unified and effective national earthquake response mechanism and a system of incentives and disincentives to enable communities to become earthquake safe.
- To build a strong, well-resourced and credible institution that will be the national focal point for earthquake risk management actions, a facilitator and coordinator in the network of earthquake disaster management, and a source of all available information on the subject.

NSET's Values

NSET has been guided by its institutional beliefs, values and principles developed internally and also adopted from good practices of various institutions; local, regional and/or global. Bringing "substantial change in the application of technology to the many facets of earthquake disaster management for saving the lives of the people" has remained the guiding philosophy of NSET ever since its inception.

NSET

- Is concerned with the ever-growing earthquake risk in the country, and is deeply convinced in the possibility of making a change despite the generally adverse economic condition of the country, and is determined to achieve reduced earthquake risk in Nepal with time.
- Firmly believes that Nepalese initiatives are primary for achieving any risk reduction. International assistance can, at best, help the local initiatives.
- Will act as a working platform for all, national or international, irrespective of caste, creed, religion, age, gender, race, to contribute towards reduced earthquake safety in the country.
- Will not endorse political parties or candidates, political philosophies or policy issues other than those directly related to the primary mission of reducing death and injury from earthquakes in Nepal, but will engage in political processes, as necessary, to advance earthquake safety.
- Will operate as a NGO governed by highest ethical/professional standards, uphold the principles of integrity, including transparency and accountability in the use of funds, and decisions regarding projects, people and remuneration.
- Will not confront or compete with any individual or organization, but will facilitate the work of other organizations and will help them and individuals develop the skills needed for earthquake risk mitigation; will participate developing network and synergy.
- Is non-judgmental. It understands the overriding national developmental priorities such as basic and primary health, education, infrastructure, etc. but firmly believes in the benefits of integrating mitigation in development efforts. Therefore, it will try to influence new investments by multilateral and bilateral agencies to consider earthquake -resistance adequately in their investments in Nepal.
- NSET will seek, translate and transfer foreign and domestic knowledge and research results to the earthquake problem in Nepal, as also to bring state-of -the -act earthquake technology to Nepal.

Crafting NSET vision, mission, objectives and strategic directions

Though NSET was conceptualised in 1993 and formally registered in 1994, its structure and organizational strategy in the form of vision, mission, and strategic objectives were formulated only in 1998 through a strategic planning exercise. By that time NSET was already successful to carve out its space in the society as a key organization for supporting earthquake risk management in Nepal. Even the NSET's operation was not much systematised strategically.

Noted international experts Dr. Thomas Tobin, Dr. Shirley Mattingly and Dr. Brian Tucker – the stalwarts, who were part of the broader development of earthquake risk management concepts in the US, assisted NSET in exploring the optimum modus operandi for the newly born institution.

Together with NSET Executive Committee members and the staff, the US team of experienced professionals brought in the business strategies of mainly three US-based institutions namely, Seismic Safety Commission (SSC) of California, US Forestry Service (USFS), and GeoHazards International (GHI) as models for NSET to emulate.

In addition, business models and strategies of 10 other similar institutions working in DRR and environmental studies from the Latin America, Europe and Asia were considered and surveyed. Based on such review, NSET and the team of international experts jointly outlined draft alternate strategies and business models for NSET. Karuna Management – a Nepalese business consultant assisted NSET in streamlining the progress in strategy formulation.

NSET organized a Strategic Planning Workshop during June 11–13, 1999 to look into the propositions in the Nepalese context, evaluate the underlying potentials, review the suggestions made by international experts and recommend strategic directions for NSET.

The workshop, attended by around 40 key officials from different government institutions, professional societies, donor agencies and other non-government organizations, made suggestions on the final draft.

NSET Management Committee subsequently reviewed the draft critically and accepted the strategies unanimously. The whole exercise of strategy visioning for NSET lasted about nine months.

Till date, NSET is still guided basically by the Strategic Visions formulated in 1999, albeit with subsequent updates. Major revision process was held in 2006 that endorsed the NSET philosophy and approaches for the next period. The strategies have fundamentally been successful in driving NSET to its present-day position.

Revisiting NSET vision, mission, objectives and strategic directions

After feeling need of introspection to achieve better clarity on its strategic intents and roles & responsibilities commensurate with the global, regional, national and local needs and possibilities, NSET organized a workshop "Organizational Strategic Assessment" during June 7-8, 2014 with the view to assess understanding of organizational core and build unified understanding related to the same among its management team members – core decision makers at strategic, departmental and program level. That was focused on conducting organizational self-assessment for building unified understanding about NSET's organization, strategies, operations, policies, capabilities, strengths and weaknesses.

It also discussed emergent issues with respect to the field of Earthquake Risk Management (ERM), to assess Strengths and Weaknesses of the organization and prioritize them in order of their relevance to achievement of its current strategic objectives.

The process was facilitated/ moderated by experts from Three H Management, a 360-degree management consulting firm. The team has now consolidated the findings and results into a Final Report, and NSET hopes this will guide further in the pursuit of incremental improvements. NSET is gradually implementing the findings of the assessment.

Capacity Assessment and Development Initiative for NSET Senior Managers

NSET carried on Human Resource Audit of the organization by Third Sector Partners, a management consulting group from India. Third Sector Partners' team participated as Observers in a 2 days workshop conducted with the leadership team on strategic visioning for NSET in 2014. This was interspersed by intensive interactions with the Executive Director and Deputy Executive Directors to understand the organization's future growth plans and corresponding people processes. Subsequently, two Assessment Centers were conducted in August 2014 for the Leadership Team & the Senior Management Team. Detailed Assessment reports of all the participants were submitted after giving feedback on the strengths & development areas to the respective participants. As a next step, NSET wanted to start a Development Intervention with a select set of high potential managers to prepare them to take larger roles to achieve NSET immediate goals & its long-term vision. After understanding the needs of NSET, Third Sector Partners had run a Development Initiative for the selected batch of people.

Organizational Capacity Assessment (OCA) of NSET

With the view to assess capacity of the organization, NSET conducted its Organizational Capacity Assessment (OCA) with the technical facilitation support of FHI360 and Nepal Participatory Action Network (NEPAN) during May 29 – June 2, 2017. The OCA tool assesses organizational capacity across seven domains—Governance, Administration, Human Resource Management, Financial Management, Organizational Management, Program Management, and External Relations—with each domain having a number of sub-sections.

Senior professionals and officials of NSET were engaged for the assessment during the OCA process. NSET has been using the outcomes and findings of OCA for preparing and implementing improvement plans.

Mr. Surya Narayan Shrestha appointed as Executive Director of NSET; Dr. Amod Mani Dixit completes his tenure

The Governing Board of NSET appointed Mr. Surya Narayan Shrestha as the Executive Director to be effective from March 21, 2018. Dr. Amod Mani Dixit has completed his tenure as Executive Director on March 20, 2018. Dr. Dixit served as the Executive Director since the establishment of NSET; he will continue to serve NSET as the General Secretary of the Governing Board.

The Governing Board Meeting convened on March 12, 2018, chaired by NSET President Mr. Varun Prasad Shrestha finalized the appointment of Mr. Shrestha to the position of Executive Director.

The Governing Board heartily thanked Dr. Amod Mani Dixit for his selfless contributions, visionary leadership and extra ordinary spirit that upheld the virtues and glory of NSET in national and international arena and welcomes Mr. Surya Narayan Shrestha as the new Executive Director. Governing Board has noted; we are confident of embarking upon NSET's new and exciting journey of growth and development

under his executive leadership and we wish him every success in assisting NSET achieve new heights.

Mr. Shrestha has a ten-year record of management and leadership in Earthquake Technology and Disaster Risk Reduction. Most recently Mr. Shrestha served as Technical Advisor to the National Reconstruction Authority (NRA), and played an important role in formulating national level policies, plans and programs for post-earthquake reconstruction. He is also serving as a member of the Governing Board of Global Earthquake Model (GEM). Mr. Shrestha has led many successful projects and programs under his service at NSET as the Deputy Executive Director.

NSET felicitates Dr. Amod Dixit and Mr. Tika Sharma; Mr. Surya Narayan Shrestha welcomed as the Executive Director

A Felicitation Program was organized by NSET executive board and staff on 26th March 2018 at NSET Office to pay regards and extend wishes to NSET veterans Dr. Amod Mani Dixit and Mr. Tika Sharma; and also to welcome Mr. Surya Narayan Shrestha as the Executive Director of NSET.

Dr. Amod Mani Dixit was felicitated for his outstanding contributions and services at NSET as the Executive Director from the establishment of NSET in 1993 to March 20, 2018. Mr. Varun Prasad Shrestha, President of NSET presented Dr. Dixit with a Letter of Appreciation for his contribution for the past 25 years. Speaking on the occasion, Dr. Dixit said that the establishment of an organization such as NSET was the need of the moment not just in Nepal, but in the regional and global scenarios as well.

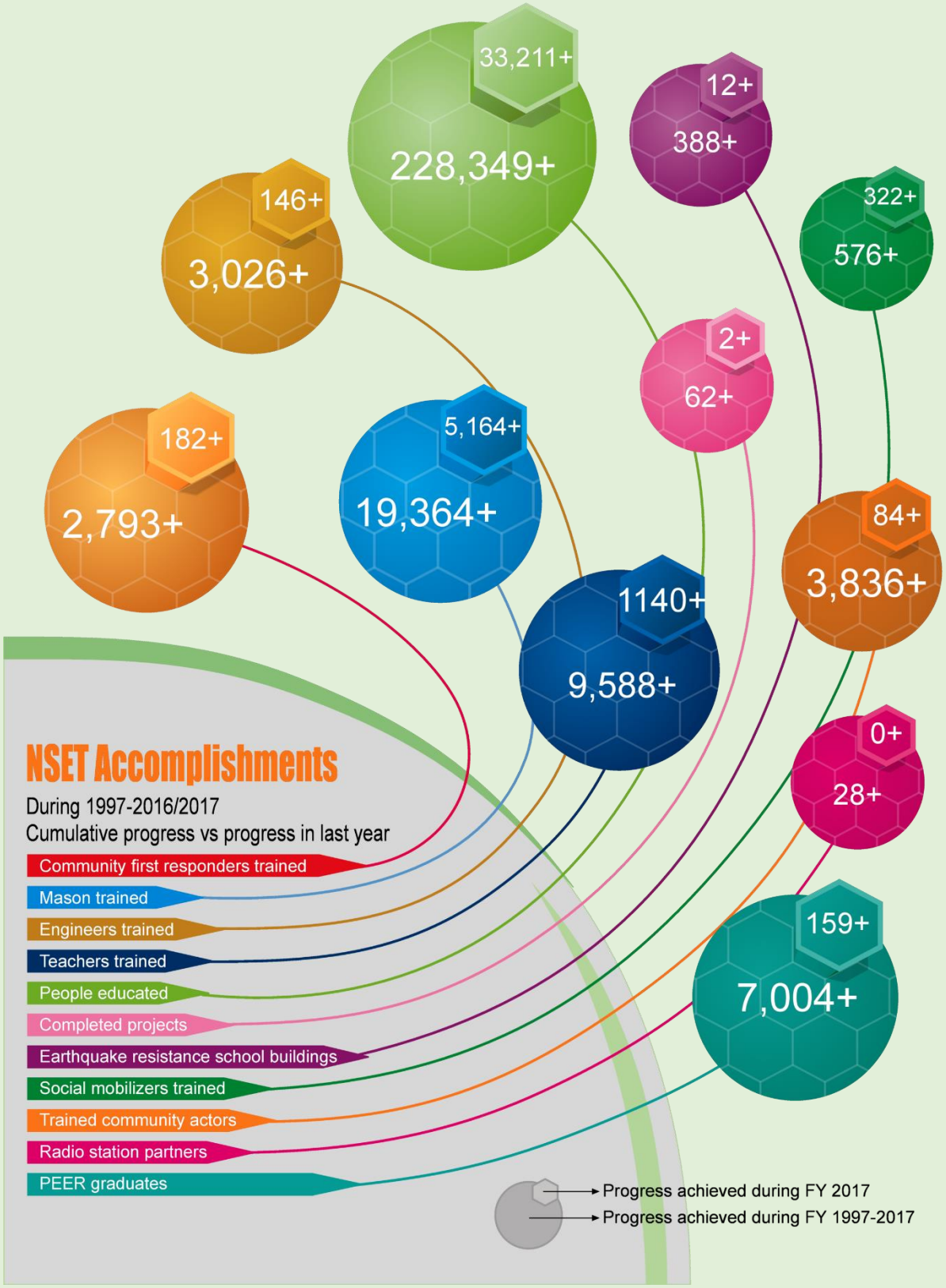
It was an emotional and a joyous moment as Dr. Dixit recollected his experiences throughout the years, the challenges and the struggles faced. Along with the challenges, achievements followed, one of which Dr. Dixit mentioned is the trust that NSET has been able to gain nationally and internationally has been one of the highlights. He also appreciated and remembered the contribution of various personalities who were associated with NSET during the initial years and those who are still supporting the organization directly or indirectly.

Senior Officials at NSET reminisced their professional and personal journeys with Dr. Dixit. They appreciated Dr. Dixit's dedication, an abundance of knowledge and visionary leadership.

On the occasion, NSET also felicitated Mr. Tika Sharma for his valuable contributions and services at NSET as Finance Director for the last 18 years. Mr. Sharma's action and implementation-oriented approach, financial discipline and effective leadership were highlighted by the senior officials of NSET.

During the event, Mr. Surya Narayan Shrestha was congratulated on his appointment as the Executive Director of NSET. He was welcomed as new leader of NSET staff. Speaking on the occasion, Mr. Shrestha expressed his commitment to take NSET to new heights. He further added, "NSET's biggest achievement so far has been its ability to spread the message about earthquakes amongst Nepali households in every nook and cranny of the country. NSET, as an organization, has seen many accomplishments and the future equally holds many possibilities." He spoke about some potential new ventures.

NSET Accomplishments



NSET marks Silver Jubilee of its Journey

National Society for Earthquake Technology–Nepal (NSET) has marked Silver Jubilee of its journey with a gala event on June 20, 2018. 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". NSET, however, marked the 25th Anniversary this year right after the conclusion of a International Conference "Risk2Resiliance" which was commenced on June 18, 2018. The conference focused on the experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal.

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 Risk2Resilaince 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.

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 25 years. 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 School in Nangkhel, Bhaktapur.

On the occasion, Mr. Hareram Shrestha, President of Nepal Engineers' Association appreciated 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 Mines 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 Napal 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 Krishna Parajuli, NSET Management Board Member jointly unveiled a publication: "Earthquake Scenario of Kathmandu Valley based on Post 2015 Gorkha Earthquake".

Total 500 persons 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.

A documentary film on NSET's 25 Years Journey was screened on the occasion.

Concluding the formal segment of Anniversary Ceremony, NSET President Mr. Varun Prasad Shrestha thanked all the guests and partners for all their encouragements, guidance and supports to NSET. The program was conducted by Dr. Ramesh Guragain, Deputy Executive Director of NSET.

RISK2RESILIENCE (R2R): International Conference on Experience of Earthquake Risk Management, Preparedness and Reconstruction in Nepal

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) jointly organized the Conference in association with Kathmandu Metropolitan City, Lalitpur Metropolitan City, USAID and Durham University as Conference Partners, and Nepal

Engineers' Association (NEA), Society of Nepalese Architects (SONA), Society of Consulting Architectural and Engineering Firms (SCAEF) Nepal, Disaster Preparedness Network (DPNet Nepal) and Nepal Red Cross Society joined as knowledge partners. Leading private sector business, Jagdamba Steels Pvt Ltd took charge of Platinum Sponsor to organize the Conference.

The conference saw the presence of both Nepali and international citizens across continents in order to learn about the progress of Nepal in areas of Disaster Risk Management, to share the results of our scientific research, to share our concerns about the growing social and technological risks in Nepal and to collectively explore ways for Nepal to further strengthen the efforts in Disaster Risk Reduction and to pledge continual support to the people of Nepal to their excellent and innovative works of Disaster Risk Reduction and Preparedness under the leadership of the Government of Nepal. Risk2Resilience Conference was based on three major themes: Learning from the Past three decades, Understanding the Present and Searching the Future.

The Conference was inaugurated by the Home Minister Ram Bahadur Thapa. In his inaugural remarks, Minister Thapa said, "Government of Nepal is working on Disaster Risk Management in more organized ways. Government has passed Disaster Policy and Action Plan defining roles and responsibilities of all tiers of governments. These policy documents are as guided by Constitution of Nepal and in line with Disaster Risk Reduction and Management (DRRM) Act that was promulgated last year." Minister Thapa also expressed hope that the conference would help to draw a solution to impending multi-disaster risks including the earthquake risk faced by Nepali citizens. Mr. Thapa stressed the need to consider the disasters in the development process.

Addressing the Inaugural Session, Mr. Yuba Raj Bhusal, CEO of National Reconstruction Authority remarked; "you may observe that the impact of reconstruction is way beyond its spatial and temporal boundaries. And, that is exactly what we want. This effort of “building back better” reconstruction

serves as a solid foundation block for future development works that would effectively encompass disaster risk reduction measures." CEO Mr. Bhusal further registered his confidence that the country would accomplish its total reconstruction target in two years down the road; and focused to accelerate the process in infrastructures and cultural heritage sector.

The conference brought together 240 people including national and international citizens. A total of 40 international professionals from 13 different countries were present. Throughout the proceeding of the Conference, there were 15 Key-Note 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 during the conference.

While concluding the Conference, Mr. Prem Kumar Rai, Secretary, Ministry of Home Affairs remarked that, “this 3-day International Conference has come up with important conclusions and way forward for the country to lessen the adverse impacts of disasters in Nepal based on lessons from the past. I assure you all that Nepal Government highly acknowledges all these recommendations”. He further mentioned that on June 18, 2018 when the Conference was about to begin, the Meeting of National Council for Disaster Risk Reduction and Management Chaired by Rt. Hon. Prime Minister of Nepal had endorsed National Disaster Risk Reduction Policy 2018 and National Disaster Risk Reduction Action Plan 2018-2030.

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

RISK2RESILIENCE
Nepal's Collective Journey towards a Safer Future

RISK2RESILIENCE : Nepal's Collective Journey for Safer Future

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

June 18-20, 2018 in Kathmandu

Program at Glance

Time/ Day	Day 1: Monday, June 18, 2018 (Asadh 4, 2075) Theme: Learning from the Experience of past 3 decades				Day 2: Tuesday, June 19, 2018 (Asadh 5, 2075) Theme: Understanding the present					Day 3: Wednesday, June 20, 2018 (Asadh 6, 2075) Theme: Setting the Future				Day 4: Thursday, June 21, 2018 (Asadh 7, 2075)
8:00-09:00	Registration				Registration					Registration				
9:00-10:30	Plenary 1: Opening Ceremony				B) Understanding the Present in the Aftermath of the Gorkha Earthquake Five Keynotes by senior professionals national and international, to reflect upon the past efforts of Nepal, achievements made and lessons learned					C) Searching the Future Plenary: Strategies and priorities for ERM in Federal Democratic Republic Nepal, Six Keynotes by senior professionals national and international, to reflect upon Possible Strategies and Priorities for Earthquake Risk Management in the Federal Democratic Republic of Nepal				One Day Field Trip by Bus to Nuwakot to observe earthquake reconstruction in a rural setting. Free for all invited Foreign Delegates. A separate Guidebook will be shared. Separate detail Scheudle Scene Setter with Map Schedules Cost Logisticks Participants
10:30-11:00	Tea/Coffee Break				Tea/Coffee Break					Tea/Coffee Break				
11:00-12:30	A) Learning from the Past: Keynote Session Day 1				Understanding the Present in 4 Parallel sessions divided according to the Sendai Framework's Four priorities papers with questions and answer and one Side Event				Side Event 1	Panel Discussion 3 Day 3: Thematic Issues			Side Event 2	
	Five Keynotes by senior professionals national and international, to reflect upon the past efforts of Nepal, achievements made and lessons learned				TS5: Technical Papers (6 Nos) on SFDRR Priority 1	TS6: Technical Paper (5 Nos) on SFDRR Priority 2	TS7: Technical Papers (6 Nos) on SFDRR Priority 3	TS8: Technical Papers (6 Nos) on SFDRR Priority 4	Earthquakes in South Asia: Lessons from History	PD9: Panel Discussion on Enhancing close links among research, education, implemtnation and local agencies (6 Panelist)	PD10: Panel Discussion on Problems of DRR in infrastructure and critical facilities and Ways for Enhancing Disaster Resilience (5 Panelist)	PD11: Panel Discussion on Updating National Building Code: Factors to Consider, Research to Undertake, Mechanism for Updating (6 Panelist)	Young Scientists on DRR of Nepal	
12:30-13:30	Lunch Break				Lunch Break					Lunch Break				
13:30-15:30	A. Learning from the Experiences of Past 3 Decades in 4 Parallel Technical sessions divided according to the Sendai Framework's five priorities papers with questions and answer				Understanding the Present in 4 Parallel sessions divided according to the Sendai Framework's Four priorities papers with questions					Plenary: Reporting of the Various Technical Sessions, Panel Discussions, and Adoption of Conference Resolution				
	TS1: Technical Papers (8 Nos) on SFDRR Priority 1	TS2: Technical Papers (6 Nos) SFDRR Priority 2	TS3: Technical Papers (5 Nos + 1 Innovative demonstration) SFDRR Priority 3	TS4: Technical Papers (7 Nos) on SFDRR Priority 4	TS9: Technical Papers (7 Nos) on SFDRR Priority 1	TS10: Technical Papers (5 Nos) on SFDRR Priority 2	TS11: Technical Papers (7 Nos) on SFDRR Priority 3	TS12: Technical Papers (8 Nos) on SFDRR Priority 4						
15:30-16:00	Tea/Coffee Break and to organize the setting for4 Panel Discussion Sessions				Tea/Coffee Break and to organize the setting for4 Panel Discussion Sessions									
16:00 -17:30	Panel Discussion 1 Day 1: Learning from the Experiences of Past 3 Decades				Panel Discussion 2 Day 2: Thematic Issues					Closing Ceremony (16:00-16:30)				
	PD1: Panel Discussion on SFDRR Priority 1 (6 Panelist)	PD2: Panel Discussion on SFDRR Priority 2 (7 Panelist)	PD3: Panel Discussion on SFDRR Priority 3 (5 Panelist)	PD4: Panel Discussion on SFDRR Priority 4 (6 Panelist)	PD5: Panel Discussion on Cause of death due to Gorkha EQ : Lessons on DCH (6 Panelist)	PD6: Panel Disucssion on Need for national programs on CO-seismic hazards/landslide /floods (6 Panelist)	PD7: Panel Discussion on Private sector in DRR ; Opportinities and Realities (6 Panelist)	PD8: Panel Discussion on Lesson learned and not learned from Gorkha Earthquake (6 Panelist)						
	summary	summary	summary	summary	summary	summary	summary	summary		Free Time				
17:30-18:30	FREE TIME				Conference Resolution Drafing Committee Meeting and Drafing of Resolution									
18:30-20:00	Classical Musical Event (on Invitation only)													

Government of Nepal
- Ministry of Home Affairs
- National Reconstruction Authority Nepal

National Academy of Science & Technology

NSET
Earthquake Safe Communities in Nepal

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)

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 SFDRR 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 SFDRR 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

Section 2 NSET's Major Contributions in 25 Years

Efforts to support Building Code Implementation

Introduction

A study done by Global Earthquake Safety Initiatives (GESI, 2001) in Kathmandu valley shows that major source of earthquake risk is from possible collapse of buildings. Many studies of past earthquakes have shown buildings as main source of human casualty. 2015 Gorkha Earthquake gave a similar picture on the sources of casualty during earthquake. The detail damage assessment of 200,000 buildings conducted by NSET after Gorkha Earthquake shows that more than 95% of people who lost their lives were inside the buildings which clarifies the immense need of safer construction. Effective implementation of building code is one of the most effective ways to decrease potential risk of casualty from earthquakes.

Udaypur Earthquake 1988 was an eye opener and turning point for Nepal not only in regard to the extent of damages that tremors could cause, but also in terms of the understanding why preventive measures were important. Nepal drafted the National Building Code (NBC) in 1994 based upon scientific assessment of seismic hazard and risk, the existing practice of building construction including the usage of different construction typology and technologies in the different climatic regions, and considering the socio-economic realities. The Government of Nepal, through Nepal Building Act 1998 made the NBC mandatory for all municipalities and urbanizing settlements in the country. Implementation of building code was a long-term task. Nepal is still struggling to implement the NBC, and in the meantime, more and more vulnerable buildings are being constructed every year in urban and rapidly urbanizing settlements of Nepal.

Building Code Implementation in Nepal during 1998-2011

NSET implemented "Kathmandu Valley Earthquake Risk Management Project (KVERMP)" in 1997-1999. Under KVERMP, NSET conducted various activities contributing towards promoting earthquake safety. Key activities include assistance to municipalities and municipal professionals in implementing seismic provisions of building code; trainings to the engineers, architects, technicians, contractors and masons on the aspects of earthquake-resistant construction technology; seismic vulnerability assessment of critical facilities, lifeline structures and public buildings within Kathmandu valley, suggest vulnerability reduction measures and assist in implementation of suggested measures and design.

Although the building code was developed in 1994 and made mandatory in 1998 through Nepal Building Act, the formal implementation was started only in 2003. Then Lalitpur Sub-Metropolitan City (LSMC) became the first municipality in Nepal to

announce the mandatory enforcement of NBC into the building permit process. NSET and other professional groups supported the initiative of LSMC. Since then, several municipalities have initiated the enforcement of building code.

As a replication process of the successes of the KVERMP, NSET successfully piloted "Municipal Earthquake Risk Management project (MERMP)" in Banepa, Dharan, Vyas and Pokhara Municipalities in 2003. Through this program, NSET embarked upon the process of promoting earthquake safer construction using 4 strategies (a) Raising awareness (b) improve capacity of Engineers (c) improve capacity of masons, head masons and petty contractors (d) institutionalize quality control of construction materials.

A glimpse of Orientation program to houseowners on safe construction conducted by Dharan Sub-Metropolitan City.

Dharan Sub-Metropolitan City was the second municipality that officially announced the enforcement of building code in 2007. Dharan used the lessons learned by Lalitpur and developed programs of training of masons, engineers and a comprehensive awareness program targeted to the various stakeholders involved in the building production process – from the house-owners, community people to the masons, designers & architects, traders in construction materials, quality control offices, officials of the building permit system and others.

NSET implemented 'Nepal Earthquake Risk Management project (NERMP)' during 2005-2010 as a logical continuation of long-term effort in reducing earthquake risk in Kathmandu Valley and Nepal. NSET conducted "Earthquake Safety Construction Skill" training for masons and construction technicians in Bhadrapur, Gaur, Bhaktapur Thimi, Kirtipur and Kathmandu Metropolitan City while providing technical support to 'Lutheran World Federation (LWF) Nepal under the LWF DIPECHO-CPDRR project. In 2008, NSET implemented 'Municipal Disaster Risk Reduction Program in Nepal (MDRIP)' under the program (GRIP) of UNDP/Bureau for Crisis Prevention and Recovery (BCPR)

Dharan became the leader among municipalities for its efforts in building code implementation. Dharan adopted comprehensive approach that included earthquake awareness programs, capacity enhancement trainings and allocation of budget to implement activities supporting effective building code implementation.

Kathmandu Metropolitan City (KMC) started working on building code implementation. Utilizing the provisions of the Local Self-Governance Act, KMC relaxed to a certain extent the provisions of NBC and included most stipulations into its building permit process.

NSET was involved directly or indirectly to assist municipalities to implement the building code effectively.

Despite efforts by different organizations incuding NSET, till 2011, there were only few municipalities in Nepal in the process of building code implementation. Among them, Dharan and Lalitpur were effectively implementing the NBC by the end of 2011 while municipal areas of Panauti, Banepa, Ilam, Vyas and Hetauda also started implementing the NBC.

Building Code Implementation Program in Nepal (BCIPN) after 2011

To consolidate the experiences and lessons learned from Lalitpur, Banepa, Dharan and Vyas municipality in the past on implementation of building code and urgent need of scaling up, NSET developed a program **'Building Code Implementation Program in Nepal (BCIPN)'** and implemented in 30 municipalities from 2012-2017 with funding support of USAID/OFDA. NSET worked in close collaboration with these 30 municipalities under the direction of the Ministry of Urban Development (MOUD) and Ministry of Federal Affairs and Local Development (MoFALD) and the supervision of the government Department of Urban Development and Building Construction (DUDBC). BCIPN focused on assisting the municipal governments in enhancing their capacities to develop and administer the building permits and control system for ensuring improved seismic performance of all new building construction.

BCIPN focused on three main components to implement from local to national level. The first is raising awareness of local community, related stakeholders and government representatives on root cause of earthquake risk in Nepal and possible ways to mitigating the risks. Secondly, building the capacities of the construction workforce- local masons and contractors in earthquake-resistant construction technology; and building capacities of engineers and technical professionals to design and supervise construction of safer building is another major strategy. Thirdly build the institutional capacity of municipalities to effectively enforce building code and institutionalize the code compliance system.

BCIPN assisted the municipal governments in enhancing their capacities to develop and administer the building permits and control system properly for ensuring improved seismic performance of all new building construction in those urban and urbanizing areas of Nepal where compliance to the National Building Code was made mandatory by law. This entails, on one hand, helping the municipalities to develop an effective mechanism for building code implementation, and on the other, enhance earthquake awareness of the residents and technical knowledge of the municipal official on aspects of earthquake risk management including earthquake-resistant design and construction.

Assessment of Municipalities

In addition to the general experiences gathered between 1998 and 2011, NSET conducted a baseline survey of 58 municipalities in 2012 to gather basic information of municipalities status on current building construction practices, municipal capacity and status of building code implementation. Survey shows that the majority of the municipalities have only two engineers while average number of building permits per year is about 500. And only three municipalities were found implementing the building code with concrete plans and programs. With limited technical human resources, and municipal engineers not being able to monitor construction on-site, majority of new buildings in urban and urbanizing areas of Nepal are constructed without compliance to the building code. The building permit system is taken as a medium of revenue collection by the municipal governments and not in generating safety for the house owners.

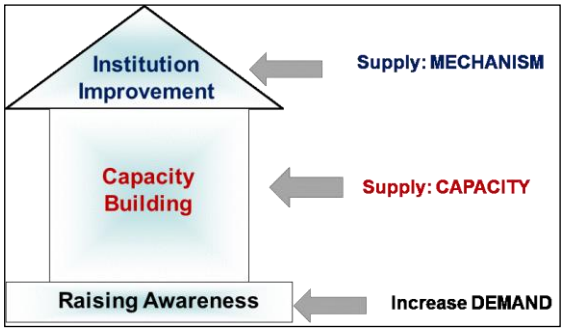
The baseline survey of about 40,000 households on risk perception was done using Knowledge, Attitude and Practice (KAP) survey approach in 23 municipalities in the starting phase of BCIPN.

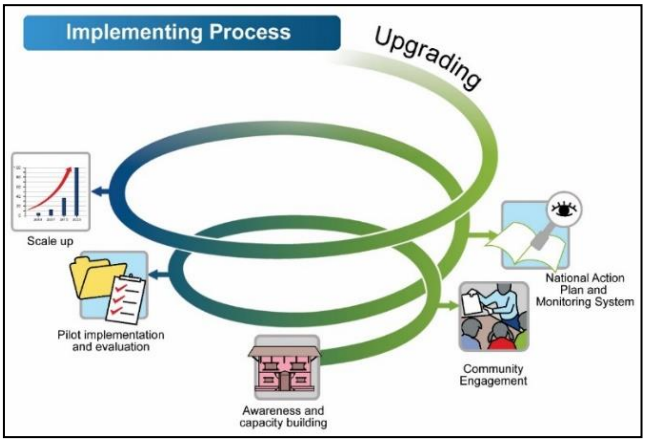
The survey results showed that the knowledge level of the municipal residents was fairly good (scored 47 out of 100).

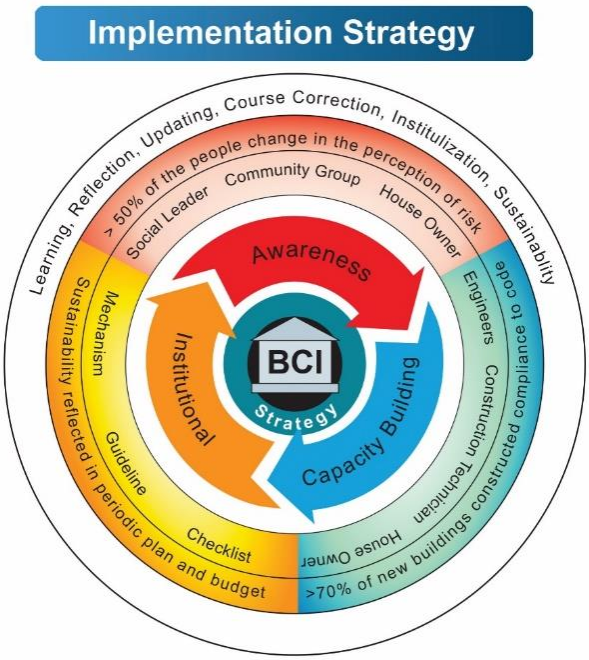
Similarly, their attitude towards earthquake risk reduction was also very good (scored 73 out of 100) but there seemed to be a gap between transforming knowledge and attitude into practice (scored 20 out of 100). Factors such as gender, age, occupation, participation in awareness programs and training, and prior experience of earthquake influenced the KAP scores of the residents.

Strategy for Implementation of BCIPN

With the findings of existing status of municipalities and the experiences garnered on assisting municipal government on building code implementation, NSET developed strategy for implementation of building code at municipal level. Three core issues were identified for proper implementation of building code at municipal level. Awareness raising, capacity enhancement and institutional and policy improvements were three pronged strategies and activities focused by NSET during the implementation of BCIPN.







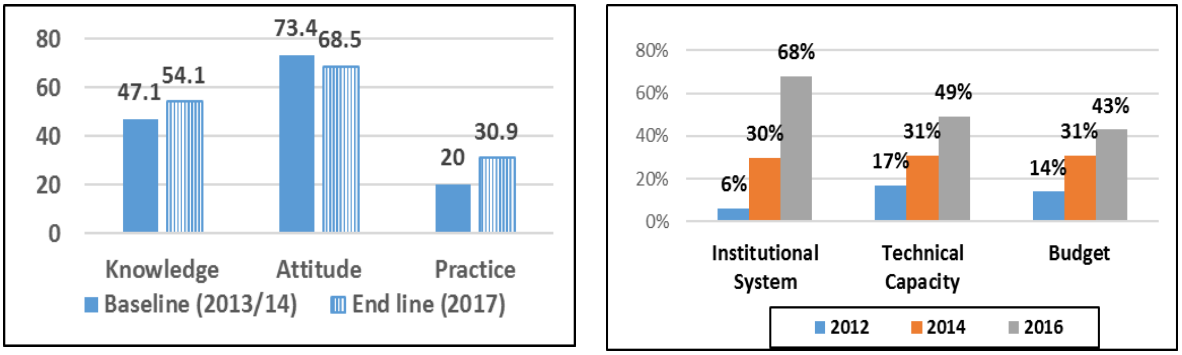
Various activities were targeted on these identified strategies. Earthquake awareness initiatives and methods were developed and implemented differently for the various specific target groups, such as social leaders, community groups, homeowners and mothers' groups.

Mobile clinics at the building construction site to impart the stakeholders the knowledge on earthquake resistant construction, retrofitting demonstration buildings and awareness through publications, earthquake safety day celebrations with different activities, shake table demonstration were the major activities carried out to aware people on need of safer construction Different training programs were developed the different actors of building production, such as engineers, technicians and masons. And to strengthen the institutional setup and policies, three major activities like development of a system of improved building permit process, mechanism for code compliance check in the permit process and development of building code implementation guideline and checklist for code compliance check are implemented.

Change in perception of risk through BCIPN intervention

BCIPN conducted baseline and end-line '**Risk Perception Survey**' of the residents of BCIPN program municipalities with an objective to measure the change in the residents' perception of risk to earthquakes, their level of preparedness and the earthquake risk reduction activities they are implementing. Average result of all 23 municipalities where the survey was conducted shows that people are aware to some level on possibility of earthquake and need for making safer buildings.

Change in status of Building Code Implementation

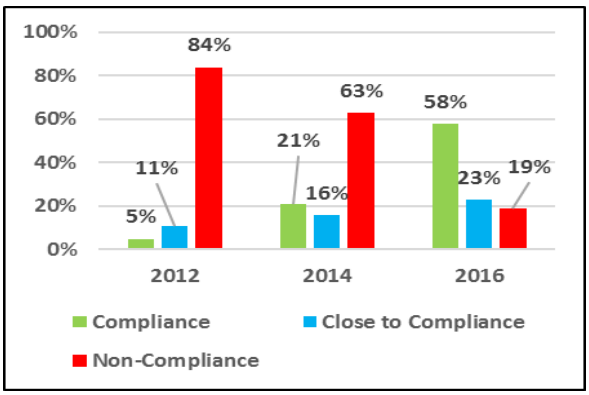


Change in major aspects of building code implementation over the years in BCIPN program municipalities

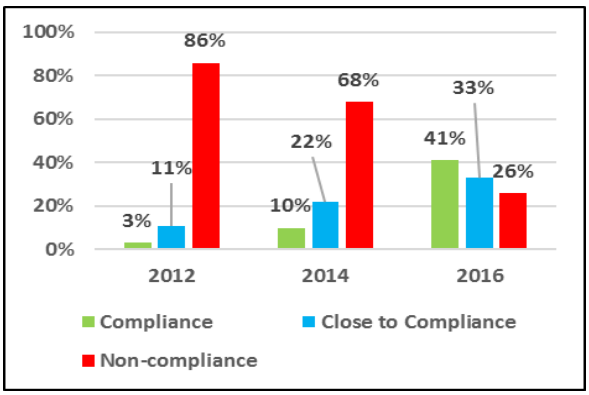
BCIPN program municipalities were surveyed in three different time periods, in 2012, 2014 and 2016 of the program implementation to assess the change over the years. The increase in scores shows that there has been a significant improvement in the three vital aspects: Institutional System, Technical Capacity and Budget Allocation, of the building code implementation.

Success in Code Compliance

Under BCIPN program was carried out during the program period to understand the change in building drawing and construction practices, to identify the existing non-compliance parameters for monitoring and planning for building code implementation system. A total of 8,133 buildings: 4,440 building on drawings and 3,693 buildings on field were assessed in 30 program municipalities. The average compliance rate in 30 municipalities improved in drawings submitted from 5% to 58% and actual construction compliance from 3% to 41%. These results indicate that Nepal's municipalities can enhance the seismic performance of new buildings but need technical assistance in present context of Nepal.

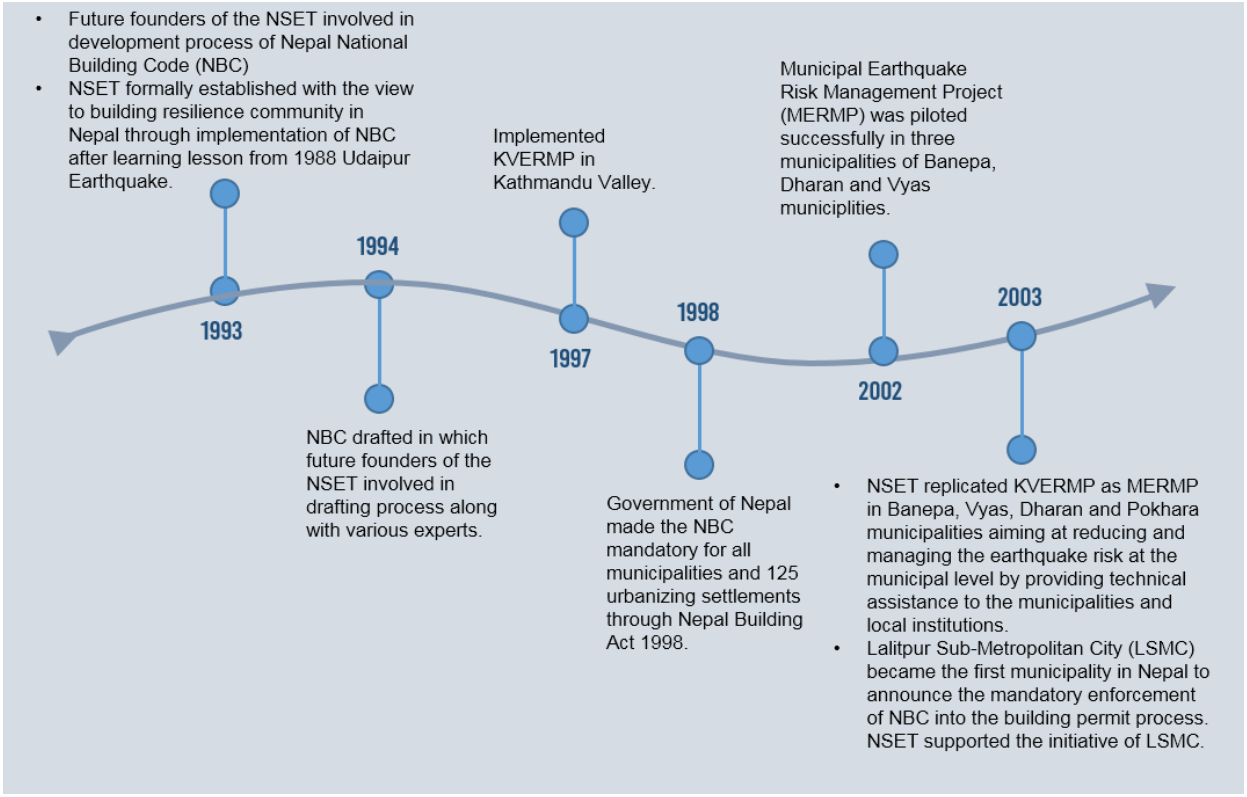


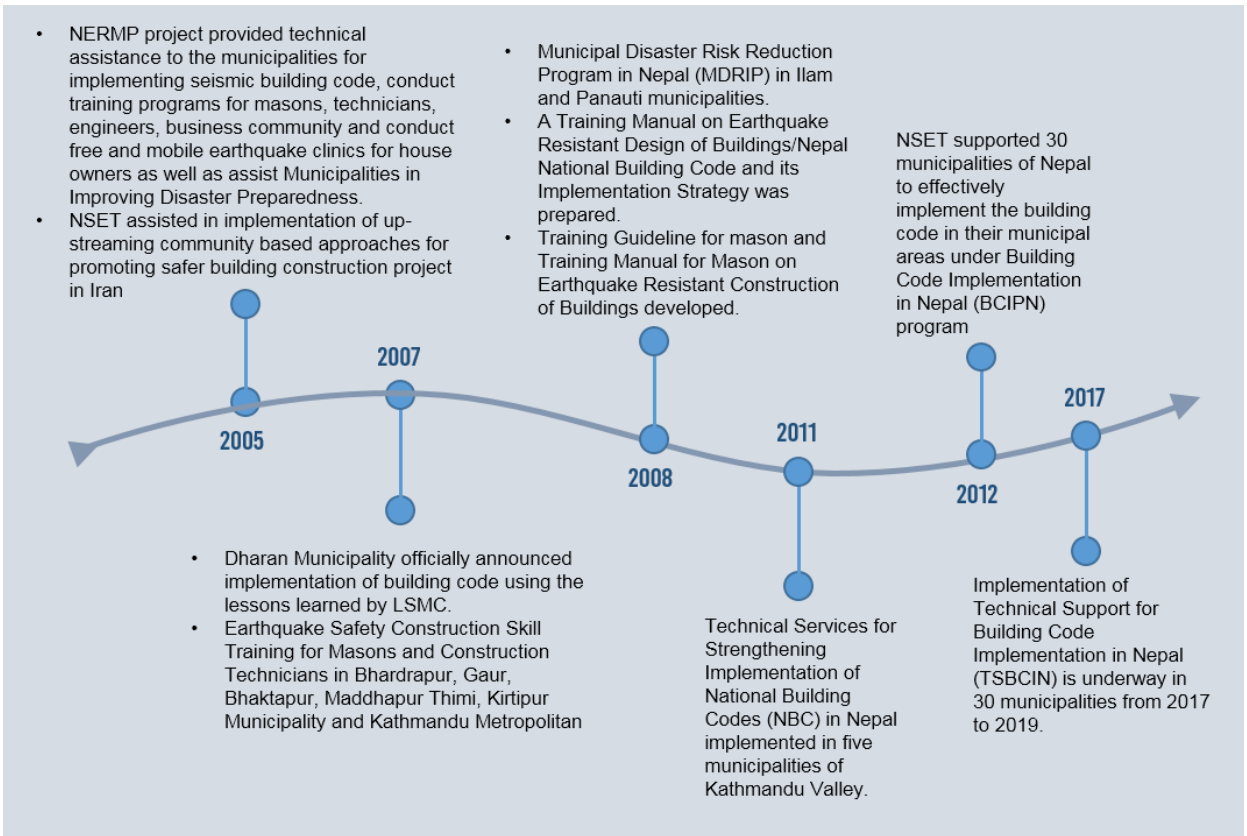
Compliance rate over the years- in building drawings



Compliance rate over the years-in field

The journey: NSET efforts on Building Code Implementation





Challenges

Building code implementation is not a one-day work. It needs continuous effort to get the results which have been proved from the results obtained with the interventions of past decades. NSET was involved in some way in many of the municipal efforts and we can identify the following as the main impediments, challenges and problems for effective implementation of building code.

- Local governments of Nepal differ in terms of their size, urbanization, building construction materials and building construction process. It is necessary to develop individual implementation strategy for each municipal government for incorporating provisions of NBC on their building permit process based on the prevalent ground realities relating to the building construction and all associated processes.
- It is challenging to enforce building code implementation through building permit process at the municipalities where large proportions of buildings are constructed without any building permit.
- Municipalities are facing problems of negative influence of other neighboring municipalities without enforcement of building code on their permit process.
- Lack of institutional capacity and human resources is another hindrance at national and local levels.
- Lack of standard training curricula for some training in the past has resulted in graduates of different skills and approaches.
- Several organizations involved in conducting several training courses has been observed that many have not been following the standard of training course. This has created confusion among the populations and authorities.
- Significant proportion of existing vulnerable buildings being in use. Development of proper regulation for retrofitting of existing vulnerable buildings is a huge demand. A careful study and strategy formulation is necessary.

Key Lessons learned

The key lessons learned from building code implementation working with large number of municipal governments since 1998 are as follows.

- Awareness raising and capacity building is the key for success. The awareness creates demand for safety. Once the community starts demanding safety, society has to supply it. Therefore, the capacity building of the different stakeholders specially the training of Engineers and Masons in case of building code implementation is critical. If there is sufficient awareness among the house owners and training for construction workforce, most of the building will be constructed with compliance to the code.
- Institutionalization is the long-term process: - to achieve better seismic performance of building, the approach and process should address the needs at more than one level and take into account the grass root reality. It must create an awareness that leads to increase demands for safer building and skills. It must strengthen capabilities at all level. Nepal developed the NBC in 1994 and promulgated it as mandatory via the Building Act in 1998, and yet enforcement of the code remained a serious

challenge. Dharan Municipality in Nepal took approximately eight years of consistent efforts to achieve code compliance in majority of new buildings. A continuous effort by the local government and continuous backup by an organization such as NSET were crucial for Dharan. Building code implementation is a long-term task which requires dedication and perseverance.

- Working with champions helps institutionalization: - BCIPN worked closely with municipality's key professional conducting various awareness, capacity building activities and improving institutional capacity and policies in collaboration with the local government. This close association helped to develop confidence to carry out all the activities independently and helped to establish a proper system within the municipality.
- Building code implementation is not only technical issue but also a social issue so there is a need to consider related social aspects.
- Need to work with wider stakeholder. Masons, engineers, house owners, municipalities and those who can contribute in risk transfer such as insurance companies and banks.
- Coordination and collaboration with other organization working in BCI and regular coordination with government is necessity.
- Acceptance and involvement of all municipality staffs is necessary to get support of the whole municipal staff.
- Formation of Mason groups must be a systematic process, needs appropriate policies at national level.
- Refresher course from mason and other key professionals need to be formulated and implemented. Guidelines and materials and standardization of construction process need to be developed and disseminated.
- IT tools, technology such as mobile apps, social media etc. should be strategically and massively used for awareness raising and advocacy.

Way Forward: Technical Support for Building Code Implementation in Nepal (TSBCIN)

To continue the success and institutionalization of the process, NSET is now implementing the program Technical Support for Building Code Implementation in Nepal (TSBCIN) with funding support from United States Agency for International Development / Office of U.S. Foreign Disaster Assistance (USAID/OFDA) in 30 Municipalities during 2017-2019. TSBCIN program is being implemented under the overall guidance and directives of the Department of Urban Development and Building Construction (DUDBC), Ministry of Urban Development (MOUD) and the program municipalities. The program focuses on assisting the municipalities in enhancing their capacities to appropriately develop and adequately administer the building permits and control systems to ensure improved seismic performance of all new building construction.

NSET's support for building code implementation aims to support building code implementation through awareness raising, capacity building and institutionalization with main goal to build a disaster resilient community in Nepal through assisting municipalities in implementation of NBC. It involves a comprehensive strategy that focuses on assisting municipalities in enhancing their capacities to appropriately develop and adequately administer the building permits

and control system ensuring improved seismic performance of all new building construction. Learning lessons from the previous experiences in the field of BCI, TSBCIN has adopted the four main strategic components to implement the program adding networking and collaboration in the previous components.

Conclusions

More than two-thirds of earthquake risks come from poorly constructed buildings. To address this huge risk, effective implementation of building code is one of the most effective ways. The NBC, first prepared in 1994 and implemented by then Lalitpur Sub-Metropolitan City in 2003, has clearly marked a sign on the success of implementation. Now the coverage of code implementation has been increased significantly since then along with the increment in the code compliance rate.

Practical exercise as a part of Mason Training conducted under Building Code Support Program

Section 2 NSET's Major Contributions in 25 Years

Awareness Raising: The Foundation of DRR Efforts

Awareness Raising on DRR means helping people build better understanding on various facets of disaster phenomena so that they could engage better in risk reduction and preparedness efforts. For that, NSET emphasizes on bringing scientific knowledge from technical literatures and research laboratories to the door-steps of Nepali people, working together to contextualize the knowledge and learning together.

All the NSET programs consist of public awareness-raising components and that has helped raise significant awareness and disaster literacy among commoner people, policy makers and implementers. The target groups of NSET's awareness activities are not only the poor and illiterate but also the educated urban elite, not only the 'community people' but also the top-level officials, policy and decision makers including professional of allied disciplines.

NSET's Awareness Raising Efforts

NSET aims to accomplish its mission through

- Knowledge & Information Management: develop, produce and disseminate IEC Materials (Publications, A/V Materials etc.);
- Coordination & Collaboration with mass media, new media and all means of public communications to enhance earthquake safety; and
- Networking & Outreach: connecting, sharing, learning and working with multiple stakeholders at local, national, regional and global level to institutionalize risk reduction initiatives.

NSET uses all the possible and available media for raising awareness on disaster risk and earthquake related issues. NSET's awareness raising messages are scientifically proven (in the country and abroad) and NSET takes responsibility for the contents. NSET packages the content in such a way that it is well understood, accepted, internalized and that helps changing the behaviours.

Information, Education and Communication (IEC) Materials

NSET produces various information, education and communication (IEC) materials and disseminates in different communities and clusters. NSET has been producing publication materials in the form of Flier, Poster, Advisory, Guideline, Manual, Booklet, Story Book, Brochure, Notebook, Diary, Dictionary and Kit targeting to community people and various social groups including school children, teachers, community front-liners, house-owners, women groups, DRR practitioners, policy makers and others. These materials are widely disseminated.

NSET also produces various A/V materials such s Short Video, Film, Documentary, Telefilm and Visual messages (Public Service Announcements - PSAs) focusing on Earthquake Risk Management. NSET, in association with various stakeholders, has produced more than 40 videos and more than 50 PSAs so far related to earthquake safety and disaster risk management. NSET manages dissemination of these visual materials through national national and local television channels as much as possible. NSET visual materials are available on NSET's Youtube Channel.

NSET produces and distributes visual materials in DVD also. NSET has produced 20 thousand of orientation video in DVD and distributed to schools, community organizations and various stakeholders. NSET produced a 60-minute Telefilm entitled "Ghar" meaning "House" which was broadcasted from national television channels. NSET also produced a 5-minute video "Feeling the Risk" that reveals and highlights the various seismic vulnerability factors of Kathmandu. NSET worked with UNDP in developing Video Toolkit for Earthquake Safe Building Practices in Nepal. The storyline is based on contents of National Building Code (NBC) provisions and also on the experiences of building construction practices in Nepal.

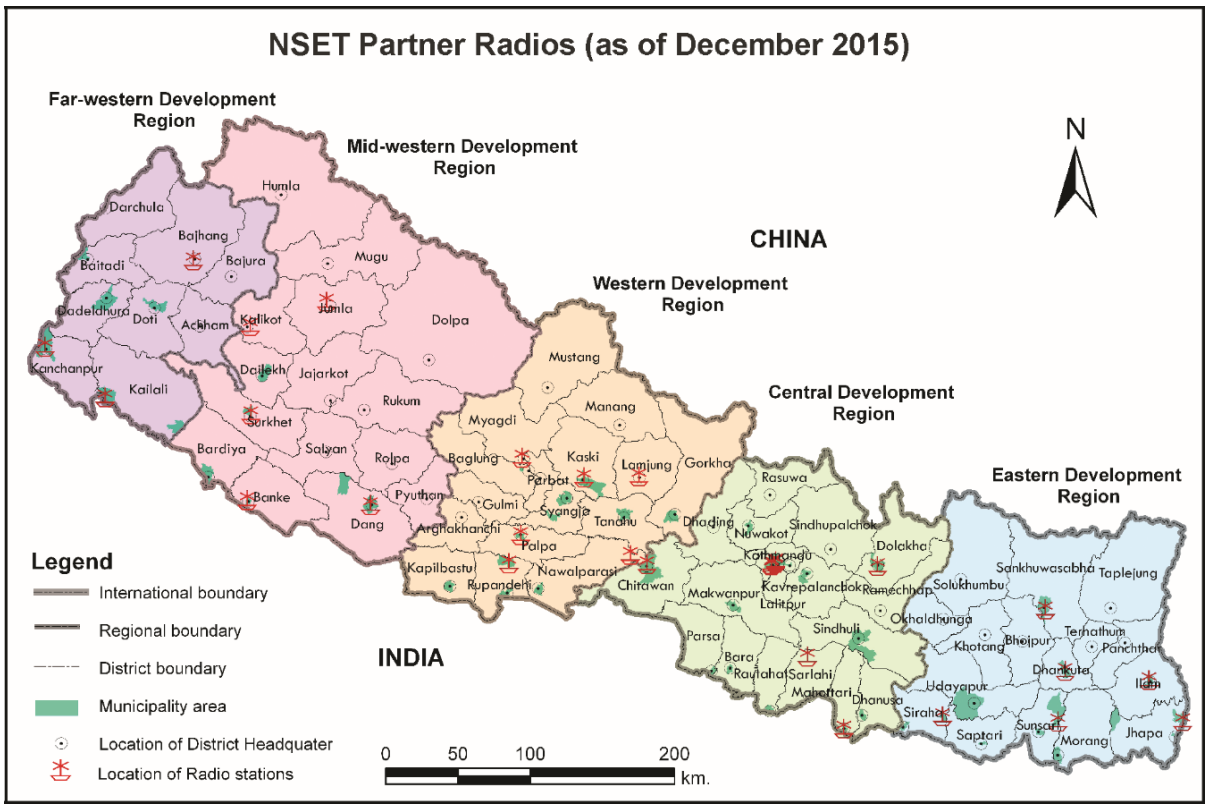
Mass Media Campaign

NSET works with different mass media which have been proved as effective advocacy tools in a bid to promote education, knowledge and awareness among the common people to policy/decision makers & implementers. NSET works to coordinate with mass media institutions for disaster reporting, helps build their better understanding on disaster issues and encourages media discourses on various facets of Disaster Risk Management.

NSET also collaborates with media institutions for the regular or periodic media activities focused to the theme of Earthquake Risk Management and Disaster Risk Reduction.

Collaborating for Radio Programs

NSET has established partnership with a number of FM radio stations to spread awareness messages about the risks associated with earthquakes and advocate on risk reduction issues. NSET began collaborating with radio stations from the first community radio in South Asia, Radio Sagarmatha, in Kathmandu from 2002. Outside the Valley, NSET first collaborated with Annapurna FM station in Pokhara to disseminate earthquake safety tips and preparedness. The weekly talk and discussion programs aim at enhancing earthquake awareness and influencing public policy on disaster management by creating public demand.



NSET Partner Radios (as of December 2015)

As of now, NSET has collaborated with more than 40 community and private radio stations, with the program aired to cover almost 85% of country's territory. At present, NSET is collaborating with 13 radio stations to disseminate the information and ideas on safer construction technologies. The regular weekly radio programs are 30-minute magazine format and are aired twice a week from each station. Each radio airs the messages (PSAs) on safer reconstruction practices and processes 10 times daily. The community based and local radio stations carry 70 percent of local stories (stories of beneficiaries, success, problems and challenges) and 30 percent of program content focuses on policy and processes.

Collaborating for Television Ptograms

Considering the fact that the television viewership is increasing day by day, NSET has been collaborating for television programs on promoting earthquake safety and preparedness. In 2009, NSET had started partnering with Watchdog Media Services to produce "Earthquake Special" segment of regular TV program "Janachaso" (Public Concern), a weekly 10-minute magazine format that broadcasted from Nepal Television. The program partnership continued till 2014.

NSET started regular Weekly TV Talk Shows in 2012 under the USAID/OFDA funded program “Public Private Partnership for Earthquake Risk Management (3PERM)”.

Under 3PERM, NSET collaborated with Watchdog Media Services for a weekly TV Talk Show "SANKALPA" that was broadcasted from Nepal Television during 2012-2016. The program was mainly focused on educating community people, authorities and different stakeholders on various issues of Earthquake Risk Management.

Studio Guests for Television Program "Sankalpa"

NSET collaborated with Media Help Line for another weekly TV Talk Show "Talk of the Town" that was broadcasted from Image TV during 2012-2016. This program was primarily focused on policy advocacy and more on lobbying for appropriate disaster policies and systems.

Under the 3PERM program, NSET also partnered with All Three Media Ghar to produce TV Magazine "Surakshit Samudaya" (Safe Communities), a weekly 15-minute magazine and get broadcasted from News24 Television. This program used to focus on various facets of earthquake safety and mitigation measures. The program continued till 2016.

After the 2015 Gorkha Earthquake, with the aim of reaching most of the earthquake affected districts through different TV channels, NSET started a regular TV program "Baliyo Ghar" under USAID supported Housing Reconstruction Technical Assistance Program (Baliyo Ghar). NSET has partnered with All 3 Media Ghar to produce a weekly half-an-hour TV magazine series and arranges its regular broadcast through 3 different television channels, Kantipur TV, News24 TV and Avenues TV.

Studio Guest for Television Program "Talk of the Town"

Promo for Television Program "Baliyo Ghar"

The program episodes are focused on policies, reconstruction practices and technologies for safer reconstruction. Program collects the grass root stories, problems and success stories of reconstruction and make it heard nationwide.

Print Media

NSET works with Print Media in coordination and partnership at the level possible. The purpose is to disseminate earthquake safety messages timely, accurately and widely. NSET conducts orientations, workshops, field visits and interactions for media people including print media with the view to promote their engagement in media issues.

Awareness through Social Media Campaign

By utilizing the multi-purpose social networking platform, NSET is campaigning through social media platforms and other new media. NSET prioritizes the messages on earthquake safety, preparedness and now safer reconstruction practices and make them public. NSET along with its program's social media platform has got wider followers.

Orientations

NSET is conducting orientation programs on earthquake safety in the communities, schools, hospitals, government offices, provate sector businesses, NGOs, CBOs, and international as well as diplomatic agencies. The NSET conducted orientation programs are intended to make the group familiar with earthquake hazard and risk of Nepal, provide risk reduction ideas and also make them knowledgeable on earthquake preparedness and life saving tips such as what to do before, during and after an earthquake; how to prepare at individual, family and community level; and etc. These programs have been very helpful to enhance public understanding on aspects of Earthquake Risk Management that has helped in DRR policy efforts to actions on risk reduction and preparedness at various level.

NSET staff orienting the community people in Samundradevi, Nuwakot on Earthquake Safety and Safer Reconstruction

Street Dramas

Realizing the effectiveness of drama as means of public awareness promotion, NSET has been working with Drama teams to use the innovative ways of awareness raising. NSET collaborates with street drama team/s on regular basis as part of program activities and also on certain occasions such as Earthquake Safety Day.

Street Drama performed by Dabali Natya Samuha under NSET implemented program 3PERM

Display Boards

NSET together with Government departments, municipalities, and private sector has placed display boards with the earthquake safety messages and information in various locations. In 2014-2015, 18 display hoarding boards with key messages of earthquake safety were designed, prepared, and placed in five cities. After the 2015 Gorkha Earthquake, display boards carrying the message of safer reconstruction tips have been placed in earthquake hit areas.

Display board with earthquake resistant construction message placed under the program 3PERM

"Seeing is Believing" - Shake Table Demonstration

NSET developed the simplified shake-table demonstration as an innovative tool for public awareness raising and convincing people on the effectiveness of earthquake resistant construction practices. The main principle it follows is "Seeing is Believing".

NSET demonstrated its first Shake-table in January 1999. *(please refer Section 3 for more detail).*

Documentary Shows

Since 2004, NSET is organizing documentary shows in public places in different cities and locations with the view to raise the awareness of the commoner people on various aspects of earthquake risk management including earthquake preparedness, earthquake risk reduction, response, and safer re/construction practices.

Documentary Show on awareness raising on earthquake safety

Mobile Earthquake Clinics

"Mobile Earthquake Clinic" is to provide on-site consultation on earthquake resistant building construction to the house-owners who are constructing new houses. NSET team consisting of Engineer, construction technician and social mobilizer visits building construction sites, observes the construction process and advises further as needed. The aim of the Mobile Clinic is to help improve the construction practices. NSET has conducted such clinics under various programs such as building code support programs, reconstruction support program etc. Mobile Clinics have been very effective to indetifying the problems in the real ground and also help make correction to improve the seismic safety level of building structures.

Earthquake Vulnerability Tours

Vulnerability Tour is a guided tour in a defined route or a defined location to observe different vulnerability factors. NSET conducts such tours in different routes in Kathmandu valley. The purpose is to make feel how vulnerable the city's buildings and critical facilities are to earthquakes. The tour aims to convince common people to policy/decision makers and the international community on urgency of urban earthquake vulnerability reduction initiatives and to help develop perception of existing seismic vulnerability of building structures, lifeline structures and their combination.

Earthquake Safety Day

Nepal observes Earthquake Safety Day (ESD) annually on 2nd of Magh (10th month in Nepali Calendar) that falls on 15 or 16 of January to commemorate the Great Nepal-Bihar Earthquake of 1934. Government of Nepal first declared to mark the day on 1999 with view to promote the earthquake safety and enhance public awareness. ESD aims to make the general public aware about the earthquake risk and available risk reduction measures and preparedness programs. The day is also for sharing the experiences and exchange good practices and create common platform for the stakeholders to join hands in improving seismic safety in Nepal. ESD, in fact, unwraps the culmination of earthquake risk management works implemented in the country in the preceding 12 months and allows taking stock of the achievements and shortcomings. On this occasion, many public events such as National Meeting, Symposium, Earthquake Safety Rally, Exhibition, various awareness-related and learning & sharing programs are organized.

Efforts through Literature and Art

Responsibility of DRR lies in all sections of people including the creative people like Writers, Poets, Artists, Actors, Musicians etc. They are the ones many people trust to and do follow. NSET has been working with the artists and litterateurs to enhance their disaster risk perception and facilitate their contribution in aspects of disaster risk management.

NSET has organized several unique events and created pieces of art and literature promoting DRR in the country.

Shocks and Reverberations: *A Creative Journey*

Shocks and Reverberations: *A Creative Journey* was first accomplished during January 18-19, 2011 under Earthquake Safety Day program activities. The journey was held along Bhainsepati-Jamal-Asan-Basantapur Durbar Square and Nagarkot. Second phase of the creative works was done on December 24, 2011 at NSET Office premises, Bhainsepati. During the process, a group of eminent Artists from Nepal Academy of Fine Arts (NAFA) including then Chancellor and Academicians produced canvases on the theme of earthquake safety promotion. In parallel, a group of Litterateurs & Poets created powerful literary works. Participating journalists, government officials & organizers also took part in the creative works.

All these creations were displayed in **Shocks and Reverberations: *Art Exhibition*** with the view to reach to broader audiences/viewers and exploring new avenues to raise public awareness on ERM/DRR. On January 27, 2012, apex personality of Nepali poetry and living legend of Nepali Art & Literature Poet Laureate Mr. Madhav Prasad Ghimire graced the inaugural session of **Shocks and Reverberations:** *Art Exhibition* at Araniko Exhibition Hall, Nepal Academy of Fine Arts (NAFA), Naxal, Kathmandu. On the occasion, Chief Guest Mr. Ghimire inaugurated the Exhibition and also unveiled a publication comprising of creative works produced during the process **Shocks and Reverberations: *A Creative Journey***.

Community Level Trainings

Community awareness is key to build community resilience. NSET has focused community centric awareness efforts on Earthquake Safety. These efforts aim to make aware individuals of the community on the associated hazards and vulnerabilities; prepositioning the emergency supplies; making response plan; and make capable to cope with disasters using locally available resources.

DRR Promotion using Folklore

In 2004, NSET had first conducted "*Lok Dohori*" folklore program in Damauli, Tanahun with the theme of earthquake safety. That folklore songs were aired from radios and other means as awareness tool. Similarly, in 2017, a Deusi Song on Earthquake Safety and Safer Reconstruction has been recorded and broadcasted from 4 television channels and 13 radio stations; and also from youtube channel. The song carries the earthquake safety message including the techniques of building earthquake safe houses.

Lessons Learned & practiced

Earthquake awareness and preparedness is not a subject to accomplish overnight or within some deadline. It's a long process. It takes place in a series of small steps taken at home, work, school, community and the region. It is accomplished through actions by individuals, families, institutions, and government agencies. Though in case of earthquake, the hazard cannot be stopped, the impact can be significantly reduced by effective preparedness and mitigation measures, which has been experienced during recent disaster of 2015 Gorkha Earthquake in Nepal. Few of them are:

- Better understanding of the issues is key to better media reporting. Unless the capacity of local journalists is enhanced on disaster issues, the quality of disaster reporting is not achieved as expected. Capacity enhancement through trainings, workshops and field visits is necessary for the journalists involved in disaster reporting.
- Simplified messages derived from complex science works rather than displaying the jargons and complex ideas.
- Massive awareness among the people creates the demand of safety, which ultimately pushes the government for specific plans of actions for disaster risk reduction. So, components of awareness activities should be a part in every DRR program.

- Awareness is more than transmission of knowledge. We have found this is best done through collaboration in action, by doing things together. It is about realization and internalization of the need and critical issues by media so that they can make a lot of contribution in such a scale and impacts which is hard to expect through any other activity.

Testimonial

A man who saved his life by "Drop, Cover and Hold on"

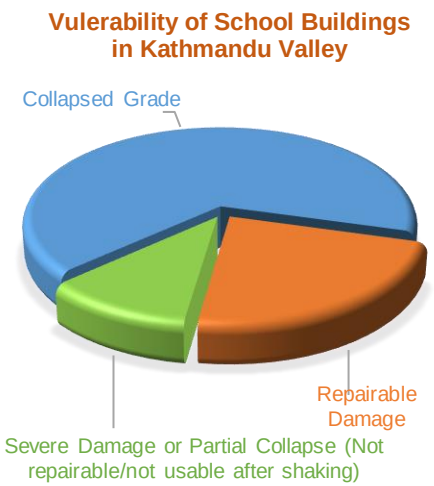
"During the shaking on May 12, 2015 (major aftershock of Gorkha Eathquake) I was at the second floor of my house with some household work. My wife was at downstairs with son in-law and daughter talking to them and I was there alone in the second floor. When our house started to spin, quickly I entered the space beneath my bed. I heard some stones and wood pieces falling on the bed and below I prayed to God wishing for my and family member's life. I heard my wife, daughter and son-in-law crying outside but couldn't step downstairs as I am physically weak (right leg impaired). I had heard about saving life during shakings in radio and TV. I had heard about the "Drop, Cover and Hold on". I did the same. I know hadn't I dropped inside my bed, I would have been killed by stones of my roof wall that fell during the shakings and definitely I would not be with my family."

- Mr. Saroj Khadka, resident of Dhakrebot, Chilankha, Dolakha

Section 2 NSET's Major Contributions in 25 Years

Earthquake Education: From Teachers to Students to Parents to Community

Background



Schools in Nepal, both buildings and their occupants, face extreme risk from earthquakes. The vulnerability of schools was evidenced during the 1988 Udayapur Eart hquake (Magnitude 6.6) in eastern Nepal. The same situation occurred again after the Sikkim / Nepal border Earthquake of 2011. Many schools in Eastern Nepal were damaged. The 2015 Gorkha Earthquake struck on Saturday. Had the earthquake occurred on a school day, thousands of children would have been affected.

Seismic vulnerability assessment of 643 public schools conducted in 1997 as part of 'Kathmandu Valley Earthquake Risk Management Project' (KVERMP) had revealed an alarming result. The study found should there be shaking equivalent to 1934 earthquake shaking in Kathmandu Valley, about two-third of school buildings would collapse and additional 10% would damage to the level beyond possibilities of repair. The consequence would be loosing of a whole generation of school going children should there be earthquake during the school hours.

NSET Efforts

The School Earthquake Safety Program (SESP) is an initiative of NSET started from one school in 1997. This is focused to school safety but not limited to. Building earthquake-safe communities through intervention at schools is at the core of SESP. It is a holistic approach taken by NSET to improve the earthquake safety of communities by intervening in schools. The main goal of the program is to gradually ensure that school children in seismic regions go to earthquake-safe schools and that local communities build their capacities to cope with earthquake disasters. The targeted beneficiaries are students, teachers and the surrounding community of the selected schools.

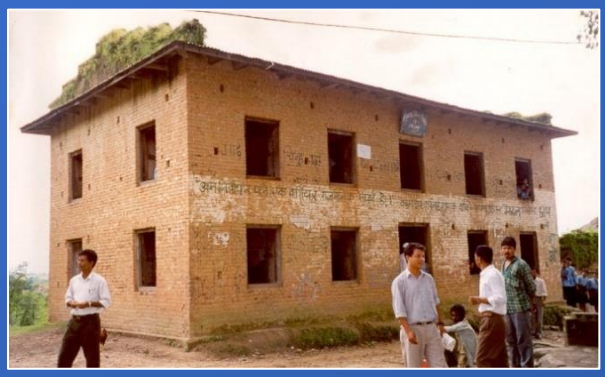
The School Earthquake Safety Program consists of three closely inter-knit sub-components, namely, (1) Training of masons, (2) Training of teachers, parents and students on earthquake preparedness and preparedness planning, and (3) seismic retrofit or earthquake resistant reconstruction of public school buildings.

The SESP basically has five objectives. Firstly, it aims to raise awareness among schools, community and education stakeholders on earthquake risk and measures to reduce risk. Secondly, protecting children from the impact of potential hazards and assists schools in continuation of education after hazard events. Thirdly, disseminating earthquake safety message to the community through schools to build earthquake safe community and develop and adapt best practices to reduce earthquake vulnerability. Likewise, it aims to enhance the capacity of local community, schools and education stakeholders on preparedness and responding to potential hazards. Lastly, it also aims to carry out advocacy for adequate policy formulation and support Government institutions to enforce the policies to safeguard children from natural hazards.

Uninterrupted two-decade time span of NSET's effort to build the resilient schools has a significant contribution towards improving the safety of school structures, enhancing school disaster risk management capabilities and promotion of disaster safety education in Nepal. Beside this, the entire community has been benefited from the program on promoting safer construction technology through the learning from schools and trained human resources. It has demonstrated the technical, financial, political and social feasibilities of programs addressing the reduction of structural, non-structural, and functional vulnerabilities of schools in Nepal.

At the UNESCO event, International Initiative to Promote Human Security and Sustainable Development by Reducing the Impact of Natural Disasters held in Mexico in 2003, Ms. Sony Maharjan, Kathmandu student representative, at the initiative's final symposium raised some important concerns,
"It is our right to have safe schools! We do not build our school buildings. However, if they are very weak, the earthquake will destroy them and kill us. Why should we, the children, die from the weakness that others create? So, we request our parents and teachers to build safe houses and school buildings for us!"

School Retrofit in Nepal



Before retrofitting

After retrofitting

Bhuwaneshwori Lower Secondary School Bhaktapur, the first retrofitted school in Nepal

Considering the high risk of an earthquake in Nepal, NSET initiated seismic retrofitting of school buildings in 1998 in Nepal. As this was a start of something completely new, a lot of questions were raised, firstly by the masons as they wanted to know why was retrofitting necessary, their questions led to the start of mason trainings. Through the mason trainings, the masons were convinced about the importance of retrofitting and they also suggested that all this information about disaster preparedness should be passed on to the community members as well.

Eventually, the students, teachers and parents all came together and developed the disaster education concept including preparedness and response plan. Since the retrofitting of the first school in 1998, Nepal had more than 300 school buildings retrofitted till 2015. Hundreds of new school buildings have been constructed following the standard of the national building code. Of the school buildings retrofitted in Nepal, nearly 70% are located in the areas impacted by the Gorkha earthquake. Of the schools affected by the Gorkha earthquake that were retrofitted and seismically reconstructed, no collapse or serious damage was reported. Even those schools located near the epicenter remained in a condition that allowed them to be immediately used after the earthquake. This contrasts sharply with the poor performance of the un-retrofitted schools, including those located nearby retrofitted ones. During the Gorkha Earthquake, about 80% of the un-retrofitted school buildings were damaged beyond repair.

Students' Summit on Earthquake Safety

Conducted regularly by NSET in association with the Government agencies, NGOs, INGOs, UN Agencies and Maiko High School, Kobe, Japan, the Students' Summit on Earthquake Safety focuses on the issues of earthquake and disaster safety in schools. Initiated in Nepal in 2002, the main purpose of this event has remained to exchange knowledge, ideas and information of earthquake safety and also safety from all types of disasters amongst students from Nepal, Japan and other countries. The ninth edition of Student's Summit on earthquake safety was held in 2014 at Pokhara which also featured an awareness rally.

Kobe-Kathmandu Exchange Program on Earthquake Safety

Starting from 2002, Kobe-Kathmandu Collaborative Exchange Program on Earthquake Safety has been an important component of SESP in the schools of Kathmandu valley. The program aims to enhance cooperation between the students of Kobe, Japan and Kathmandu through learning experiences and sharing knowledge in disaster mitigation.

Participanting students from Nepal and Japan in the events

Japanese Students performing cultural program

Disaster Preparedness for Safer Schools

Disaster Preparedness for Safer Schools (DPSS) in Nepal was implemented in 50 schools from two districts - Bhaktapur and Nuwakot from 2009 to 2010 with a view to improving disaster safety of public schools and communities and assist institutionalization of disaster safety concepts.

The main goal of the program was to; reduce the impact of disasters by building safer and resilient schools and communities. Its objectives were to

- Improve disaster safety of public schools through increased hazard awareness; improved disaster management skills among school children, teachers and parents; and by establishing proper disaster preparedness and response systems;
- Increase disaster awareness of communities through disaster awareness and training programs and campaign using schools as entry points;
- Assist to institutionalize disaster safety concepts into regular education system by developing and assisting in implementation of national strategies for widespread application of concepts approaches and methodologies to enhance disaster safety of entire education system throughout the country.

Initially, the program was implemented in Nepal and based on the experiences and lessons of the initial phase, it was extended to Bangladesh.

SESP Timeline

1997
- NSET started School Earthquake Safety Program (SESP)
- Earthquake Vulnerability Assessment of Public Schools in Kathmandu Valley conducted under Kathmandu Valley Earthquake Risk Management Project (KVERMP)

1999
- First School retrofit done in Nepal: Bhuwaneshwori Lower Secondary Schoo in Nangkhel, Bhaktapur
- Mason Training on Earthquake Resistant Construction started under SESP

2002
- Kobe-Kathmandu Collaborative Exchange Program' on Earthquake Safety held
- Students' Summit on Earthquake Safety started

2005
- Nepal Earthquake Risk Management Program (NERMP) started, School Safety was also a part

2006
- SESP approach replicated in Gilgit, Pakistan, with one school block retrofitted and one school block rebuilt for demonstration)

2007
- Massive Mason Training along with Teachers' Training on DRR held

2008
- Development of "Strategy for Improving Seismic Safety of Schools in Nepal" with pilot implementation in Nawalparasi and Lamjung District

2009-2010
- Disaster Risk Reduction through School Project implemented in Kathmandu, Makwanpur, Rasuwa and Banke districts
- Disaster Preparedness for Safer Schools in Nepal (DPSS) implemented in 50 schools from two districts- Bhaktapur and Nuwakot.

2011
- NERMP 2 started which school component continued, re-assessment of 44 retrofitted schools done.
- DPSS 2 started in Nuwakot, Bhaktapur and Rasuwa

2012
- DPSS Bangladesh started based on learnings from Nepal
- Contributed in "Capacity Development for School Sector Program" under which 165 school buildings were retrofitted under Nepal Government's leadership

2014
- Participation of Students and Teachers in the International Conference on Disaster Risk Reduction as part of the 'Kobe-Kathmandu Collaborative Exchange Program'
- Enhancing Children Safety and Community Resilience through Integration of DRR & CCA in Education Sector implemented in 5 districts - Humla, Bajura, Achham, Saptari and Dhanusha

2015
- In the aftermath of 2015 Gorkha Earthquake, worked in Temporary Learning Centres designs and contributed in Education Cluster Response.
- "Building Back Safer Schools for Nepal Earthquake Response 2015" program implemented

2016
- Government incorporated Comprehensive School Safety framework in School Sector Development Plan (SSDP) for 2017- 2023.
- 'Disaster Education from Hyogo in Nepal' implemented in eight schools of Nuwakot district.

2018
- Nepal Safer Schools Project (NSSP) launched for Far-West and Mid-West Nepal. A consortium of 4 organizations including NSET has been formed to implement the project.

Major Accomplishments

Since 1999, NSET has implemented SESP in several schools. NSET has been involved in making almost 300 school buildings safe from earthquakes; over 200 engineers and 2000 masons trained, over 11,000 teachers, 5,00,000 students and 5000 community people got orientations on earthquake risk and safety measures.

At present, the education sector has developed more capacity to implement DRR activities. School safety and mason training on safe construction has been one of the integral components of almost every agency working in the education sector in Nepal. Ultimately, there has been a progress in nation's capacity in Disaster Risk Reduction.

Masons trained before the earthquake served the community to improve the construction quality and served affected people to build stronger houses. The rate of recovery of SESP program schools after the earthquake was noticed faster than non-program schools.

SESP has given rise to several innovative ideas.

All the retrofitted buildings performed well in 2015 Gorkha Earthquake even near to the epicenter and were used as community shelters and relief centers after the earthquake.

SESP has been recognized in national and international level. SESP's model, experiences and methodologies have been replicated in countries such as Pakistan and Bangladesh. School safety was also identified as one of the high priority area as Flagship 1 of Nepal Risk Reduction Consortium (NRRC).

School retrofitting program was continued by the Government. Government incorporated Comprehensive School Safety framework in School Sector Development Plan (SSDP) for 2017- 2023.

Retrofitted schools didn't suffer structural damage during 2015 Gorkha Earthquake

After the earthquake, the initial rapid damage assessment of school buildings was carried out under the leadership of Department of Education. It was conducted to identify the status of schools building either to occupy the building or build temporary classrooms until detail damage assessment is accomplished. The initial rapid damage assessment found that about 60% of the existing school buildings in earthquake affected districts were identified unsafe for immediate occupancy. However, the retrofitted schools didn't suffer any structural damage while in an earthquake. Most of the schools were used as an immediate community shelter, field hospital and relief centers. The findings have shown a clear direction for structural vulnerability reduction and enhancing disaster preparedness. It has demonstrated the feasibility and cost effectiveness means of improving school safety through locally available resources.

Retrofitted building of Balbikas School, Alapot, Kathmandu which provided shelter during 2015 Gorkha Earthquake

Happy with Retrofitted School Building

Two of the five school buildings were already retrofitted hence are completely safe while the remaining three buildings have suffered partial damages. After an overall look at the fine buildings of Tilingtar School, one could hardly believe that a major quake had recently struck the country.

- Mr. Saroj Pandey, Principal, Tilingatar Higher Secondary Boarding School, Dhapasi Kathmandu

Established in 2019 B.S, Tilingatar Higher Secondary Boarding School served as the temporary shelter for around 200 people in the aftermath of the 2015 Gorkha Earthquake. Dhapasi is one of the worst hit areas by the earthquake.

Challenges

The following are the identified challenges:

- There are thousands of school buildings all over the country which are poorly built. Hundreds of thousands of school children are under unsafe structures. Bringing them under safe roofs is a big challenge. Volume of problem is big.
- Qualified work force is required in massive number to ensure building code compliance in new school buildings. There is limited or no trained work force available locally. Need is to develop capacity of masons and construction workers massively.
- There is limited capacity on Monitoring and Evaluation.
- Retrofitting is comparatively a new idea to many stakeholders and hence need is to familiarize people with the concept and approaches of retrofitting.

Lessons learned

- School Earthquake Safety Program (SESP) activities are not limited to schools. The concepts and approaches are passed on to communities and contribute to building community resilience.
- Collaboration amongst all stakeholders is important as the Government alone cannot enhance earthquake safety.
- Grant of school construction from the Government is not sufficient to build school building according to the approved design. Hence, Government needs to improve unit cost per class room construction so as to ensure quality construction.
- To ensure the quality of construction/ retrofitting, a strong Evaluation and Monitoring system is essential.
- Strong technical team with sufficient number and skill is required in each district.
- Combination of a comprehensive approach works well for the sustainability of the results.
- Community led construction/ retrofitting is a better implementation modality in order to ensure ownership and technology dissemination.
- Retrofitting is the only option to reduce structural vulnerability. It should be scaled up to make schools safer and encourage the community to replicate.

What Next?

There are about 82,000 buildings belonging to more than 34,000 schools in Nepal, out of which about 60,000 buildings require seismic improvement. Much needs to be done when it comes to school safety. Past experiences say that they 'can be done' through collaboration. Old schools need to be retrofitted; new buildings need to be constructed with proper compliance with building codes.

To continue the efforts on promoting school safety in Nepal, Nepal Safer Schools Project (NSSP), a consortium of Crown Agents, NSET, Save the Children and Arup international has been launched with the financial support from DFID and it will be implemented in Mid-West and Far West Nepal. The NSSP will address 250-300 schools in the Far and Mid-West of Nepal as this region is considered to be the most at risk of future seismic disturbance.

NSET seeks every opportunity to work with more and more schools on building resilient schools.

Conclusion

Uninterrupted two-decade time span of NSET's efforts to build the resilient schools has a significant contribution towards improving the safety of school structures, enhancing school disaster risk management capabilities and promotion of disaster safety education in Nepal. Beside this, the entire community has benefited from the program on promoting safer construction technology through the learning from schools and trained human resources Schools are the key entry point for enhancing disaster awareness and safety amongst families and ultimately the community. Students and the teachers could be used as important change-agents for disseminating disaster knowledge to the community.

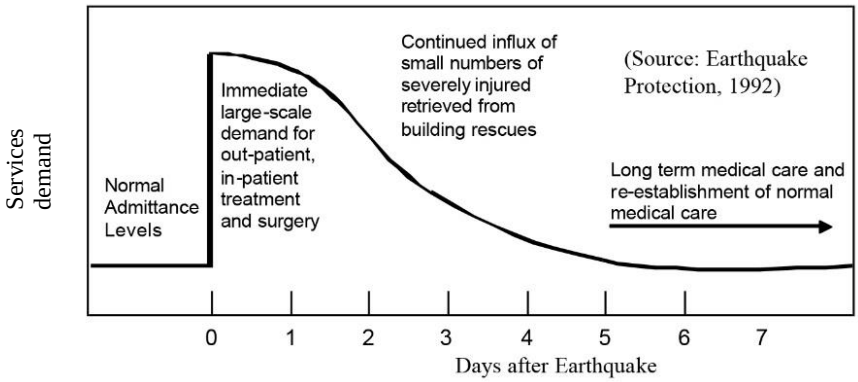
Retrofitting of Tri Padma School, Lalitpur

Section 2 NSET's Major Contributions in 25 Years

Hospitals get prepared for Disaster Emergency

Background

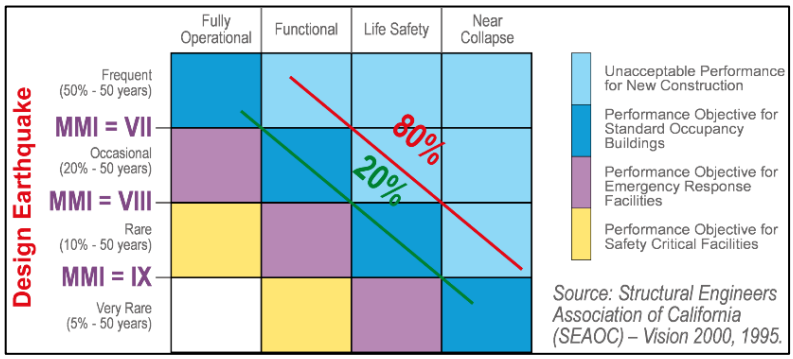
Hospital plays critical role during and immediate aftermath of any disaster incidents. At the times of big disaster like earthquakes, hospitals are required to provide health care services and treatment to people. Hospitals play a lifesaving role during large-scale, sudden onset disasters. They must provide health services even more efficiently than when in a normal condition. Hospitals, health facilities and health workers should be ready and able to function well in the emergency time. For that, health facilities should be strong enough to withstand earthquakes and other disasters; and also there needs to be well devised systems to resume services and functions in disaster emergencies.



Health institutions are critical facilities that need to be functional in earthquake situation; and be able to manage services during post-earthquake situations. Realizing this, NSET has worked on medical sectors also collaborating with key institutions. Some pilot works have been done, some capacity ingredients have been built up and some risk reduction actions are put in as described below.

Seismic Vulnerability Assessment of Major Hospitals of Nepal

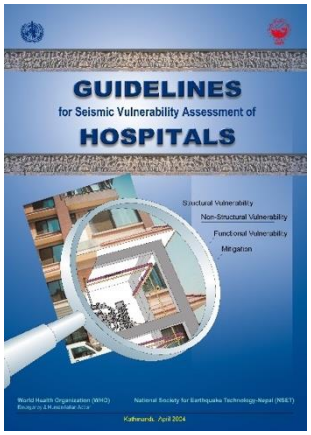
Understanding disaster risk is the first step for DRR. For that, NSET conducted two studies "Structural Assessment of Hospitals and Health Institutions of Kathmandu Valley" and "Non-structural Vulnerability Assessment of Hospitals in Nepal" in year 2001 and 2003 respectively working closely with the Ministry of the Health, Government of Nepal and WHO-Nepal. The objective of the assessment was to a) develop a



systematic approach towards assessment of structural and non-structured vulnerabilities of hospital buildings and health institutions of Nepal, b) identify appropriate intervention measures for improving earthquake resilience of the existing health infrastructure, c) development of local capacity for such work in the country, and d) disseminate the findings for facilitating implementation of the identified earthquake risk reduction measures.

NSET undertook these assessment works as per the Health Sector Emergency Preparedness & Disaster Response Plan Nepal prepared by the Disaster Health Working Group, Epidemiology and Disease Control Division (EDCD), Department of Health Services (DHS), the Ministry of Health and WHO-Nepal. Thus by 2003, NSET conducted a seismic vulnerability assessment of major hospitals of Nepal. And this was the first ever such work in the region.

The assessment estimated that most of the hospitals would withstand the occasional earthquake of MMI VII without collapsing, but 10% of the hospitals might be functional, 30 % partially functional, and 60% out of service in case of a major earthquake shaking of intensity IX MMI. [The major cause of possible functional loss was considered to stem from non-structural damage.]



Guideline for Seismic Vulnerability Assessment of Hospitals

With the view to facilitate assessment of hospitals and health institutions, NSET prepared a "Guideline for Seismic Vulnerability Assessment of Hospitals" and published jointly with WHO and Ministry of Health in 2004.

HOPE, MFR courses helping in emergency response

Hospital Preparedness for Emergencies (HOPE)

Started in 2003, Hospital Preparedness for Emergencies (HOPE) is a training course to impart knowledge and skills to healthcare medical personnel and managers to develop risk reduction and disaster response plans to enable their facilities to manage complex emergencies such as earthquakes, floods, epidemics, fires and other mass casualty incidents. HOPE graduates have vital skills in hospital disaster planning, mass casualty emergency care management and effective response. HOPE trainees learn about multi-hazard risk management to make their healthcare facilities safer.

Under the Program for Enhancement of Emergency Response (PEER), NSET has produced more than 2,590 HOPE graduates in the countries of South Asia including Nepal.

Medical First Responder (MFR)

MFR is a thirteen-day course that was developed by the USAID/OFDA in collaboration with the Miami-Dade Fire which provides non-medical responders skills necessary to assess, treat, and transport sick or injured patients following an emergency or disaster. So far, NSET has produced more than 580 MFR graduates across the region including Nepal and contributing in emergency response works.

Hospital Disaster Preparedness Drill

NSET assisted in conducting Hospital Disaster Preparedness Drill at B.P. Koirala Institute of Health Sciences (BPKIHS) Dharan in coordination with Action Aid, Dharan Municipality and BPKIHS in 2007. The drill was organized as part of the "Safe Hospitals Campaign, declared by the UN International Strategy for Disaster Reduction (UN/ISDR). The objectives were to create earthquake awareness and to "test" the emergency response plan and capability of BPKIHS.

Emergency Response Plan of Bheri Zonal Hospital

NSET conducted a detail assessment of structural and non-structural vulnerability of Bheri Zonal Hospital, Nepalgunj in 2010. NSET, Action Aid Nepal and Handicap International together with Hospital implemented plan to enhance functionality of hospital services; structural, non-structural and functional. Awareness and interaction programs conducted. Also, team developed Disaster Preparedness and Emergency Response Plan with spatial map. Non-structural mitigation also carried out in the hospital.

Planning meeting at Bheri Zonal Hospital

Emergency Water Supply Systems for Hospitals

In 2011, NSET, under the project funded by the European Union, provided technical assistance for seismic vulnerability assessment of water system in five selected health facilities, namely, Tribhuvan University Teaching Hospital (TUTH), Shree Birendra Hospital (SBH) and Civil Service Hospital (CSH) and two rehabilitation centres were Army Rehabilitation Centre (ARC) and National Disability Fund (NDF). NSET helped establish new deep tube well, develop Emergency Water Supply Response Plan (EWSRP), conduct training to Emergency Water Supply Response Team (EWSRT), and stockpiling and implementation of non-structural vulnerability reduction of water system to ensure continued functionality of the hospitals immediately after a large earthquake.

Non-Structural Assessment of Health Facilities

NSET with the funding support from Save the Children provided technical service to health facilities to carry out seismic non-structural vulnerability assessments including WASH followed by nonstructural retrofitting. The program was implemented in Bhaktapur Hospital and Patan Hospital and nine health facilities in Kathmandu, Lalitpur and Bhaktapur districts, namely, Imadol health post, Jhaukhel Health Post, Duwakot health post, Lubhu Primary Health Care Centre, Chagunarayan Primary Health Care Centre, Siddhipur Sub-Health Post, Ichangu Narayan Health Post, Siuchatar Health Post and Bishnu Devi Health Post to ensure health facilities remain functional in the event of a major earthquake.

Major Accomplishments

In collaboration with Government and other agencies, NSET has been implementing various initiatives regarding vulnerability reduction and emergency preparedness of Nepal's institutions for more than last 20 years. As part of its efforts following activities and projects have been accomplished.

- Assisted Department of Health in developing Emergency Preparedness and Disaster Response Plan for Health Sector in Nepal.
- Structural and Non-Structural Assessment of 19 Hospitals in Nepal and preparation of Guideline for Hospital Assessment. The hospitals implemented structural Vulnerability assessment are including Bir Hospital, Army Hospital, TUTH, Patan Hospital, Bhaktapur Hospital. The non-structural improvements implemented in Bir Hospital, TUTH, Patan Hospital, Bhaktapur Hospital, Western Regional Hospital, Koshi Zonal Hospital, Bheri Zonal Hospital, Seti Zonal Hospital, and Bharatpur Hospital.
- More than 2590 medicos trained on HOPE and more than 580 medicos trained on MFR in the South Asia region so far.
- A total of 610 (376 are male and 234 female) people trained in Nepal on BEMR.
- Conducted Vulnerability Assessment of blood bank buildings in Kathmandu and other five district centers (Biratnagar, Pokhara, Nepalgunj, Dhangadhi and Birgunj).
- Retrofitting of Chhetrapati Community Hospital held.
- A qualitative earthquake vulnerability assessment of Epidemiology and Disease Control Division building, TUTH, CSH, SBH, NDF and ARC.
- Non-structural Performance Assessment of Health Facilities TUTH, CSH, NDF SBH ARC, Bhaktapur Hospital, Patan Hospital.
- Seismic Vulnerability Assessment of nine health centers in Kathmandu Valley including Syuchatar Health Post, Ichangunarayan Health Post, Bishnu Devi Primary Health Care Center, Changunarayan Primary Health Care Center, Duwakot Health Post, Imadol Health Post, Jhaukhel Health Post, Luvu Primary Health Care Center, Siddhipur Sub Health Post.
- Assisted in developing emergency response and preparedness plan of various health facilities including TUTH, Patan, BP Koirala Institute of Health and Science, Bheri Zonal, Bhaktapur, Civil, Birebdra Sainik hospitals among others.
- Various Guidelines and Manuals have been developed such as Guidelines on Emergency Preparedness & Disaster. Management for Hospitals, Rapid Health Assessment Format and Guidelines for using the Formats, Guidelines on Non-Structural Safety in Health Facilities, Poster on myths and realities of natural disaster-based concept from the WHO/ PAHO, and Guidelines for Seismic Vulnerability Assessment of Hospitals.

Section 2 NSET's Major Contributions in 25 Years

Mason Training: Creating the backbone of risk reduction at the last mile

Background

Construction of residential houses in various developing countries including Nepal is primarily carried out by informal sector, mostly by the local craftsmen and owners-builders. Usually, the work force (masons, bar-benders, carpenters, electricians and plumbers etc.) employed in this sector lack formal trainings, most acquire skill through trial and error, working as an apprentice or a helper to head mason who is believed to be knowledgeable in the art of cnstruction through intra-generational transfer of knowledge. This process also builds up the traditional wisdom of incorporating earthquake resistant elements over century. However, several elements of traditional wisdom and technology were mis-interpreted and some were lost in this process. Moreover, the introduction of new materials and technologies in the construction sector put further challenge demanding specific skills for their effective use. Improper use of such materials and imitation without knowing details of technology have resulted in high cost and low quality of buildings even in urban or urbanizing areas. This is leading to increase in vulnerability.

Like in most of the developing countries, masons in Nepal also have a very important role in building construction both as a consultant and contractor to owner-built buildings and housing. Approximately 90 % of the buildings are constructed by this process in Nepal. Involvement of engineering professionals in building production is limited to approximately only 10% that also mostly in urban areas. Despite the huge involvement of the masons in building production, masons do not have formal training, and in most cases, they are not even aware of earthquake resilient construction practices. Studies have shown that almost 90% of the total resources mobilised for capacity building in construction businesses goes to engineering professionals and the very small resource goes for training masons. Such discrepancies are to be mitigated and building capacity of masons should be a priority.

History of Training Masons

One of the masons working with NSET for school retrofit in mid nineties had a question to a young Civil Engineer in a school retrofitting site, "We are masons and you are Engineer. We do what you say to us, but why are we doing this (retrofit works) in this way?"

Then, it was realized that it's not only "what" but also "why" needs to be discussed with masons. Then NSET started training to the masons.

Start of Masons Training on Earthquake Resistant Technology: Through KVERMP program in 1997

As NSET saw a clear need of producing trained masons, NSET started mason training in 1997 under the Kathmandu Valley Earthquake Risk Management Project (KVERMP). The purpose was to upgrade skills of the practicing masons as well as new-comers in the construction sector; and disseminate the earthquake resistant construction technology to reach to the grass-root level.

The KVERMP included formal and on-the job training programs for masons as part of its School Earthquake Safety Program (SESP) that was implemented in Kathmandu, Vyas, and Banepa Municipalities. The program was a success, not only because the local masons learned the skills of earthquake-resistant technology in non-engineered construction, but also because they were able to convince the house-owners on the benefits of such approach. Further, the skilled masons could successfully impart their skills to masons of their localities. Numerous mason trainings have been organized by NSET then on.

2001: Mason Trainings in Gujarat

NSET began training to masons in Gujrat following the Gujrat Earthquake in 2001. Importance of training the masons gained more grounds as SEEDS India invited NSET for collaboration in the Patanka Nawajeevan Yojana (PNY) in earthquake reconstruction program in Patan District of Gujarat during 2001-2003. "Nepal Gujarat Masons Exchange and Training Program (NGMETP)", a joint program of NSET and SEEDS India started in August 2001 and continued till the completion of PNY. It was an opportunity to replicate the past experiences of NSET in identifying and implementing simple earthquake resistant construction technology transfer at the grassroot level through awareness and mason training.

NGMETP was conceived to share the experiences of trained and experienced masons from Nepal to fellow masons from Gujarat and vice versa. Exchange visits of Gujarat masons to Nepal and Nepali masons to Gujarat helped to fortify the learning process as well as acquire new techniques in safer building construction.

2005: Curricula for Mason Training

As an attempt to consolidate the experiences of mason trainings gained in KVERMP, Curricula for Mason Training and Guidelines for Trainers got prepared and published in 2005. Mason Training course was meant for practicing construction workers mainly masons (stone-layers, brick-layers), carpenters, and bar-benders. Generally, the practicing masons have basic knowledge and skills required for construction of a house, but they do lack knowledge and skills on earthquake-resistant elements. This course helped to upgrade their skills to incorporate simple and economic ideas on earthquake-resistant construction.

2006: Mason Training for Earthquake Resistant Housing Reconstruction in Pakistan

The training of masons in aspects of earthquake resistant construction was implemented in a massive scale in the two provinces of Kashmir-Pakistan after 2005 Kashmir Earthquake. In 2006, NSET started providing technical support to Earthquake Reconstruction and Rehabilitation Authority (ERRA) of Pakistan working in close co-ordination with UN-HABITAT. Under the program, NSET provided support to formulating policies & strategies, developing training curricula, monitoring, capacity building for earthquake-resistant reconstruction and etc. Trainings for Masons and Engineers have been major activities done in Pakistan.

2007: Mason Training in Iran

In 2007, NSET and Asian Disaster Preparedness Center (ADPC) implemented Program for Strengthening Capacities for Disaster Risk Management in Iran, commissioned by UNDP and Government of Iran. Also, the Up-streaming Community Based Approaches for Promoting Safer Building Construction in Iran formulated and implemented by UNDP-Iran. NSET provided mason training to the working masons to promote safer building construction practice.

2007 onwards: Striving to produce adequate trained masons

In 2007, under the DIPECHO program, NSET in association with Lutheran World Federation (LWF), Nepal conducted Earthquake Safety Construction Skill Training for Masons and Construction Technicians in Bhadrapur, Gaur, Bhaktapur, Madhyapur Thimi, Kirtipur Municipality and Kathmandu Metropolitan City. Enhancing knowledge and skills of masons and construction workers on the earthquake-resistant construction technology was the main objective of the project. A total of 635 Masons got trained. Further, a total of 104 Self-Builders were trained in Kathmandu Valley.

From 2012 to the end of 2017, through Building Code Implementation Program in Nepal (BCIPN), NSET trained 5413 masons in 30 Municipalities of Nepal. And through Technical Support for Building Code Implementation in Nepal (TSBCIN) Program, 305 local masons have been trained till April 2018.

2015: A Pilot work on Technical Support for Earthquake Safer Housing Reconstruction

NSET implemented the Technical Support for Earthquake Safer Housing Reconstruction (TSESHR) program with the funding support from US Office of Foreign Disaster Assistance (USAID/OFDA). TSESHR was a short-term intervention planned for 3 months. It commenced on 1 July and was completed by the end of October 2015. TSESHR was designed to cater the immediate requirement in planning, developing and piloting the potential methodology of technical support for earthquake safer reconstruction. Total 55 masons got trained in 2 training programs conducted in this pilot phase.

2015: Massive Mason Trainings through Baliyo Ghar Program

After 2015 Gorkha Earthquake, NSET implemented Baliyo Ghar Program, a technical assistance program to ensure safer reconstruction supported by USAID Nepal. Under the program, NSET has been conducting mason trainings in 4 districts; Dolakha, Dhading, Nuwakot and also in Kathmandu. In total, 7,200 masons have been trained under the Baliyo Ghar Program till May 2018.

As estimated by government, more than 100,000 trained masons are needed to reconstruct the damaged buildings in quake hit areas. Existing available numbers could cover less than 50% of the total need. Hence to fulfill the need, like other organizations, NSET also implemented On-the-Job Training (OJT) to produce new masons.

2016: Revision of Mason Training Curricula

Consolidating the 2-decade long experience in mason training, NSET contributed for the development of standardised Mason Training Curricula for Urban and Rural construction in Nepal. These curricula have been developed under the guidance of Government of Nepal and based on rich experiences of Nepal during past 2 decades. Government of Nepal brought out these curricula and made effective in 2016.

Earlier, the mason training was a 5-day course for both urban and rural buildings. It became clear that speedy reconstruction of almost a million houses cannot be done unless the mason training curriculum is split into rural and urban. Further enhancement and revision of such already existing curricula and guidelines was necessary to address the needs in the aftermath of 2015 Gorkha Earthquake. The existing training course required certain updates realizing the need for giving ample time for skill enhancement in various technologies. Under the guidance of DUDBC, NSET worked extensively and came up with modular courses on different technologies. There are two modules in the new course; on stone-mud masonry house and reinforced concrete building. Now this is 7-day training package each.

Now, these 7-day curricula, separate for the rural and urban masons are the national standard curricula.

On the Job Training (OJT) for New Masons

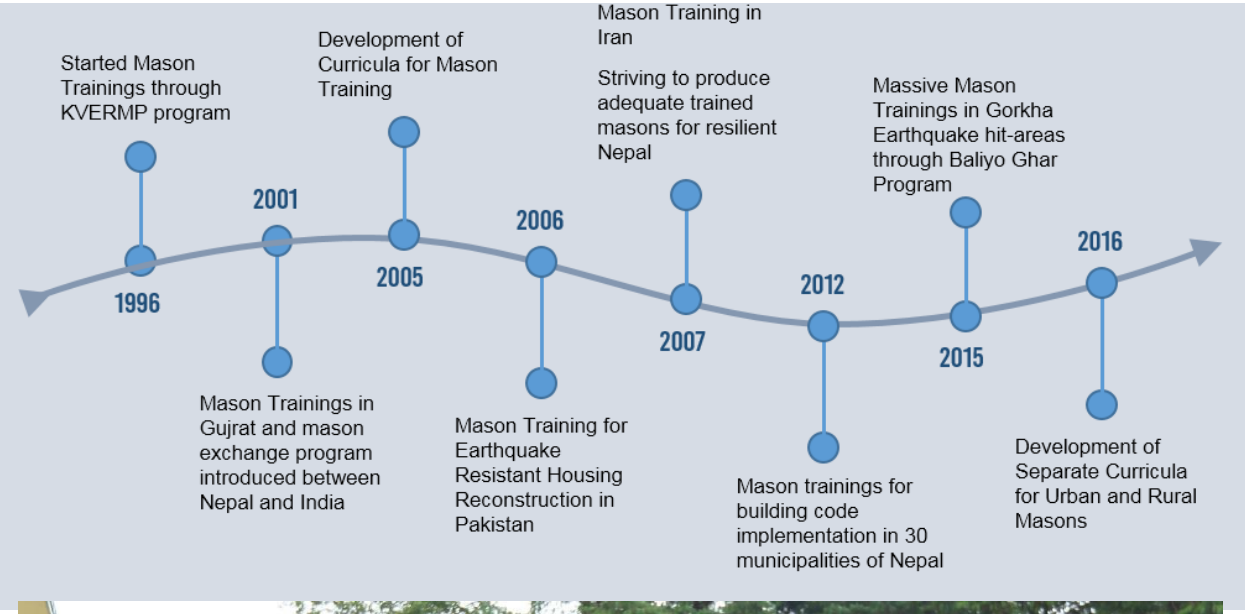
The Gorkha Earthquake created a huge demand of trained masons for Building Back Better. A total need for 100,000 masons was estimated in the affected area. Existing masons who could be trained constituted only half of this need.

Therefore, a concept of On-the-Job training (OJT) was introduced to develop new masons. During the OJT course, potential new masons are involved in the construction of real house under the supervision of

trained mason and a technician. Classroom lectures are also organized to give basic knowledge of construction. Within 50 days duration of on-the-job training, one group of 6 new masons can be developed.

This system of on-the-job training is actually a transitional arrangement for the production of huge number of skilled masons. This ultimately transforms into a sustained regular training course for the development of masons. NSET/Baliyo Ghar is developing approximately 500 masons in a program rural municipality.

Evolution and Refinement of Mason Training Concept



Major Challenges

- The rates of new building construction in many cities and urbanizing centers are high while most of the buildings are being poorly constructed. There are issues of quality and safety also in rural construction.
- Many practicing masons in different parts of the country are not trained on earthquake resistant construction techniques. They are continuously working with the knowledge and skills they have.
- The local government are yet to formalize mandatory provision for registration and management of masons and petty contractors. Proper training of masons is not yet mandatory.

There is no clear provision to involve the masons trained on rural construction to urban and vice-versa.

Lessons Learned and practiced

Mason Training has been very effective way of proliferating knowledge and skills of earthquake resistant construction in the country. The major learnings can be listed as follows:

- Engagement and support by local authorities can greatly help in scaling up the process of training. A system of accreditation and licensing of trained masons including maintenance of database at the office of building permits is required. This will encourage and make trained masons accountable for safer construction. Also, new house-owners will be benefitted with the information about trained masons to work with.
- A system of engaging the citizens in aspects of disaster risk management should be installed in the plan and programs of Local Governments.
- Coordination with house-owners is of paramount importance to create a proper environment for trained masons to work.
- Adequate social mobilization is required before planning and conducting any training to ensure that the working masons are incorporated in the training.

Conclusions

Masons are the key actors who translate designs into reality, especially in developing countries where many of the buildings are non-engineered, and the masons are commonly serving as the “best technical hands” available for building construction. Therefore, masons need to be aware of the technology they are working with in order to ensure optimum, efficient and effective use of the building materials and the construction processes. The positive impact of the Mason Training can be clearly observed at three major levels; in the community, in the attitude of the masons trained and the most important is in the construction quality and safety level of the buildings constructed.

Masons, who were initially confused and reluctant to the technology, are now confident on the technology acquired. Trained masons have also been committed to implement earthquake resistant construction techniques in their communities. The organized efforts of trained masons have led to the creation of masons group and the group are now advocating for safer construction practice.

Mason training has been effective; and impact is seen remarkable and definitely creating backbone for risk reduction. In addition, strong policy support and conducive environment are indispensable for enhancing the effectiveness and impact of training programs.

Trained Masons becoming Prmoters of Resilient Construction

Mrs. Doma Sherpa, 23, is a resident of Khartal, Bigu Rural Municipality-5, Dolakha. She has seen from her childhood that only males get involved in laying walls in house construction. She got chance to participate in 50 days On-the Job Training (OJT) conducted by NSET under Baliyo Ghar in April 2017. She can now be found in construction site with shovel, plumb bob and other tools.

Mrs. Doma has now turned to be a trained mason who can lay walls and lead other masons. She has managed her household works and construction job simultaneously. She is well received mason in Khartal Dolakha.

Mr. Sheer Bahadur Tamang, 49, is a resident of Yarsha Village of Bigu Rural Municipality -5, Dolakha. He has been involved in construction works since long. Mr. Tamang remembers, *"I had built more than 20 houses. Most of them collapsed in Gorkha Earthquake. I felt so bad. I was seeking the earthquake safe ideas and it was NSET to fulfill my thirst."*

Mr. Tamang participated in Mason Training conducted by NSET under Baliyo Ghar. He is now taking lead in rebuilding many houses in earthquake hot village of Chilanka in Dolakha. Mr. Tamang is guiding fresh masons about the safer construction technology and promoting safer reconstruction.

Mrs. Nirmala Shrestha, was a house wife confining herself within the four walls of her house. Ms. Nirmala had never imagined that she would be a mason one day in her life. But after the Gorkha Earthquake as there was a huge need of masons in her locality to reconstruct the damaged houses, she thought to be a mason. Nirmala, a mother of three children turned to be a professional mason after she participated the on-the job training of NSET-Baliyo Ghar in Jyamrung Dhading. She is now helping reconstruct Jyamrung. “I am carrying out masonry works alike senior masons and nobody has made complain against my works. I am very happy from the work I am engaged in, as I have been earning by myself and contributing to build Jyamrung better and safer,” said Nirmala.

Mr. Chatra Man Gurung is a well-known name in his community in Shivapuri Rural Municipality, Thanapati, Nuwakot. With more than 30 years of experience, Mr. Gurung was one of the few masons who participated NSET-Baliyo Ghar's 7-day mason training in Nuwakot. Soon after the Gorkha Earthquake, he was involved in rebuilding 4-5 houses which lacked compliance and failed to receive government grants. But after the training provided by Baliyo Ghar all the houses rebuilt under his leadership have received all government grant as they comply with the code and standard. After the completion of 2 dozen of houses since the training, Mr. Gurung engaged in the pilot training regarding retrofitting of masonry buildings in his community. Mr. Chatra says, "my career has boosted up after the training. I am transferring my knowledge and skills to the youths so that they could contribute in reconstructing our locality and even after the reconstruction is over."

“*Many masons who are trained by NSET in different part of the country through different programs have been mosrtly found involved not only in constructing safe buildings but also in promoting safer construction practices in the communities. There is a gradual elevation of the social importance of masons trained in earthquake resistant construction – they are respected, consulted with trust and have gradually become the "Change Agents" in the society. Thanks to the social influences and contribution of the trained masons.***”**

Section 2 NSET's Major Contributions in 25 Years

Community Centered Disaster Risk Management

Background

Neighborhoods and communities are the first ones to help each other during any major disaster situation including earthquakes. Recent experiences have shown that systematic awareness and preparedness at the community levels will significantly contribute to reduce the risk. Realizing this, National Society for Earthquake Technology-Nepal (NSET) has been working with different sector of societies to implement community based earthquake risk reduction programs. At the initial stage NSET was implementing earthquake focused program and these years, it has widened its activities so as to cover multi hazards risk reduction program in the communities. The lessons are very encouraging; communities have accepted the idea of Community Based Disaster Risk Reduction (CBDRM) and highly motivated towards actively implementing such initiatives.

CBDRR initiatives of NSET

NSET started community based earthquake risk reduction initiative in ward number 34 of Kathmandu Metropolitan City in 2001. This program seemed to be very much promising at the initial stage. The lessons from the first initiative were applied in ward number 17 in 2002. NSET carried out similar intervention but involving the local authority - the ward office and also local rotary club. NSET clearly mentioned that it would facilitate them to work for earthquake risk reduction. The local committee then required to active in carrying out the works independently after a couple of years of technical input from NSET. This model worked better, and 17 wards Disaster Risk Management Committee has remained active till date.

NSET then started to replicate the CBDRM initiatives in other communities with improved implementation strategy from the lessoned learned. There was high need to cover multi-hazard disaster risk reduction initiatives as the community people were facing frequent disasters like epidemics, fire, flash floods and landslides every year where as earthquakes have a long return period with heavy devastations as compared to other disasters.

The following table shows some of the major Community Based Disaster Risk Reduction Projects conducted with the financial support and partnership with various national and international agencies.

Table 1. Major CBDRR Projects of NSET

SN	Project Brief	Supporting Partner	Geographical Coverage	Duration	
				From	To
1	Global Grant for Sustainability (GGS) Enhance Disaster Risk Reduction Capacity of the Municipality through mobilization of local platforms at the community level	Kyoto Univ.	LMC 16 and 21	Mar 2017	Feb 2018
2	Nepal Earthquake Risk Management Program (NERMP) Create awareness and facilitate the communities to develop and implement municipal /village development level disaster risk management plan.	OFDA	6 VDCs of 6 Distriucts	Jan 2014	Mar 2015
3	Community Based Disaster Risk Management in Nepal (CBDRM-N) AS- NEP 002- 10) Create awareness and strengthen capacity of three communities to conceptualize, formulate and implement disaster risk reduction and preparedness initiatives.	LWR	KMC 18, LSMC 12 and Alapot VDC	Jul 2010	Dec 2011
4	Community Based Disaster Risk Management (CDBRM) - NEP-05-001 Enhance existing capacity to deal with disasters of the local community through model mitigation works.	UNDP	18 wards of 6 municipalities/Districts	Apr 2006	Dec 2007
5	Kathmandu Valley Earthquake Preparedness Initiative (KVEPI) Enhance earthquake preparedness capacity of five municipalities of the Valley by prepositioning of light search and rescue kits and producing community volunteers.	ARC	10 wards of 5 municipalities of KV	Feb 2004	Mar 2005
6	Kathmandu Valley Earthquake Risk Management Program (KVERMP): Establish and strengthen the Earthquake Risk Reduction initiatives in Kathmandu Valley	OFDA	LSMC 16, KMC 34 and 17	Jul 2003	Dec 2005

Implementation Strategy

NSET works as a facilitator for the community and the local government to develop and implement the Local Disaster Risk Management Plans (LDRMP) which are prepared as guided by LDRMP Guidelines. NSET has a three-pronged implementation strategy consisting of Institutional Development, Capacity Building and Demonstration. Networking with the local, national and regional organizations has been also considered to enhance the sustainability of the disaster risk reduction endeavors.

Institutional Development

A local level Disaster Risk Management Committee (DRMC) is formed by the concerned local authority with the participation of the local people in each community. The members of the committees work as representatives of the local government. This is possible as the person leading the committee is the same who leads the Municipality ward or the Village Development Committee. This is very much essential as the committee needs a perennial source of resources. This is possible only if it is well linked with the local governance system which can allocate a portion of its resources in mainstreaming disaster risk reduction to the regular development activities.

Capacity Building

The members of the Community level Disaster Risk Management Committees are trained on disaster risk reduction and preparedness. Five-day training on Community Based Disaster Risk Reduction is organized for the committee members in the initial stage of the project. All the activities related to the project are then conducted by the committee with the technical assistance of NSET. Further, the committees organize awareness and training programs for the community volunteers and the general public.

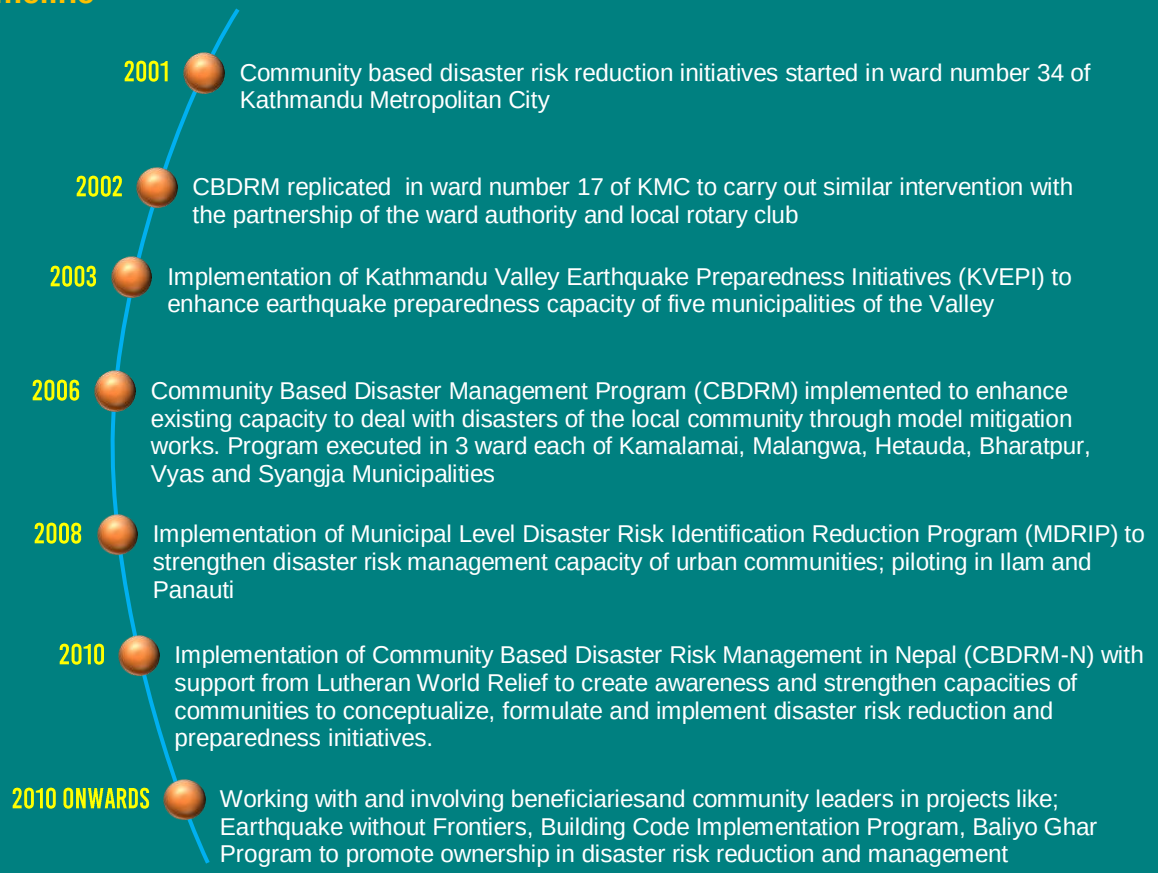
Each DRMC mobilizes the trained volunteers to conduct Hazard Vulnerability and Capacity Assessment of its communities. This data is then processed and used to prepare a Disaster Risk Management Master Plan for the community. Committee prepares such master plans with the technical input from NSET. The plan is then implemented in an incremental manner.

Model Demonstration

The DRMC is facilitated to plan and implement some of the priority actions from the Master Plan prepared for the community. Such actions vary according to the timeline and the resources available. Some of the examples of such demonstration actions are: painting the earthquake response plan on the wall of a school, small scale non-Structural Mitigation (NSM) in a public building, bamboo diversions and bamboo retaining walls for river training works and landslide protection and an earthquake resistant model building within the community.

In addition to these three strategies, the DRMCs are also being associated with the local, national as well as international networks to share experiences and learn from each other. This strategy has enabled the DRMCs to conceptualize, formulate, plan and implement various risk reduction activities at the local level. The DRMCs are conducting awareness sessions, training programs, preparing Community Based Disaster Preparedness and Response Plans. The best part of this process has been that the DRMCs learn the entire process while implementing the activities. The “learning by doing process” has proved to be one of the best ways of transfer of skill including the detailed processes.

Timeline



Outcome

Implementing any project in a Community Based Participatory Approach enables to involve maximum number of community members in the project. Thus, the project does not become just another output oriented project but it will be a process oriented activity owned by the stakeholders within the community. One of the projects implemented in partnership with three local communities of Kathmandu Valley has involved 13 to 24 percent of the total population of the entire community. NSET has put its effort to include maximum number of community members in this programs.

The major outputs of CBDRM have been 2 ward level earthquake scenarios prepared by Ward Disaster Management committee with the help of community volunteers and technical input from NSET; 10 Municipal Level Disaster Risk Reduction and Management Master Plan; 48 Community Level Disaster Risk Management Committees and 3,206 persons trained in various aspects of Disaster Risk Reduction. The following table shows the outputs of the different projects that CBDRM undertook.

Major Outputs of CBDRR Projects of NSET

SN	Project	DRMC	Number of local volunteers/champions Trained															
			DRM	VCA	DRMP	SAR	FA	HFR	Co-Sup	MT	NSM	BTT	SBDRR	DRP	VOA	DLRW	DMT CB	TOT/TFI
1	GGS		30		30	24					22							
2	Training and Campaign for NSM										72							24
3	BLS on DRR and Governance																	
4	LDRMP Nepalgunj	1			30													
5	LDRMP Banepa	1			24													
6	NERMP	9	72	150	120			24	30	300	120							24
7	URM for Municipalities in Terai	2			48													
8	CB in EQ Affected Area (RAP)		48							150		24	24	24				32
9	AS-NEP-3-002-010	3	24	60		72		72		80				72				
10	CRA-Humla																	
11	MDRIP	2			48					60								
12	CDBRM - NEP-05-001	18	48	360	48										24	24	24	
13	KVEPI	10	48		48	240	240											24
14	KVERMP	2	24		24	24	24											
	TOTAL	**48**	**294**	**570**	**420**	**360**	**264**	**96**	**30**	**590**	**214**	**24**	**24**	**96**	**24**	**24**	**24**	**104**

Impacts of CBDRM initiatives

The impact of CBDRM efforts was clearly seen aftermath the 2015 Gorkha Earthquake. There are no speicifc studies done but it has been found that the communities which had worked for earthquake preparedness earlier incurred comparatively less losses. They have been able to provide better community support to affected people in the locality. Examples are from Lalitpur-12 and Kirtipur. They followed basic ideas of emergency communication, retreunification, temporary shelters, taking care of senior citizens & people at most need and managing relief items.

The effectiveness of the training and orientation programs to the housewives has been found more. They have been implementing Non-Structural Mitigation (NSM) measures at the household level. Such programs aimed at the housewives have resulted in making many houses safe. Some of the female participants of the NSM training program have been engaged in non-structural hazard assessment and mitigation at schools and health posts.

There has been some impact at the local government sector despite the adverse political situation prevailing in the country. The government came up with the Local Disaster Risk Management Planning (LDRMP) Guideline in 2011. Now, the LDRMP is being revised to fit into the federal structure of Nepal. Most of the LDRMP prepared for various municipalities with technical input of NSET are now in the process of periodic review. More and more Local Governments are engaged to prepare LDRMP.

Lessons Learned

The following are the lessons learned from the experience of implementing various Community Based Disaster Risk Reduction programs by NSET.

Continuous mass awareness campaign is the must: The awareness level of communities regarding the importance and effectiveness of

Disaster Risk Reduction is increasing. But the increased awareness is yet not enough to motivate them to act for Disaster Risk Reducti

The Involve Local Government: **Implementation strategy adopted by NSET has well recognized the engagementand leadership of Local Government in making DRR initiatives sustainable. All the concerned leaders and officials of the local government will take the ownership of the programs if they are explained well about the importance and effectiveness of the activities.**

Use Simple Languages: Usually, people do not know what to ask for with the disaster managers and the disaster managers do not know what and how to advise the people. NSET Projects, apart from conducting Hazard and Risk Assessment, also provided opportunities for everyone to learn things in simple language.

Honor Indigenous Wisdom: While disaster risk reduction is a long-term and challenging task, however, respect of local wisdom and local indigenous technologies creates better psychological environment for DRR.

Be Transparent: the process of DRR efforts should be kept transparent to the people. Presence of representatives of all political parties and government offices together with those of the academia and civil society and private businesses could help propagate the message that disaster risk reduction is a task that disobeys all political and social difference.

Cost Effective and Replicable: Community centered approaches need to be cost effective, that is the first criteria. Only then, the ideas can be replicated. NSET, hence focuses ot only on proper solutions to the problem but also that should be in the access of local people and relevant to their real-life situations.

Realistis Plans: Normally the local leaders and community frontliners sitting to prepare plans tend to make ambitious plans. Once the planned activities are not held, a negative perception and mistrust created towards the planners. That ultimately leads to frustration. The DRR efforts at the local level only work if the committees and planners are facilitated to make Specific, Measurable, Achievable, Realistic and Time-bound (SMART) Action Plans.

Conclusions

NSET implemented Community centered DRR intitaives are mainly focused on local capacity building, demonstration works and institutionalization of efforts. Sustainability and Replicability of the program concepts are always considered into desigining community focused programs at NSET.

The strategy, methodologies and approaches adopted for Community centered DRR initiatives of NSET have ever been improving based on the local needs and fitness. The procedures developed by NSET have been adapted and used by other organizations working in DRR at community level. It is very important to reach to all the Local Governments and Communities and help them build their capacity and systems for DRR and Preparedness. Making resilient communities should be the priority of all stakeholders from policy makers to implementers to community people.

Section 2 NSET's Major Contributions in 25 Years

Traditional Wisdom combined with Modern Science and Technology for Enhancing Community Resilience

Context

Role of Science and Technology for Disaster Risk Reduction (DRR) has evolved globally in accordance with different international declarations from the IDNDR (International Decade of Natural Disaster Reduction) to the Hyogo Framework for Action (HFA: 2005-2015) and the Sendai Framework for Disaster Risk Reduction (SFDRR: 2015-2030).

Nepal has indigenous knowledge on earthquake resistant construction which is evidenced by the existence of several hundreds of buildings that are older than 400 years.

After the 1988 Udaypur Earthquake, the Building Code Development Project carried out a study and assessed the prevailing practices of construction in various geographical areas of Nepal. It found the incorporation of earthquake-resistant elements such as symmetric configuration, small length-to-breadth ratio, symmetrically located small openings, a low floor-height and a limited number of stories, wooden bands, vertical posts at corners, wooden corner stitch, boxing of openings by wooden frames, wooden pegs and use of wooden wedges among others in building construction in different parts of Nepal such as Solukhumbu located in the Everest region of Nepal, Kali Gandaki Valley in central Nepal and the Gurung and Magar ethnic groups spread over the entire central Nepal from its east to west.

NSET Efforts to Improve the Traditional Buildings

Our historical buildings/ monuments have survived several episodes of large to very large earthquake shakings. Historical buildings are like open laboratories in which signatures of indigenous wisdom in earthquake-resistant construction technologies are preserved. That has protected the structures against vagaries of nature including earthquakes. Such knowledges are considered useful also for ensuring earthquake safety. Knowledge of prevalent indigenous technologies, the history of application, conservation, and the seismic behavior of the constructions could be very helpful in present-day construction practices. NSET believes while talking about modern science and technology in construction practice, we should not overlook the aspects of traditional wisdom and practices too.

NSET has developed **Guidelines for incorporating Earthquake Safety Measures in Repair and Maintenance of Buildings with Historical & Archeological Importance**. The Guideline helps to incorporate the earthquake resistant components in repair of traditional buildings and monuments.

NSET has also carried out a study: "**Traditional Wisdom of Earthquake Resistant Building Construction in Nepal'** to trace and share traditional wisdom and indigenous practice of Nepal in Earthquake Resistant Building Construction Practice. The study consisted six major components ranging from exploration of such traditional wisdom, knowledge and practices on earthquake resistant practices, consolidation, and validation to dissemination.

The traditional architecture and planning of the Kathmandu Valley in particular, has evolved over the years to suit the various local conditions. Development of building technologies in the valley was guided not only by a coping strategy for disaster and socio-cultural beliefs and values, but also influenced by climatic condition, availability of the local materials and skills. These traditional buildings exhibit a good example of vernacular technology including earthquake resistant technology as a coping strategy for disaster but need regular maintenance and repair.

NSET Efforts to use Modern Science and Technology

NSET's role in Earthquake Risk Management is best placed to bridge Academia, Governments and Communities. NSET actually attempts to link Science and Technology with real-life situations of people. NSET attempts in exploring ways of using Science and Technology for building resilient communities. For that, NSET is involved also in research works, technology development and technology transfer.

Retrofitting: Enhancing the strength of Existing Buildings

NSET first adopted the philosophy of retrofit in Schools in Kathmandu Valley with series of feasibility studies. Retrofitting an existing building to improve its seismic safety involved four main issues. First was the engineering method employed, it included technical problem of code requirements, design approach, materials and construction techniques. Second was the cost of the project, such as cost of construction, design and testing and the cost of permits and approvals. Third was the indirect cost of retrofitting such as relocation cost. And fourth was the question of the effectiveness of the retrofitting in reducing the damage.

Stitching the Walls

The weak connection between transverse walls at corners, T-junctions can be improved by stiching these walls with reinforced concrete or inserting timber pieces. It can be done by opening the wall in parts and introducing RC stich if wall is constructed in mud mortar. Alternatively, the stitching can be done by drilling walls first, filling the drill hole with cement grout and forcefully inserting steel bar.

Jacketing the walls

RC jacketing is strengthening and retrofitting technique that consists of application of single-or-double-sided RC walls or coatings. This technique is suitable both for stone and brick masonry.

Splint and Bandage

This system is basically extension of "Jacketing of Wall". In this system the mesh is provided in only critical zones to cut the post. Splints and bandage are vertical and horizontal belts respectively to tie up the walls together.

Through these methodologies many more schools, some public buildings and buildings of diplomatic missions were retrofitted in Nepal and abroad. Though the real test of the retrofit was yet to be witnessed.

Cost of Retrofitting of masonry buildings in developing country like Nepal is a major issue. Different retrofitting techniques are in practice in Nepal. The most common one is split and bandage system. Studies are undergoing to find more economic options like PP-band & others.

NSET has carried out tests to verify the method of retrofitting for seismic resilience of existing buildings and new buildings.

Pull Down Test: Verifying the Theory

Knowing the seismic risk of such widely available masonry buildings in Nepal and the region and to identify possible improvement measures, a Pull Down Test of an existing building was performed in Nepal as a part of the Regional Program of Earthquake Risk Reduction and Recovery Preparedness Program (ERRRPP) supported by Asian Disaster Reduction Center (ADRC), Japan. NSET provided the technical assistance for the Pull Down Test. The purpose of the test was to investigate and compare seismic resilience of retrofitted and non-retrofitted buildings. The test provided further opportunity to review and analyze retrofitting methods for masonry building which are the most common types of buildings in Nepal.

Pull Down Test in progress

Pull Down Test completed

In the test, a 40-year-old building was pulled down on until it got collapsed. As the intensity was carefully increased, the cracks in the wall of the house grew larger until the structure finally collapsed. This event made the participants keenly aware of how vulnerable existing buildings would be in a major earthquake. The second test of the retrofitted building was conducted to confirm the effectiveness of the jacketing method of retrofitting as compared with non-retrofitted buildings, based on the results of the first test. The non-retrofitted building used in the first test completely collapsed at an intensity of 13.1 tons, whereas the retrofitted building used in the second test did not even crack when the intensity was raised to as high as 26.3 tons.

Research works in collaboration with Academia

To identify more options in ensuring the resilience in construction practice NSET collaborated with various Universities and Research Institutions as well as researchers. As in Nepal, the majority of the houses are in rural areas and those houses are either built with stone in mud or brick in mud or brick-in-cement. Hence, NSET has carried out multiple researches over those buildings.

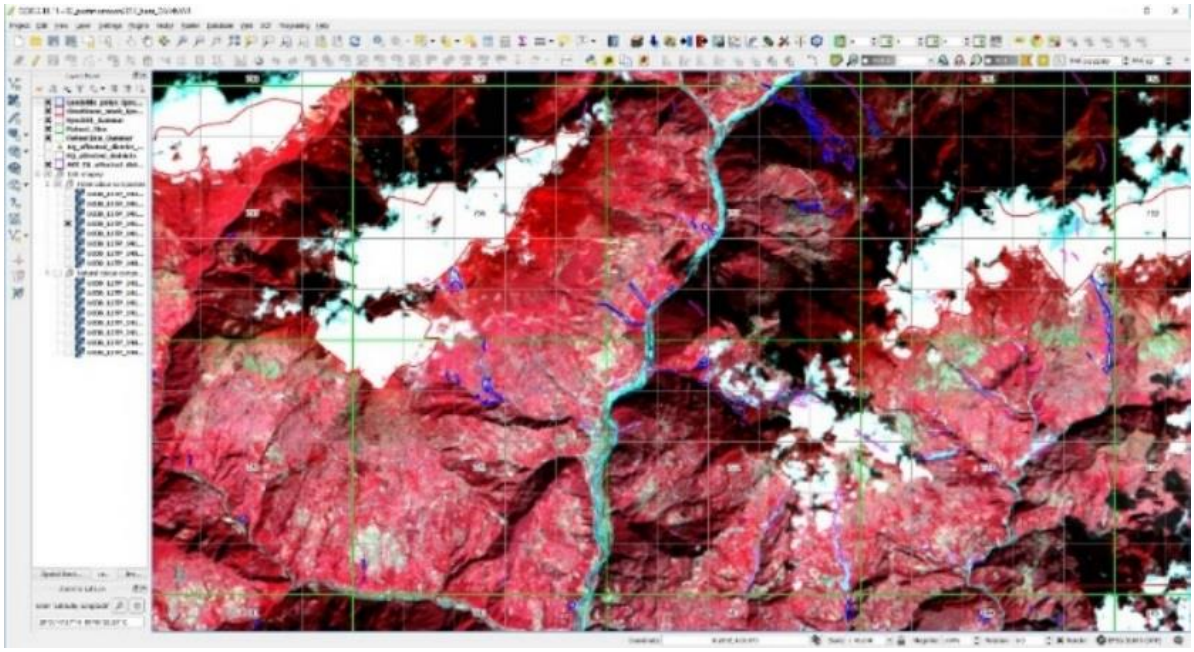
Research at Meguro Laboratory, IIS, The University of Tokyo

NSET got opportunities at Meguro Laboratory, The University of Tokyo to conduct researches by NSET professionals on development of appropriate technologies on earthquake safety of Nepalese buildings. 3 NSET professionals did their Master's degree and 2 NSET professionals did PhD from the University of Tokyo.

Development, testing and pilot implementation of PP-band mesh retrofitting technique, combination of splint-bandage and PP-band mesh technique for masonry buildings are key technologies tested. Development earthquake risk assessment system for Nepal and development of disaster response system by local authorities in Nepal in the changed context of federalization are some of the key output of the researches done.

Research collaboration with Ehime University, Japan

Research collaboration between NSET and Ehime University, Japan ranges from development of cost-effective liquefaction mitigation options to analyzing overall earthquake risk management system in Nepal. From NSET, 1 professional did Master's Degree and 2 professionals did PhD research works from Ehime University. A Memorandum of Understanding (MOU) has been signed between NSET and Faculty of Engineering and Graduate School of Science and Engineering –National University Corporation Ehime University, Japan in 2016 to perform the joint research and activities of exchange of staff for study tour, conducting research and/or supervision student project, attending seminars, colloquiums and academic discussions.



Research collaboration with Durham University, UK

Earthquake induced landslide is one of the major collateral hazard during earthquakes in Nepal. There is very high chance that many roads including the major roads connecting Katmandu Valley to India and China get blocked by earthquake-induced landslides. Proper study on earthquake induced landslide susceptibility helps not only planning for potential huge consequences of the road blockages but also helps understanding the risk that communities are facing and their mitigation measures. NSET, through sending professionals for academic researches and also implementing joint studies, is collaborating with Durham University from United Kingdom. Under the collaboration, NSET and Durham University have been jointly doing research works on landslide mapping and continuous monitoring after Jure Landslide and 2015 Gorkha Earthquake.

Shake Table Demonstration

The Shake Table is an award-winning model highly effective in educating the everyday person about the behavior of buildings during earthquakes. NSET demonstrated its first Shake-table in January 1999. NSET has conducted more than 200 such demonstrations in Nepal and the region. *(please refer Section 3 for more detail.)*

Mason Training

Mason Training is the concept that NSET developed and pioneered in 1998 in bid to impart the earthquake resistant construction skills to the existing as well as new masons so that the new buildings built by them will withstand the future earthquakes. *(please refer previous Chapter in Section 2 for more detail.)*

Sresearch on improving Seismic Performance of Stone Houses

During 2015 Gorkha Earthquake, among the collapsed house structures, more than 90% were the non-engineered un-reinforced masonry i.e. stone-in-mud, raw brick-in-mud or dry-stone masonry buildings. And remarkably, almost all of the houses were two-storeyed. Hence, to address the acute need to understand the seismic

behavior of such buildings and to identify realistic intervenstions for enhancing resilience, NSET did a research and test in China closely working with Beijing Normal University.

Development, Test and Observation in China

NSET joined with Beijing Normal University, China for a collaborative research project of International Center for Collaborative Research on Disaster Risk Reduction ICCR-DRR on **"Development, Testing, Demonstration and Training of better-built procedures and retrofit techniques for non-engineered housing in urban and Peri-Urban areas of the Himalayan belt"** with the financial support from the UK's Department for International Development (DFID). The study was on low strength stone masonry buildings which got extensive damage in 2015 Gorkha Earthquake.

Under the collaboration, team conducted Push-over tests of walls of size 2400 mm x 2100 mm X 400mm with 11 different options with the view to understand the behavior of various strengthening options. Shake Table tests on three types of stone masonry houses were conducted. These tests were completed for two story stone masonry buildings, 3/5 scale in shake table of Kunming University of Science and Technology with the input data of El-Centro Earthquake at incremental loading.

The three building models are

a. Unreinforced Stone Masonry (Model 1)
b. Stone Masonry with Wooden Bands and Posts as per NBC:203 (Model 2) and
c. Stone Masonry with Wooden Bands and Posts plus Gabion Wire Meshing (Model 3)

Test Set up and Wall tested on Stone in Mud with Wooden Bands

Damage to the Building with Wooden Bands and Posts as per NBC 203 at 0.51g

Results

Gabion wire jacketed Timber reinforced dry stone masonry building (Model 3) performed very well and met the expectation preventing local failure of walls. The building was excited up to 1.0 g in X-direction and 0.92 g in Y direction with Life Safety in the building. Though the deflection of the building was very large, the gabion wires did not break and prevented the local failure of the stones. This showed that the gabion wire provided high ductility in the building. The effect of gabion wire on both the sides of the wall, the ability to prevent the local failure, was well observed in the test.

Timber reinforced dry stone masonry building (Model 2) also performed well up to 0.62g allowing the structure to be stable. But there was no Life Safety in the building due to local failure of stone walls in between horizontal and vertical bands at the first floor. Stones tend to push out at low intensity of shaking and failed at 0.51 g. One important observation was that the building got damaged due to local failure of stones in the direction where there are no joists and wooden keys at the floor and roof levels. If we provide joists and keys in both directions at the floor and roof levels, the performance can be improved.

Both the models showed improved performance compared to the unreinforced stone masonry building tested on the first phase which showed life safety at 0.22g and partial collapse of the structure at 0.4g. Though the timber reinforcements in model 2 increased the strength of the building, but could not prevent the local failure of the stones. Once the building was jacketed by gabion wires in model 3, local failure problem was solved and the building could achieve the life safety level at the desired shaking.

Such behavior is expected to be quite close to well-dressed flat stone masonry building in mud mortar. In such case, mud is generally used in vertical layers in between the stone from inside. But in case of random rubble stone masonry buildings which are built in most of the parts of Nepal, more mud is used to fill the gap between the stones. Such buildings are more vulnerable to local failure than the one that has been tested. In such condition, jacketing by gabion wires become

more essential to prevent local failure. Also, more shake table tests need be conducted in future to check the behavior of such random rubble stone in mud buildings.

Major Challenges and Lessons Learned

- No specific policies to guide for the use of Science and Technology in resilience building.
- Limited Research and Development works going focusing on possible use of Science and Technology to solve the real-life problems of people towards building community resilience.
- Low priotity on traditional buildings.
- Modern (new) technology adopted but not in organized ways and having no complete idea on it.
- Poor practice of technology transfer and its localization.

Section 2 NSET's Major Contributions in 25 Years

Understanding the Risk: Hazard Mapping and Risk Assessment

Background

Earthquake risk evaluation is the first step for realistic and effective planning and implementation of Earthquake Risk Reduction and Preparedness initiatives as it helps understand underlying problems and its scale. The first Earthquake Risk Assessment at city level was carried out in Nepal, in Kathmandu Valley, under Kathmandu Valley Earthquake Risk Management Project (KVERMP) implemented jointly by NSET and Geo-Hazards International (GHI) in 1997.

NSET continued different Earthquake Risk Assessment studies in different cities & communities in Nepal. Different approaches and methodologies were adapted. In sone cases, simple earthquake loss estimation was done based on secondary information on general building typology distribution in the city combined with intensity distribution of past earthquake. In some cases, detail analysis of individual building was carried out. Assessments were carried out in small communities with population of a couple of thousands to the mega cities with millions. In the process, the active participation and effective involvement of communities, city level officials and concerned city and central level line agencies had been ensured.

NSET Efforts

Since 1997, various earthquake risk assessments carried out in Nepal. Different earthquake risk assessment methodologies have been used in for evaluation of earthquake risk of cities and communities in Nepal. They not only differ in accuracy but the approaches and process too.

KVERMP

The first earthquake risk assessment at city level was conducted by NSET and GHI in 1997 under KVERMP. The KVERMP used an approach of using existing information on earthquake hazard than investing resources on refining it with new tools and equipment. The program used the previous documented largest earthquake shaking to the study area as the worst case scenario in terms of hazard. Intensity distribution of 1934 Nepal-Bihar Earthquake in Kathmandu, which was published in 1936 by geological survey of India, was used as the basic potential earthquake hazard for loss estimation. In addition, liquefaction susceptibility map prepared by Nepal Building Code was used for estimating potential loss of lifelines and critical infrastructures.

General information on building typology and their distribution based on census data limited survey data carried out for other project [building code development project] was used as the building and

population information. Different lifelines networks like water supply network, road etc. and important critical facilities like hospitals were overlaid with the seismic hazard maps i.e. the intensity distribution and liquefaction susceptibility. Earthquake risk in terms of damage to buildings and infrastructures was calculated based on loss functions in ATC-13 and ATC-25. In addition, possible death and injury figures were determined by looking at statistics from previous comparable earthquakes from around the world.

The main focus of KVERMP Methodology was on process of involving cities and communities not only in mitigation planning and risk reduction but also in the risk assessment activities. Translation of technical outcome of risk assessment to common people languages was another major approach that KVERMP took as an approach.

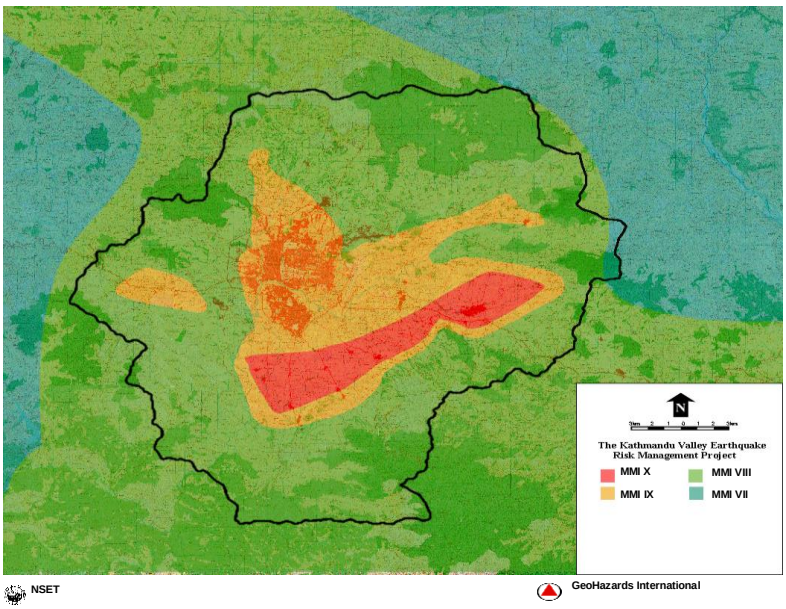


Figure 1: Intensity Distribution of 1934 Nepal-Bihar Earthquake in Kathmandu Valley compiled by KVERMP

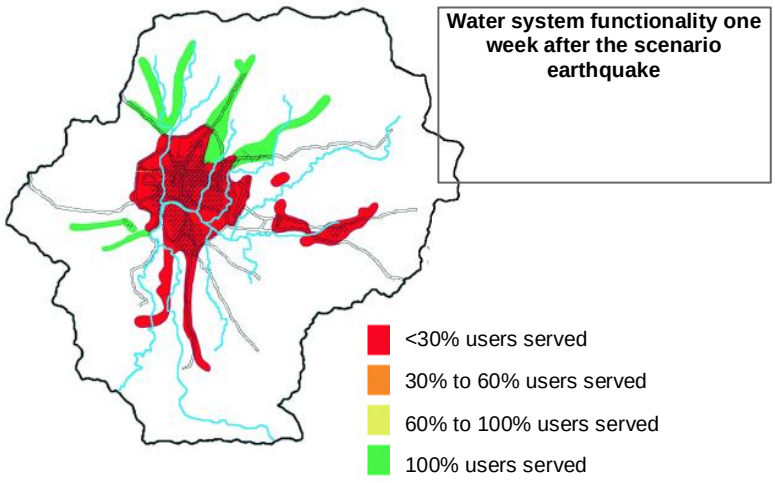
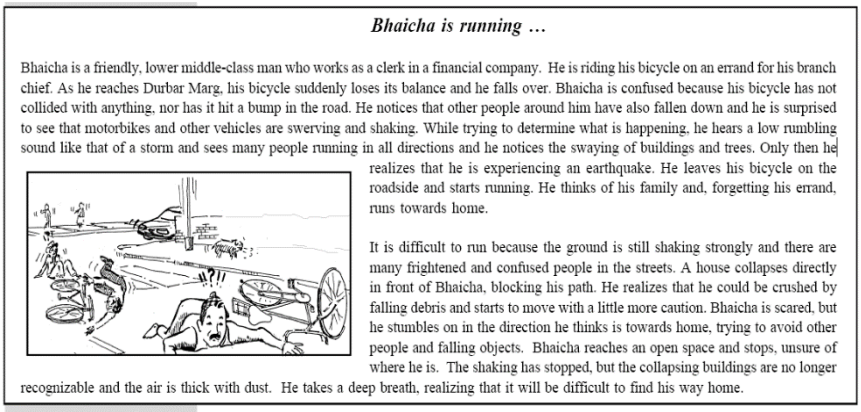


Figure 2: Water Supply System Functionality in Kathmandu Valley One week after Scenario Earthquake

All sectors of community, technical community, decision makers/authorities, lifelines, schools, hospitals etc. were involved in the process of earthquake scenario preparation. Program conducted series of interactions with stakeholders including all lifelines facilities for their opinion on estimated damage and also their preparedness level and recovery capacities. 30 people representing different national and city level organizations participated in earthquake scenario workshop as participants and 22 more as observers. After the realistic assessment of capacities of all concerned stakeholders, the risk maps were interpreted in common people language. For example, the number of possible breaks to water supply pipelines combined with repair capacity of Water Supply Corporation interpreted to water system functionality map showing the availability of water in different part of the city after different time of scenario earthquake as shown in Figure 2.



Bhaicha is running …

Bhaicha is a friendly, lower middle-class man who works as a clerk in a financial company. He is riding his bicycle on an errand for his branch chief. As he reaches Durbar Marg, his bicycle suddenly loses its balance and he falls over. Bhaicha is confused because his bicycle has not collided with anything, nor has it hit a bump in the road. He notices that other people around him have also fallen down and he is surprised to see that motorbikes and other vehicles are swerving and shaking. While trying to determine what is happening, he hears a low rumbling sound like that of a storm and sees many people running in all directions and he notices the swaying of buildings and trees. Only then he realizes that he is experiencing an earthquake. He leaves his bicycle on the roadside and starts running. He thinks of his family and, forgetting his errand, runs towards home.

It is difficult to run because the ground is still shaking strongly and there are many frightened and confused people in the streets. A house collapses directly in front of Bhaicha, blocking his path. He realizes that he could be crushed by falling debris and starts to move with a little more caution. Bhaicha is scared, but he stumbles on in the direction he thinks is towards home, trying to avoid other people and falling objects. Bhaicha reaches an open space and stops, unsure of where he is. The shaking has stopped, but the collapsing buildings are no longer recognizable and the air is thick with dust. He takes a deep breath, realizing that it will be difficult to find his way home.

The participation of all concerned stakeholders in the risk assessment process itself was educatory for them on possible consequence of potential earthquake to their daily life and helped to planning some risk management activities. A scenario document explaining the results of the earthquake loss estimation study in layman's terms was written and published in English and Nepali languages. This document includes a description of possible damages to various lifelines systems in Kathmandu and an explanation of the repercussions of this damage on in the society. The document also presents a story of a representative citizen, "Bhaicha", for an entire year after the scenario earthquake, illustrating how his life is impacted.

After this process of scenario, the project worked with over 80 government and non-government institutions to develop an action plan to systematically reduce the risk over time. The main purpose of the plan was to assist the Government of Nepal, concerned agencies and the municipalities of the Kathmandu Valley to reduce the earthquake risk over time by coordinating and focusing risk management activities. The specific objectives that this plan were: improving emergency response planning and capability, improving awareness of issues relating to earthquake risk, integrating seismic resistance into new construction processes, improving safety in school buildings, improving the seismic performance of existing structures, improving the seismic performance of utility and transportation systems, increasing experts' knowledge of the earthquake phenomenon, vulnerability, consequences and mitigation techniques, and preparing for long-term community recovery following damaging earthquakes.

Some of the important actions of the action plan were implemented by NSET in collaboration with central and local governments in Nepal. Among them activities like school earthquake safety program, mason training, earthquake safety day etc. initiated as the activities of the plan are key programs in Nepal and region in the field of earthquake

management. The earthquake scenario was helpful on raising awareness and finally leading to implementation of such earthquake risk management activities.

Municipal Earthquake Risk Management Project (MERMP)

NSET implemented Municipal Earthquake Risk Management Project (MERMP) in four municipalities of Nepal: Banepa, Vyas, Dharan and Pokhara in 2003. The project evaluated earthquake risk of cities by using RADIUS methodology and prepared developing earthquake damage scenarios, risk maps and used those for awareness-raising and better risk perception. Further it prepared action plans for risk reduction for the cities with the participation of all key stakeholders.

UN IDNDR (UNISDR), in 1996-1999, implemented the project called Risk Assessment Tools for Diagnosis of Urban Areas Against Seismic Disasters (RADIUS). The project included development of earthquake damage scenarios and action plans for earthquake disaster mitigation for nine different cities (Bandung, Tashkent, Zigong, Addis Ababa, Izmir, Skopje, Antofagasta, Guayaquil, and Tijuana). A computer program in excel for simplified Earthquake Damage Estimation was developed as a component of the RADIUS project.

NSET used the RADIUS tool for earthquake loss estimation in three selected cities, Banepa, Vyas and Dharan, under the project.

As the RADIUS tool is easy-to-use and does not require detail technical knowledge on earthquake engineering, the municipality officials conducted the risk assessment themselves with small guidance from NSET. They run the tool for different possible earthquake scenarios. The difference of earthquake impact, if it is small or large; it occurs in day time and night time etc. was analyzed. The city officials also analyzed the impact of implementing earthquake risk management activities like building code implementation by developing different scenario after a certain period of time.

Figure 3 shows an example of converting any available base map of city excel grids. Different cities continue updating their risk assessment and also develop different scenario to compare changes in building damage and casualties if any risk reduction activities are implemented. Figure 4 shows a comparison of casualty of scenario calculated in 2011 by Dharan municipality after 10 years of building code implementation, i.e. projection of casualty scenario in 2021 for two cases with and without building code implementation calculated in 2011. Such comparison has been found helpful on motivating cities and communities to focus on important risk reduction initiatives.

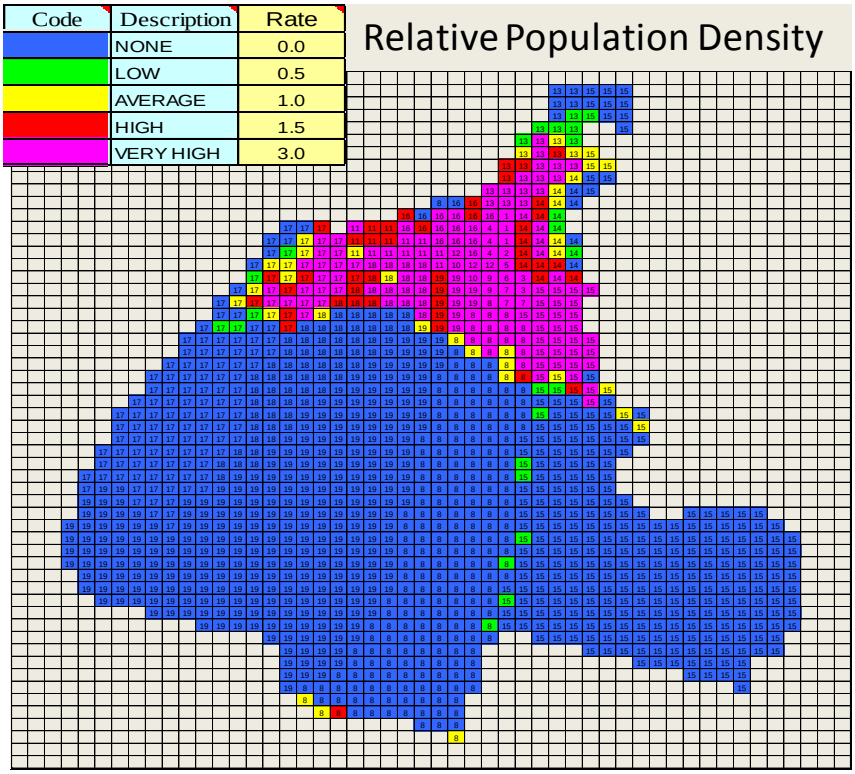
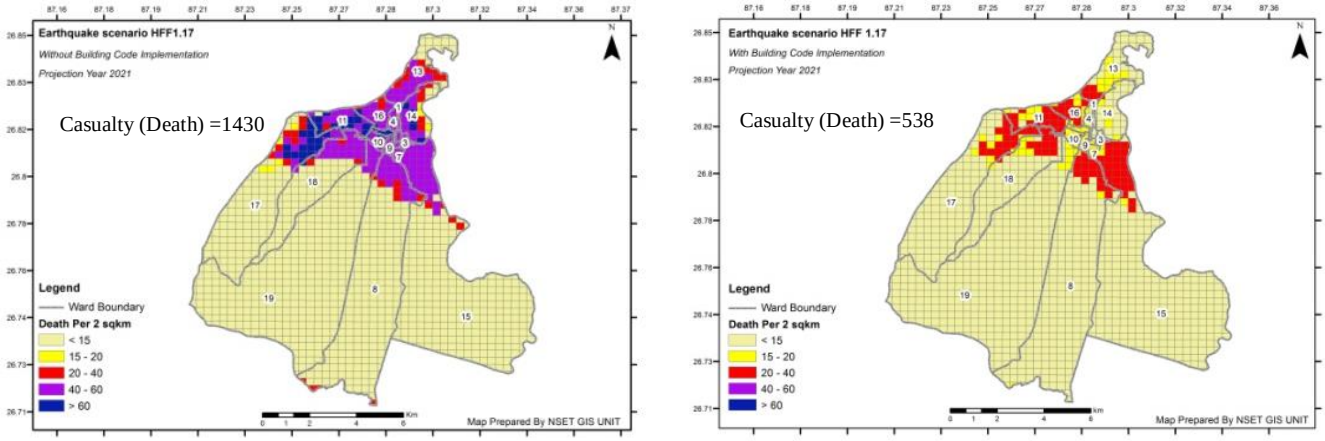


Figure 3: Example on Conversion of base map to Excel-Grids in RADIUS



(a) Casualty Scenario in case of without Building Code Implementation

(b) Casualty Scenario in case of Building Code Implementation

Figure 4: Comparison of casualty scenario for building construction with and without building code

Study on Earthquake Disaster Mitigation in Kathmandu Valley- JICA project

In 2001, Government of Nepal, Ministry of Home Affairs (MOHA) with support from Japan International Cooperation Agency (JICA) implemented a project on "**Earthquake Disaster Mitigation in Kathmandu Valley**". NSET worked with JICA study team for some components related to risk assessment. In this study, hazard and risk assessment was done in GIS environment.

The whole Kathmandu valley was divided to 500mx500m grid and distribution of seismic hazards and vulnerability were calculated for

each grid. The Whole valley was divided to six different categories based on the building typology distributions, population density and development pattern. First, the valley was divided to urban, sub-urban and rural areas based on development pattern and all three areas were further divided to core and fringe based on population density. Distribution of different building typologies in these different areas was then counted in some of the selected areas and extrapolated the similar distribution in other similar areas, that is plotted as follows (Figure 5).

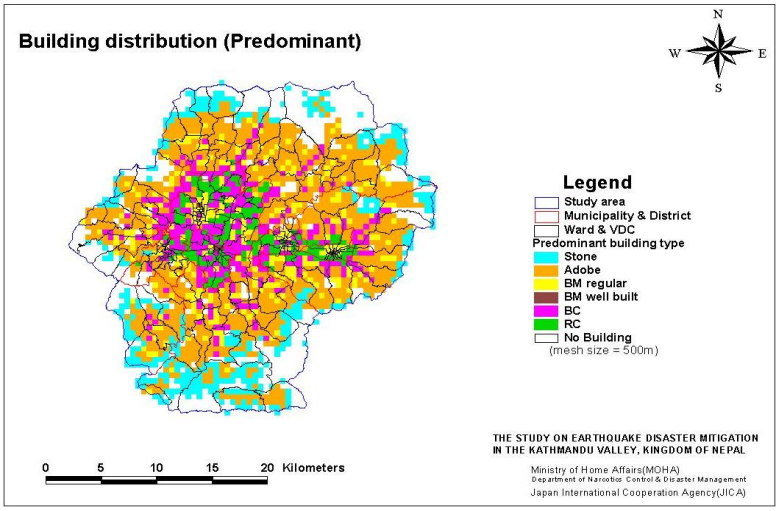


Figure 5: Buildings distribution in Kathmandu Valley

About 1200 buildings were surveyed in detail to understand the vulnerabilities of different typology as well as use of the buildings. About 80 students from engineering institute were involved for the building inventory survey which gave them an exposure on earthquake risk assessment. Some of the students continued their professional carrier in the field of earthquake risk management later on. The fragility functions given in Nepal National Building Code were modified based on building damage data of 1988 Udayapur earthquake in eastern Nepal. These modified fragility functions were then used for calculation of buildings damage. Figure 5 shows the fragility functions given in the Nepal National Building Code and the Figure 6 shows the modified fragility functions modified by the project.

Strengthening Local Authorities in Risk Management (SLARIM)-2002

In 2002, the International Institute for Geoinformation Science and Earth Observation (ITC) launched a research project with the acronym SLARIM, which stand for Strengthening Local Authorities in Risk Management. The main objective of this research project was to develop generic methodologies for GIS-based risk assessment and decision support that can be beneficial for local authorities in medium-sized cities in developing countries. The project was implemented in three cities Naga city, Philippines; Lalitpur Sub-Metropolitan City, Nepal and Dehradun, India. NSET involved in SLARIM project in Nepal.

Many students from ITC worked under SLARIM in Lalitpur Sub-Metropolitan City, a city with about 300,000 populations, for different

aspects of earthquake risk assessment and management. In terms of methodology, project took two approaches for buildings damage and casualty estimation. In the first method, the city was divided to different homogeneous clusters. The clusters were made considering similar type of buildings by their number of stories, building use, building system and materials etc. In this study the same fragility functions developed during JICA project were used for damage calculation. HAZUS-MH methodology was used for casualty estimation. The outcome of this risk assessment methodology was detail enough for city level planning for emergency response. It provided the detail information i.e. which roads are blocked by debris and which are open after an earthquake. Figure 6 gives the buildings distribution and Figure 7 the number of collapsed buildings in different clusters in Lalitpur Sub-Metropolitan City.

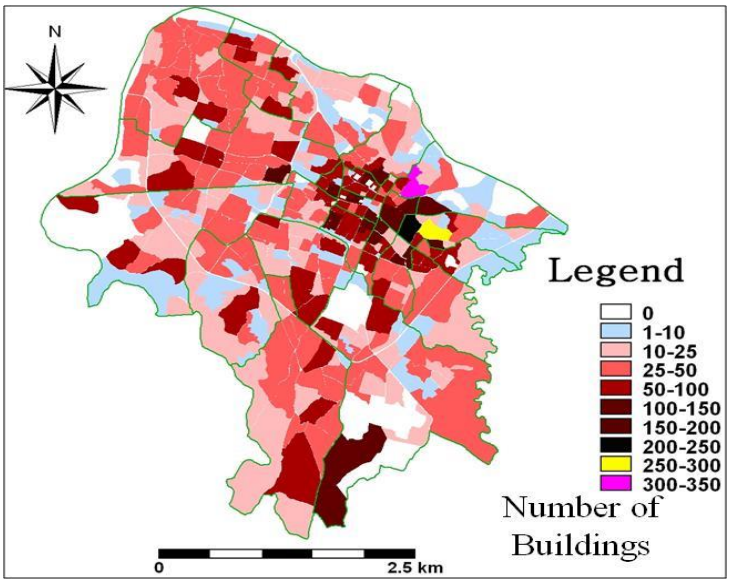


Figure 6: Buildings distribution in Lalitpur Sub-Metropolitan City

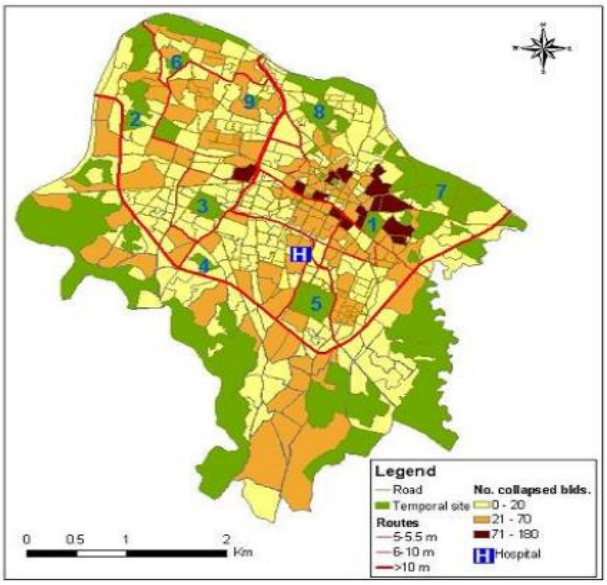


Figure 7: Buildings damage estimation in Lalitpur Sub-Metropolitan City area

In the second method, the information was collected in individual household level. Both the physical characteristics and socio-economic information of individual buildings were collected. Different building related vulnerability factors, socioeconomic conditions, public awareness, response capacity, risk perception and preparedness level of individual household were collected from the field survey.

An intensity-damage matrix, considering existing Nepalese building types, prepared by Guragain et al. (2004) was used for building damage estimation.

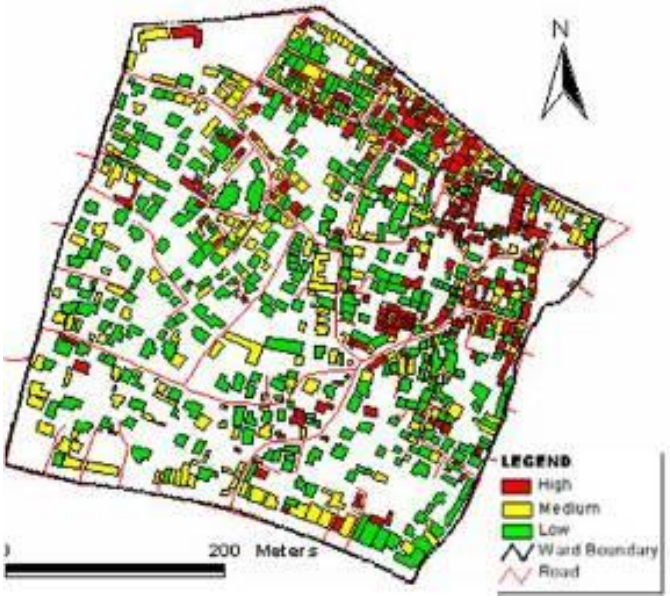


Figure 9: Buildings collapse probability at MMI IX level of shaking

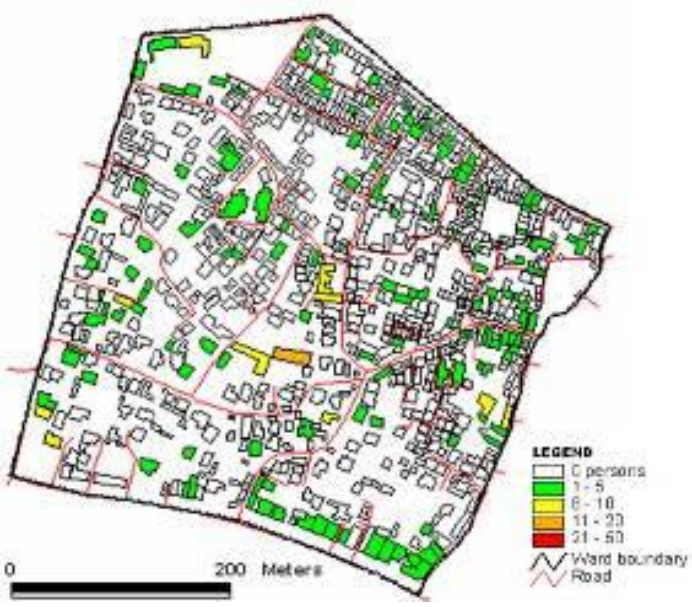


Figure 10: Possible casualty (death) at MMI IX level of shaking

Once the building damage was assessed, human casualties were estimated in relation of population distribution and building damage/collapse probability. Casualty ratios related to building damage were derived from HAZUS-MH. However, this detail study was done at ward level only. Figure 9 shows the buildings collapse probability at MMI IX level of shaking and Figure 10 shows the estimated casualty at the same level of shaking.

Risk based Planning at Community Level

NSET has been implementing Community Based Disaster Risk Management (CBDRM) program activities in various communities. The major components of the community focused programs have been Establish Disaster Risk Management Organization at community level; Hazard, Vulnerability and Capacity Assessment by community; Preparation of Disaster Scenario and Participatory Action Planning and Implementation of pilot activities as demonstration.

Community members are first trained on conduct Vulnerability and Capacity Assessment (VCA) and then they carry on Assessment of their community. Community members visit to individual buildings and infrastructures and identify them as highly vulnerable, medium or low vulnerable. They discuss all households about the problem and also collect suggestions from individuals in the community on how to reduce the vulnerability and also on how to prepare. The community also collects the resources that can be helpful during emergency. The resources includes both the human resources i.e. doctors, nurses, emergency rescuer etc. and community infrastructures like well, open spaces etc.

Figures below show an example of Vulnerability and Capacity Assessment map prepared by one of the community members in Lalitpur Sub -Metropolitan City.

Figure 11: Example of vulnerability and capacity map prepared by community

Figure 12: Leading community members finalizing the vulnerability and capacity assessment map prepared by community

After the Vulnerability and Capacity Assessment work, the community members sit together and prepare a Draft Action Plan. The Draft Plan is discussed further in a wider range of community members and finalized for implementation.

Global Earthquake Model (GEM), and NSET

The Global Earthquake Model (GEM) was initiated in 2006 by the Global Science Forum of the OECD to develop global risk assessment software and tools. GEM drives a global collaborative effort in which science is applied to develop high-quality resources for transparent assessment of earthquake risk and to facilitate their application for risk management around the globe. Open Quake is a web-based platform and offers an interactive environment for modeling viewing and managing the earthquake risk developed by GEM. It is an open source but at this stage only risk professionals can use the system for risk assessment. NSET now is using this Open Quake platform for risk assessment.

Since 2014, NSET sits in the Governing Board of GEM. NSET Executive Director Mr. Surya Narayan Shrestha represents NSET in the Governing Board of GEM. Earlier, Former Executive Director Amod Mani Dixit represented NSET in the Board. Dr. Dixit served as one of the members in the Science Board of GEM during 2009 – 2012.

GEM and NSET have jointly organized several training courses, workshops and learning events in Nepal. Several NSET and other Nepali professionals also attended GEM training courses in GEM Foundation Pavia, Italy.

Comparison of Risk Assessment Methodologies

A comparison of earthquake risk assessment methodologies and tools used in different cities and communities in Nepal are done for their characteristics in terms of different stakeholders involved, provisions of detail input and output, resources required for assessment works in terms of trained manpower and cost, simplicity for use, appropriateness for use at city level and national level and the tools and accessories are open source or not. Table given below shows a comparison of different earthquake risk assessment tools for these parameters.

The comparison of risk assessment tools in Table shows that HAZUS and Open Quake are better options for national level risk assessment though they are relatively complex to use; different level of analysis is possible in these tools and are appropriate for national level. RADIUS is comparatively better for cities where there is no GIS information of buildings and infrastructures and CAPRA GIS is better for cities where there is GIS information of individual buildings and infrastructures.

Methodologies	Stakeholders Involvement			Provisions for detail input/ output	Resource required	Simplicity	Appropriate for city level	Appropriate for national level	Ease to customize and update	Open source or not
	Professional	Local authorities	Community							
KVERMP	M	H	M	L	L	S	H	L	H	YES
RADIUS	M	H	M	M	L	S	H	L	H	YES
GIS GRID	H	L	L	H	H	C	M	L	L	NO
SLARIM	H	M	L	H	H	C	H	L	L	NO
COMMUNITY WATCHING	L	M	H	L	L	S	L	L	-	YES
HAZUS	H	L	L	H	H	C	H	H	M	NO
CAPRA	H	M	L	H	H	C	H	L	H	YES
Open Quake	H	M	L	H	M	C	H	H	M	YES

H: High, M: Medium, L: Low, S: Simple, A: Average, C: Complex

Timeline

1997	• Risk assessment of public/private buildings/schools and developed an earthquake scenario under KVERMP (1997-1999)
1998	• Implementation of various Environmental Mapping Projects(EMP) in Madhyapur Thimi, Kirtipur, Dharan and Banepa Municipality
2002	• Seismic Vulnerability Assessment of Drinking Water Supply Network of Kathmandu Valley
2003	• Implementation of Municipal Earthquake Risk Management Project (MERMP) in four municipalities: Banepa, Vyas, Dharan and Pokhara using RADIUS methodology and prepared developing earthquake damage scenarios, risk maps • Establishment of DisInventat System, a systematic data inventory of natural disaster events in Nepal • Assistance in Earthquake Risk Assessment of Kathmandu using RADIUS Tool in "UNESCO CCT Initiative: Disaster Risk Reduction in Asia, Latin America and the Caribbean" project. • Seismic vulnerability assessment of 14 major hospitals in Kathamandu Valley
2004	• Non-structural Vulnerability Assessment of 9 Hospitals in Nepal • Development of a comprehensive school assessment methodology • Seismic vulnerability of 25 residential and office buildings of British Embassy Premises in Tehran, Iran during 2004 to 2005
2005	• Seismic vulnerability assessment and retrofitting for British Embassy 21 buildings Buildings in Kathmandu during 2006 to 2011. • Seismic vulnerability assessment of NCRS building • Developing School Building Assessment Methodology and Conducting Training Program
2006	• Seismic vulnerability assessment of Saudi Pak Tower in Islamabad, Pakistan
2007	• Qualitative earthquake vulnerability assessment of UN House in Thimpu, Bhutan • Risk assessment under Thimpu Valley Earthquake Risk Management Project (2007-2008) • Earthquake risk assessment of Kathmandu and Maputo (Mozambique) city
2008	• Comprehensive Risk Assessment and Action Planning project in Triyuga Municipality
2009	• Risk Assessment in Humla District (7 VDCs) • Implementation of Views from the Frontline' (VFL) to monitor/review of the process on implementation of HFA at local level across developing countries and regions
2011	• Atlas of Open Spaces in Kathmandu Valley was prepared • Structural and non-structural assessment of Tribhuvan University Teaching Hospital, Civil Services Hospital and Birendra Sainik Hospital and 2 rehabilitation centers, Army Rehabilitation Center and National Disability Fund
2012	• Urban Risk Atlas (URA) for 58 municipalities • curriculum developed for training to civil/structural engineers and practitioners on seismic vulnerability assessment of existing buildings
2013	• Implementation of Views from the Frontline' (VFL) to monitor/review of the process on implementation of HFA at local level across developing countries and regions • Seismic vulnerability assessment of six buildings at Nepal Red Cross Society headquarters • Seismic vulnerability assessment of World Food Program sub-office facilities in Nepal • Seismic non-structural vulnerability including WASH component followed by nonstructural retrofitting in Bhaktapur and Patan Hospital, and 9 health posts of KTM valley
2014	• Seismic vulnerability assessment of historic Keshar Mahal building
2015	• Implementation of Frontline' (FL) to monitor/review of the process on implementation of HFA at local level across developing countries and regions • Rapid visual assessment of critical facilities like hospitals, schools 782 buildings • Detail Damage Assessment (DDA)" of Kathmandu Metropolitan City, along with thirteen municipalities including one VDC
2016	• Installation of landslide monitoring application in 10 locations of Listikot of Sindhupalchok • NSET and Ehime University join hands to conduct research activities and exchange of staff including study tour • Professionals and Researchers from UK and Nepal studied physical and social impacts of the Gorkha Earthquake 2015 and subsequent landslides • A training workshop on "PSHA, Seismic Microzonation and Monitoring in association with USGS • Global Earthquake Model (GEM) and NSET jointly organized several training courses, workshops and learning events
2017	• NSET and Durham University continuously undertaking the mapping work for 14 major affected district to identifying patterns of land sliding in the years after an earthquake
2018	• Using UAV for Landslide monitoring work underway in Rasuwa and Sindhupalchok district

Conclusions and Recommendations

Different earthquake risk assessment tools are used for evaluation of earthquake risk in cities and communities in Nepal. Some tools are easy-to-use and insure involvement of community and local authorities in the assessment process. Planning and implementation of earthquake risk management activities at local level depends more on the involvement of concerned stakeholders than the accuracy of the assessment result. Comprehensive and resource demanding detail tools can better serve to develop the system at national level than the local level.

Participatory Vulnerability, Hazard and Capacity Assessment done by NSET with the rural communities of Humla District, Karnali, Nepal.

Section 2 NSET's Major Contributions in 25 Years

Enhancing Preparedness and Emergency Response Capacity

Background

NSET has incorporated Disaster Preparedness and Emergency Response in its programs and activities so as to create and enhance the culture of preparedness in Nepal and region. To do so, NSET has established Disaster Preparedness and Emergency Response (DPER) division where a team of committed individuals is working to develop concepts, impart ideas and skills to enhance the capacity for disaster preparedness and emergency response in Nepal and potentially contribute at the international level as well. NSET is helping communities and institutions to develop and enhance their disaster preparedness and emergency response capacities.

NSET efforts

In order to assure earthquake safety, everybody in the community has to be aware of earthquake consequences and get prepared from it. Being prepared alone will not work always for others. Therefore, a massive awareness program for preparing individuals from all communities and different stakeholders was realized. Keeping this in mind, NSET has incorporated Disaster Preparedness and Emergency Response activities through various projects in the past 25 years. Earthquake orientation and evacuation drills are one of the various initiatives that NSET carry out on demand of stakeholders.

NSET has developed training courses targeting various stakeholders involved in earthquake risk reduction. NSET provides many professional responders trainings to the community people and organizations realizing the fact that, in the case of any disaster, the first responder may also be a victim who responds for the family and community. These courses aim to raise awareness of individuals and the community on the associated hazards and vulnerabilities, prepositioning the emergency supplies, develop response plan, and strengthen the coping capacity and resilience, using locally available resources.

PEER is a regional training program being implemented since 1999 with view to enhance the overall disaster preparedness and emergency response of South Asian countries. It has been conducting various professional training courses across the region.

Development of Earthquake Preparedness and Emergency Response Plans (ERP)

NSET has also been assisting different national and international organizations, and the Government agencies for developing Earthquake Preparedness and Response Plans (EPRP). EPRPs are prepared based on the organizational structure, capacity, available

facilities and local situation of the respective organizations and communities.

It serves as a guide defining the role of every individual to perform, minimize chaos and maintain operations of an organization after any disaster and to design and implement the activities for preparedness; to develop the skill and capacity for effective response during earthquake; and plan for quick repair, restoration of damaged physical entities for continued functioning of the organization after earthquake. ERP ensures continued functioning of an organization even after a major earthquake disaster by implementing mitigation and effective preparedness measures and developing an efficient response system.

NSET has assisted many institutions during the period of 2013-2018 in developing their Emergency Response Plans.

Hospital and Public Infrastructure Preparedness and Response

Hospital safety is a crucial aspect of disaster risk reduction efforts. In view of enhancing the hospital preparedness so that health facilities can accommodate influx of patients and provide uninterrupted emergency medical services during critical time, NSET has been implementing risk assessment and strengthening of the structural and non-structural features of hospitals around the country. NSET also promotes the regular conduct of emergency drills and simulation exercises to enhance the staff and organizational capacities during emergencies.

In so doing, NSET has assisted in development Preparedness plan and Evaluation Plan of various health facilities in the country. It has also carried out Non-Structural Assessment and Non-Structural Mitigation (NSM) of Patan Hospital, Bheri Zonal Hospital, TUTH, Civil Hospital and Shree Birendra Sainik Hospitals among others.

NSET is also working on enhancement of preparedness and emergency response aspect of schools, school children and teachers in the country and beyond through its flagship program, School Earthquake Safety Program (SESP). Under the program, various initiatives such as strengthening of school buildings through retrofitting, safety drill, promotion of earthquake awareness among the students, teachers, parents and community, drop-cover-hold on exercise, are being implemented.

Apart from that activities such as capacity enhancement programs, response planning, simulation exercises, and earthquake orientations are also being carried out by NSET.

Community/House Orientations

NSET has been conducting regular earthquake orientation programs since its establishment for different level of stakeholders in Nepal. Usually such program is conducted by NSET upon request of the agencies or organization. However, for marginalized people, if realized, NSET itself conducts such programs. The ongoing Balyo Ghar program and TSBCIN program of NSET have also incorporated the tool and encouraging house-owners for safer reconstruction.

Since 2001, NSET has conducted over 363 orientations benefitting nearly 22,500 people from different communities in which about 14000 males and about 8500 females participated representing communities and DRM stakeholders nationwide.

Figure 1: NSET member presenting at an orientation program.

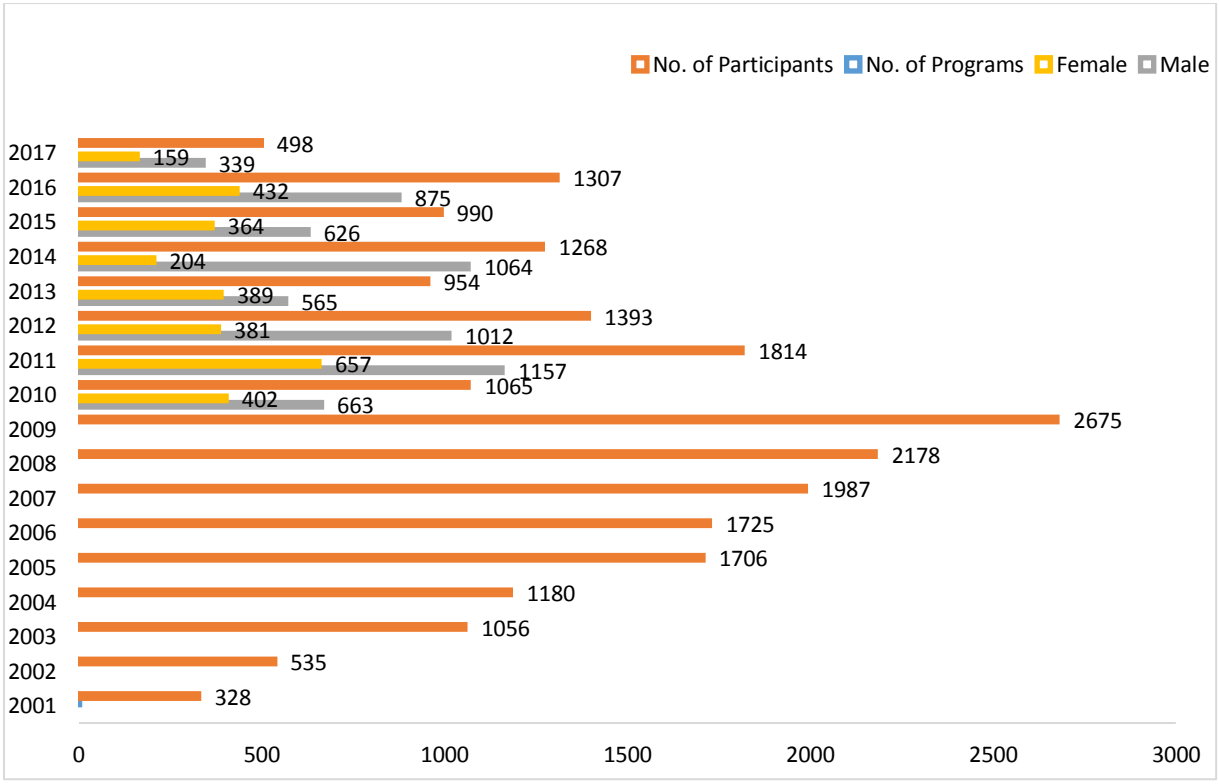


Figure 1: Earthquake orientation Program conducted by NSET in last 18 years

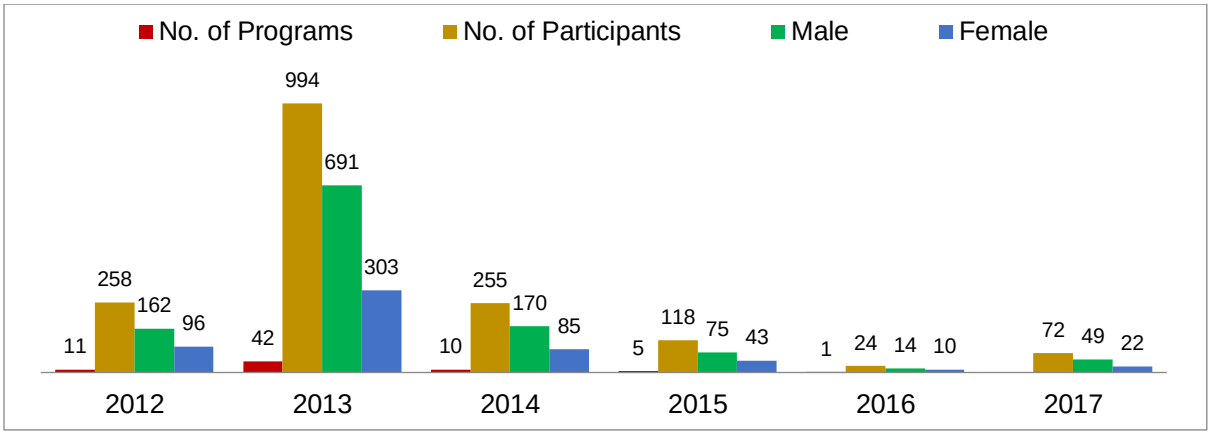
Community Search and Rescue (CSAR) Trainings

NSET has been imparting various hands-on emergency response skills.

There are two level of CSAR courses available:

- CSAR-1001 (one-day)
- CSAR 1002 (three-day).

The CSAR training aims to develop capacity of communities, schools and organizations for performing search and rescue operation mainly on searching, locating and extricating victims on the surface and/or who are lightly trapped. Basic fire response training is also included in CSAR. Since 2012, 72 CSAR trainings have been completed in Nepal, reaching out to1162 males and 559 females.

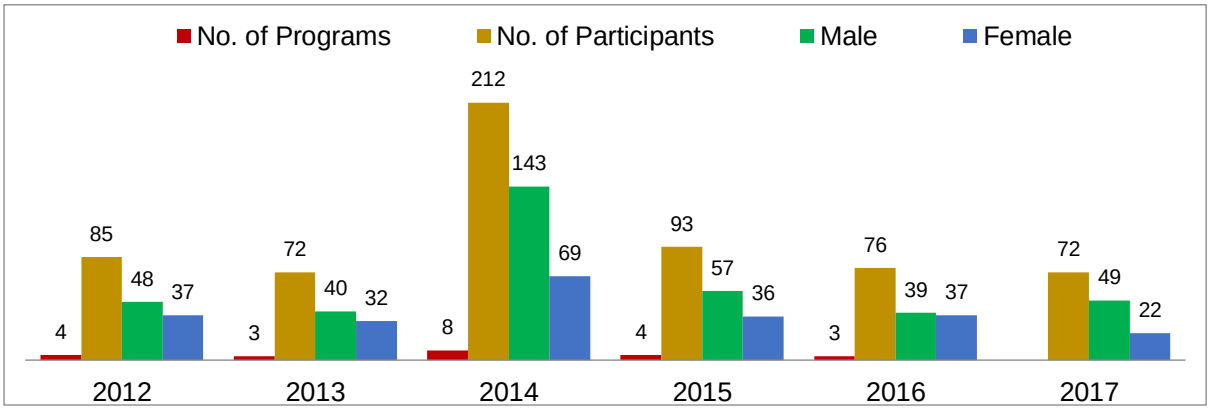


Community Search and Rescue (CSAR) Trainings

Basic Emergency Medical Response (BEMR) Training

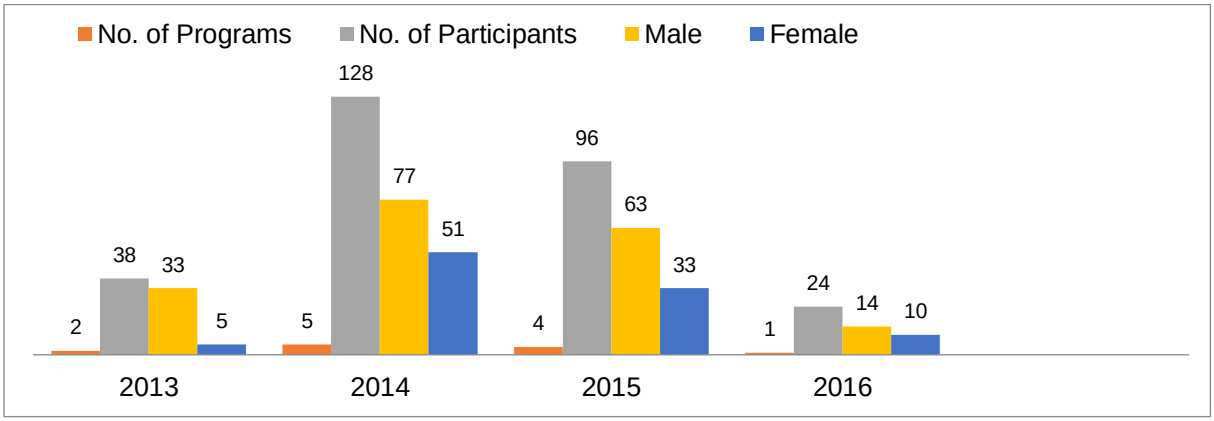
BEMR training provides knowledge on basic health emergencies such as bleeding, burns and fractures. The trained responder bridges the gap between immediate pre hospital care and hospital- based treatment. From 2012 to 2018, NSET has produced 610 BEMR responders (376 are male and 234 are female) from 25 trainings in Nepal.

Figure 2: NSET staff participating in BEMR training



Damage Assessment Training (DAT-1001)

DAT provides information and knowledge to conduct rapid damage assessment in order to determine whether it is safe to enter the building. DAT incorporates the knowledge and skills to distinguish structural and non-structural components of a building, analyse damage patterns and identify damage grades. From 2013 to 2018, NSET has conducted 12 DATs in Nepal and has produced 286 graduates, among them 187 males and 99 females.



Drill/ Simulations: "Drop, Cover and Hold on" and Human Chain

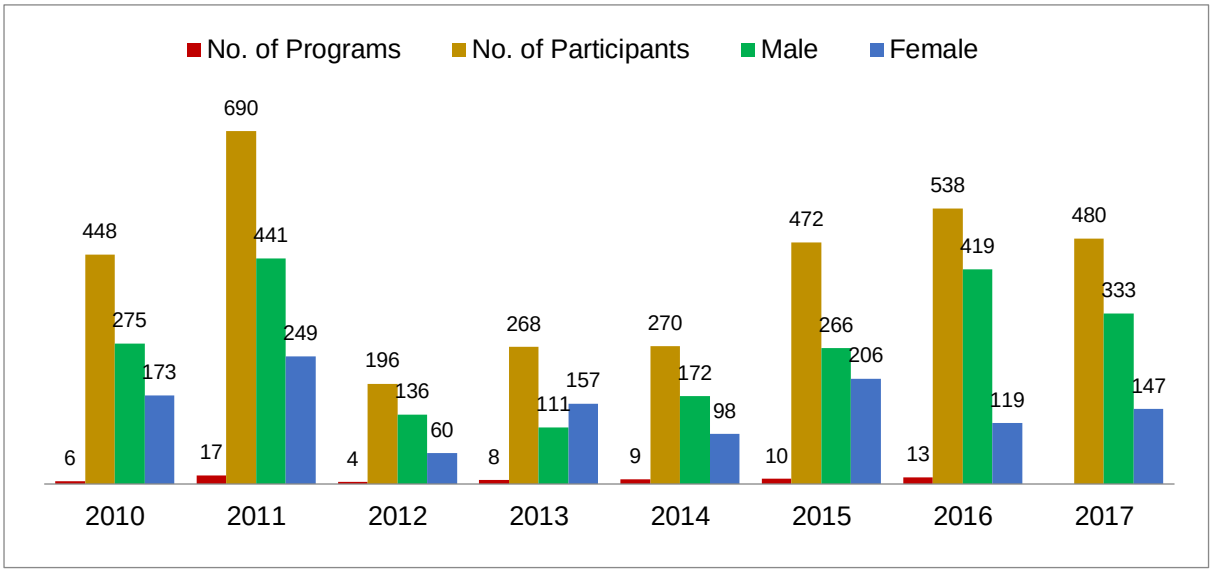
"Drop Cover and Hold On" is recognized worldwide as an appropriate action to minimize injuries and deaths during an earthquake. Emergency management experts and preparedness organizations all agree that "Drop, Cover, and Hold on" is the appropriate action to reduce injury and death during earthquakes. "Drop, Cover and Hold on" can prevent injury or death which may otherwise occur if no other safety measures are taken.

As part of regular event of annual Earthquake Safety Day (ESD), "Drop, Cover and Hold", National Drill, is being conducted in collaboration with the Government of Nepal since 2008 every year. Moreover, safety exhibition stalls are put up by various governments, non-government and DRR related agencies providing different information about disaster preparedness, response, rescue and recovery during the ESD.

The event is conducted by NSET at 2:24 PM coinciding with the strike of 1934 Nepal Bihar Earthquake. A special siren is aired for one minute from Radio Nepal and other FM stations across the country as a notification of an earthquake. During this time everybody in the country is supposed to do the "Drop, Cover and Hold." Then, each one of the participants join into a Human Chain by holding hands as a symbolic gesture of working together in reducing the earthquake risk in days to come. When the disaster occurs before the rescue team comes or any other organization for the relief arrives, the community is the first to act as the first responder. Hence, holding hands of each other for one minute and forming a chain is to emphasize the same fact.

NSET team designs and executes scenario-based simulation exercise for different organizations and communities. The simulation exercise aims to test the response plan, identify and address the gaps in the plan, ensure a practical plan and regularly update it from the lessons learnt.

During 2010-2018, NSET/DPER assisted in conducting 76 simulation exercises in different institutions, with a total of 3362 individuals, where 2153 male and1209 female participated.



NSET Contribution in DREE in Nepal

NSET is providing technical support to Nepal Pacific Resilience Disaster Response Exercise and Exchange (DREE) jointly conducted by the Nepalese Army, Ministry of Home Affairs-Government of Nepal and US Army Pacific, upon receiving request from Nepalese Army and USAID. DREE is being conducted biennially in Nepal, and NSET has been involved in all exercises and related planning meetings in 2011, 2013 and 2016. In 2018, DREE is planned during 25-28 September. DREE 2018 aims to test overall emergency response coordination mechanism of the Government of Nepal and capabilities of key players. DREE will also be a platform to examine the newly revised emergency response plan of Tribhuvan International

Airport (TIA). As in previous DREEs, NSET's contribution is mainly on developing earthquake scenario for the field training exercises (FTX) and table-top (TTX) exercises, including search and rescue (SAR); providing support for developing injects and overall plan as exercise control (EXCON) team member.

Prepositioning Emergency Supplies

With the view to enhance community level emergency preparedness and response, it also implemented the Project for Pre-Positioning of Emergency Rescue Stores (PPERS) to help 'first responders' on the ground at the local level to enable neighbors to rescue neighbors. PPERS provided a reserve of essential tools and equipment to assist in the immediate community level response to a major disaster, such as an Earthquake. Organizational structures such as local level disaster management committees and community emergency response teams constituted as required to assist in setting up the stores and its effective operation. Such stores are pre-positioned in 8 locations of Kathmandu Valley.

As part of enhancement of nonstructural safety of the community and individual households, NSET also worked with women's group in the communities.

As an effort to enhance the level of preparedness, NSET has been prepositioning and promoting various essential kits and supplies that are required during emergency response for different levels such as individual, household, communities, institutional and government.

Earthquake Go-Bag for Individuals

NSET, promotes an easy-carry bag with emergency supplies, which serves as mobile emergency kit after disaster. The bag contains items sufficient for an individual to survive for at least 3 days during an emergency. It should be kept in an accessible area whether in a house, workplace or vehicles so as to quickly grab while evacuating. NSET has reached out to four sub- metropolitan cities, 53 municipalities and 135 small towns in promoting the Earthquake Go-Bag. By April 2015, NSET has reached out to more than 4,000 people, and distributed more than 600 Go Bags.

Household Emergency (HH) Kit for families/household

HH Kit is a box containing very basic tools, equipment and accessories (TEAs), and some supplies useful for immediate response during emergencies. All adult family members should be aware of the contents and usages and know how to operate the TEAs. It's best to locate the HH in a safe and accessible location within the residential premises.

Community Search and Rescue (CSAR) Kit for Institutions or Small Community

CSAR kit is a container which has TEAs required in CSAR for small institutions/ communities. The TEAs can be operated without the use of any external source like electricity or fuel. The quantity of materials depends upon the size of the organization/ communities. It can be kept within the building compound or in a safe location and accessible to everyone.

Pre-Positioned Emergency Rescue Store (PPERS)

Pre-Positioned Emergency Rescue Stores (PPERS) are prepositioned in eight strategic locations within the Kathmandu Valley (3 in Kathmandu, 3 in Lalitpur and 2 in Bhaktapur District) as to enhance the community level emergency preparedness and for quick response. The store has all the basic TEAs necessary for the immediate rescue post disaster. This was implemented by NSET together with British Army in 2014.

Program for Enhancement of Emergency Response (PEER)

PEER is one of the major projects implemented by NSET since 2003. PEER was initiated by the USAID/Office of U.S. Foreign Disaster Assistance (OFDA) in 1993, aiming at developing the regional and national disaster preparedness and response capacities of vulnerable countries in South and Southeast Asia. PEER has advanced in four different stages: Stage 1 from 1998 to 2003; Stage II from 2003 to 2009; Stage III from 2009 to 2014; and currently at Stage IV from 2014-2019. The ongoing PEER Stage 4 started in October 2014 and will run until September 2019. PEER focuses on developing emergency responders and instructors for emergency response training courses.

PEER courses

The major courses presently implemented under the PEER are:

- Community Action for Disaster Response (CADRE) - Teaches to prepare and respond to emergencies and disasters at the community level;
- Collapsed Structure Search and Rescue (CSSR) - Provide skills necessary to safely and appropriately search, stabilize, and extricate victims trapped in collapsed structures;
- Medical First Responder (MFR) - provides skills necessary to assess, treat, and transport sick or injured patients following an emergency or disaster;
- Hospital Preparedness for Emergencies (HOPE) - For hospital staff, medical and non-medical health care personnel, to prepare health care facilities, to respond effectively during emergencies involving large numbers of casualties;
- Swift Water Rescue (SWR) - teaches to rescue the near-drowning or victims swept by swift water. SWR is a newly introduced course under PEER Stage 4;
- Training for Instructors (TFI) - Training for effective delivery of courses for adult learners;
- Instructors' Workshop (IWs) - Provide the essential skills to perform the tasks necessary to be efficient instructors of PEER training courses
- Training for Instructors Hand-off Workshop
- Medical First Responder Instructors Workshop (MFRIW)
- Collapsed Structure Search and Rescue Instructors Workshop (CSSRIW)
- Master Instructors Workshop (MIW)

Subsidiary Courses:

- Canine Search and Rescue
- Introduction to Disaster Management (IDM)

PEER Stage 1 (1998-2003)

Asian Disaster Preparedness Center (ADPC) implemented the phase 1 of the program in close collaboration with the national government agencies in four Asian countries: Nepal, India, Indonesia and the Philippines. The main program goal was to reduce mortality in mass casualty events and increase survival rates of disaster victims. Principal courses for PEER I were MFR, CSSR, HOPE, TFI, MFRIW, CSSRIW, along with subsidiary courses like Canine Search and Rescue and Introduction to Disaster Management (IDM).

Four core components of program were:

- Training Course Design, Development, Adaptation;
- Training Courses at the Regional, Sub-regional, National and Local Levels;
- Instructor Development and Certification and
- Institutionalization of the Training.

PEER Stage 2 (2003-2009)

This stage of PEER was a continuation of the first program phase, in the same beneficiary countries, plus Bangladesh and Pakistan. Along with implementation of the core courses, major activities performed were program planning with nodal agencies through country planning meeting, database management of PEER graduates and instructors, support on nationalization and institutionalization of PEER courses in the PEER countries and develop Multi-hazard HOPE Course for all six countries.

NSET, in collaboration with nodal agencies and designated training institutions in the PEER countries, completed 56 different program events during this program period. A total of 811 MFR graduates and 340 MFR IW graduates; 637 CSSR graduates and 279 CSSR IW graduates; 55 MFR-CSSR Master Instructors; 533 TFI graduates; 628 HOPE graduates and 196 H-TFI graduates were developed in the region in PEER Stage 2.

PEER Stage 3 (2009-2014)

The main focus was to continue development of qualified instructors in MFR, CSSR and HOPE courses in identified partner training institutions in each of the program beneficiary countries. Community Action for Disaster Response (CADRE), including its instructor development course stream CADRE-TFI/IW, was introduced in PEER Stage 3. ADPC implemented HOPE and CADRE program components in Bangladesh, India, Indonesia, Nepal, Pakistan, the Philippines, Lao PDR, Cambodia, Vietnam and Thailand; and NSET implemented MFR and CSSR components in Bangladesh, India, Indonesia, Nepal, Pakistan, and the Philippines. During PEER Stage 3, NSET completed a total of 88 various activities in the six PEER beneficiary countries.

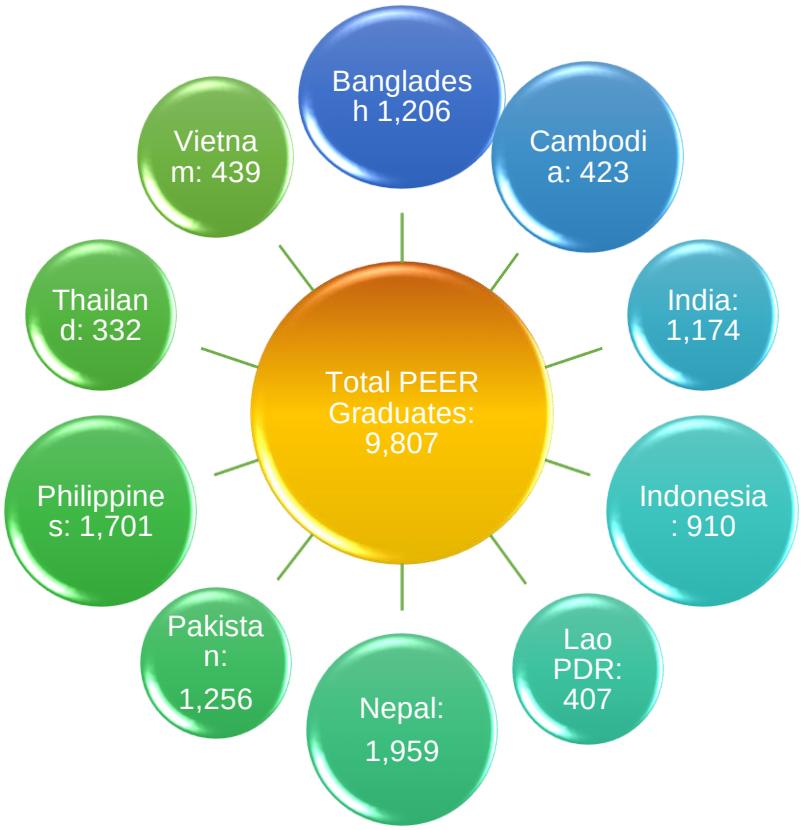
PEER Stage 4 (2014-2019)

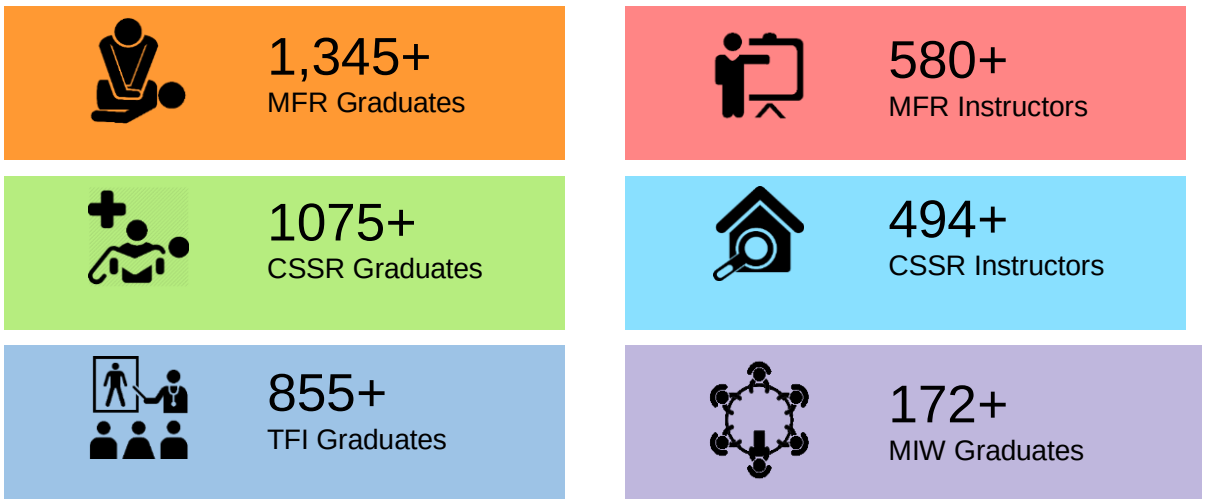
PEER Stage 4 continues the successes achieved in previous program stages in cooperation with the nodal agencies (NDMOs) and designated emergency response organizations in Bangladesh, India, Nepal and Pakistan. The program is addressing the need to further strengthen emergency response capacities of people and governments of these countries, with possibility of extension in Afghanistan, Bhutan, Maldives and Sri Lanka.

The objective of PEER Stage 4 is to enhance emergency response capacity of South Asian Countries by continuing the trainings on MFR, CSSR, CADRE, HOPE and SWR; and by promoting networking and collaboration among relevant individuals and institutions in the region. The target groups of PEER are community-level emergency response volunteers, national and regional level emergency response professionals. Program works are carried out primarily with the national disaster management organizations, local governments, identified department partner training organizations, such as the fire, police, army, Red Cross/Red Crescent societies, government - affiliated / non-government / private and volunteer response organizations. Until the current fourth program year of PEER Stage 4, 60 various program events have been completed in the four PEER beneficiary countries.

Major Achievements

Since PEER started in 1998 until as of May 2018, there are a total of 1345 MFR graduates, 1075 CSSR graduates, 855 TFI graduates, 580 MFRIW graduates (MFR Instructors), 494 CSSRIW graduates (CSSR instructors), 172 Master Instructors (MFR-CSSR Course Coordinators and Monitors/ MIW), 40 MFR Refresher Course graduates; 40 CSSR Refresher Course graduates; 2590 HOPE graduates, 551 H-TFI graduates (HOPE instructors), 1530 CADRE graduates, 488 CADRE-TFI graduates (CADRE instructors), and 102 CADRE Master Instructors (CADRE Course Coordinators and Monitors) in the PEER region.





40+
MFR Refresher Course Graduates

120+
MFR-EU Graduates

40+
CSSR Refresher Course Graduates

120+
CSSR-EU Graduates

PEER in Nepal

Within more than 15 years of PEER implementation in Nepal, PEER has contributed in giving shape to the national emergency response system and has improved the training strategies in Nepal. There is growing awareness on the need for developing qualified MFR and CSSR instructors to train the end users or responders in the PEER partner organizations, mainly the security organizations. The vision of establishing trained and equipped response teams led to a steady progress in Nepalese Army, Nepal Police and Armed Police Force. NSET has made the Training for Instructors (TFI) mandatory for its professionals delivering various programs and projects. TFI has been acknowledged by the PEER countries as a very good course in developing facilitators/trainers to manage and deliver programs and projects more effectively.

PEER graduates from Nepalese Army, Nepal Police, Nepal Armed Police Force, Nepal Red Cross Society and various Municipalities, now, are part of an existing skilled force of over 737 first responders in Nepal.

The effectiveness of PEER was noteworthy after the April and May 2015 earthquakes in Nepal. PEER graduates were heavily involved for search and rescue operations. It can be said that our national responders acquired the basic search and rescue (SAR) skills through PEER; because of this foundation, national responders were able to assist and work side by side with international search and rescue (SAR) teams with the same goal of saving lives. However, the main difference among national and international SAR teams is the use of heavy-duty and more sophisticated SAR equipment by the international teams.

Tribhuvan University Teaching Hospital (TUTH) in Kathmandu, applied the principles from HOPE course in its disaster response plan which enabled the hospital to treat over 700 patients and perform more than 300 surgeries in less than 24 hours immediately following the earthquake. Over 670 CADRE national volunteers were mobilized for response operations in affected communities. Trained and skilled emergency response volunteers were also deployed to provide additional and basic support to the already overwhelmed national search and rescue teams.

NSET SAR efforts during 2015 Gorkha Earthquake

Immediately within two hours of April 25 Earthquake, NSET formed a Search and Rescue (SAR) team with PEER qualified responders, equipped and led the SAR operation to Bungmati area of Lalitpur. NSET SAR team could recover dead bodies, jointly with Nepal Police and community volunteers.

NSET SAR team, jointly with the response teams from Nepal Police, Armed Police Force and Nepalese Army, also worked with international teams in many locations. NSET has joined the SAR operations in Kaldhara, Kathmandu, along with some responders from Nepalese Army, Armed Police Force, local volunteers, Nepal Red Cross Society, and a volunteer from China.

NSET team also worked at Dharahara (Sundhara), Kathmandu. The scene was devastated, Dharahara was totally collapsed. Local people dug and removed the rubble with bare hands and with remaining iron bars. As NSET team had some TEAs, NSET team joined in rubble removal for an hour using their TEAs. Nepalese Army also joined later on. It was difficult to work with limited number of responders and TEAs.

NSET response team continued working in the field for extricating the victims and recovering dead bodies. Though all responders in NSET team were qualified responders and equipped with SAR equipment, the team was small in number. Therefore, it worked jointly with other teams from Nepalese Army, Nepal Police and Armed Police Force. Since almost all responders were trained with PEER SAR skills and/or led by PEER responders, it was very effective and comfortable working together.

NSET team along with Nepal Police, Nepalese Army and Armed Police Force, also worked in Balaju, Gongabu and Machhapokhari area for three days. Responders from National Disaster Reponse Force (NDRF) of India also operated in the same area. It was noteworthy that most of the responders from NDRF also graduated with PEER skills and used same techniques and SAR equipment. Therefore, working jointly in the same site was more effective. However, since these areas had the most number of casualties as well as heavily damaged buildings, response operation was quite complex. Moreover, the frequent aftershocks, made working inside the damaged buildings more on high risk

Stories / Testimonials

Mr. Dhakendra Khatiwada is DSP of Nepal Police. He graduated on PEER, MFR and CSSR courses in 2008. Currently he is deployed at Disaster Management Division of Nepal Police at Samakhushi. Mr. Dhakal states:

None of us imagined the devastation of the Gorkha Earthquake would come so suddenly. When it happened, we were dispatched within 10 minutes of the earthquake. In no time we planned for our safety and started our operation in Gongabu and Balaju, which were the most affected areas in the valley. As devastating it was, this was also a big opportunity for us to bring our Collapsed Structure Search and Rescue skills into use and we did it with a strong will and coordination.

It was a big success for us when we rescued Mrs Kumari Khadka from New Jana Sewa Guest House, Gongabu after 6 days of being trapped. Although the incident was very tragic, we are very content and proud that we could at least save a life after all the risks and pain we went through. This meant a lot to our teams.

Lessons Learned

- An organized, functional emergency response system is important to save lives during emergencies. Emergency Response Plan, a basic foundation in emergency response system, including a team of trained and equipped responders, are central to saving lives. Due to the rapid attrition rate of responders, more instructors and country support are needed in program countries to ensure enough responders are available during emergencies.
- Since the workload is overwhelming for a small group of responders, therefore, additional responders should be trained for better response.
- Emergency responders should also be trained in Incident Command System (ICS).
- Emergency responders should be trained in triage of victims to minimize overwhelming hospitals with less injured victims.
- Rescue equipment should be upgraded with organizational accountability.
- Capacity development for responders is required at different levels: Community, regional and national; and each level should be provided with emergency supplies and equipment.
- There is a need to further localize the curricula, facilities and training equipment (if possible) to reduce course costs while maintaining quality.

Way forward / what next?

- Prepositioning emergency response equipment in strategic locations of different levels (Eg: Province, Local and Community)
- Long term strategy for developing Emergency Response capacity at local and community level
- Develop a mechanism continuation for developing volunteers and networking among them.
- Promoting culture of safety
- Engagement of Private organizations and Civil Society
- Continuous assessment of country needs as per current Government Structure (Federal System)
- MFR and CSSR courses have already been adapted in national context. Further improvement may address the needs by blending modern technology with indigenous knowledge and practices.

PEER Timeline

1998
PEER 1 Started. PEER 1 was implemented by the Asian Disaster Preparedness Center (ADPC), in India, Indonesia, Nepal and the Philippines. The focus during this stage was to establish partnerships with key stakeholders in program beneficiary countries and to lay the foundation for the PEER program.

2000

2002 — **PEER 1**

Implementer: ADPC

Target countries: India, Indonesia, Nepal, Philippines

1999

Objective 1: Establish PEER foundation in Asia - Establish partnerships with key stakeholders in the program beneficiary countries and to lay the foundation for the program in the region.

2001

Objective 2: Curriculum development and adaptation - develop and adapt existing and new training curriculum and materials in the Asian context.

Objective 3: Instructor training - develop and implement a system of instructor identification and training to produce PEER regional and country level instructors.

Implementer: NSET in partnership with International Resources Group (IRG)

Target countries: Bangladesh, India, Indonesia, Nepal, Pakistan, Philippines

Objective 1: Emergency Response Training - Establish and strengthen the capability of PEER countries to provide CSSR and basic life support, beginning with the first responders and continuing through the medical facilities.

Objective 2: Institutional Strengthening - Develop a training system that continually provides disaster response with qualified personnel for search and rescue, medical first response, and with medical facilities prepared to receive victims. Nationalization of the MFR and CSSR courses through adaptation to the national contexts and languages. Master Instructors were trained in the target countries to design, coordinate and organize training courses and to monitor course sessions, in place of overseas monitors and course coordinators.

Objective 3: Networking and Coordination - Establish a coordinating network of emergency and medical response through training institutions and individuals in PEER countries to ensure the continuation and evolution of PEER.

2003
• PEER 2 Started. NSET implemented with partners. **Medical First Responder** and **Collapsed Structure Search and Rescue** courses are adapted to national contexts and languages
• **Bangladesh joins program**

2004

2005

PEER 2

2006
Master Instructors' Workshop was introduced to develop regional and national course coordinators and course monitors.

2007
Pakistan joins program

2008
Hospital Preparedness for Emergencies Course was reoriented to be a multi-hazard course

2009
PEER 3 Started. Medical First Responder and Collapsed Structure Search and Rescue courses continue to be implemented by NSET in Bangladesh, India, Indonesia, Nepal, Pakistan and the Philippines.

PEER 3

2010
Community Action for Disaster Response (CADRE) course was developed and introduced

Objective 3: Strengthen the capabilities of PEER countries to provide collapsed structure search and rescue and basic and advanced life support during emergencies by further strengthening and institutionalizing the Medical First Responder and Collapsed Structure Search and Rescue courses.

2011

2012

2013

(Other Stage 3 program objectives were implemented by our partners)

2014
PEER 4 Started. Swift Water Rescue added to PEER courses

2015
• PEER trained responders deployed after Gorkha Earthquake in Nepal
• Bhutan participated in the PEER Regional Strategic Planning Workshop.

2016

Objective: Work with South Asian countries to take ownership of, extend and adapt the program through their own in-country institutions and regional networks. In addition to MFR and CSSR courses, Community Action for Disaster Response, Hospital Preparedness for Emergencies, and Swift Water Rescue training will be provided and further adapted to national contexts.

2017

2018
Swift Water Rescue Course Pilot course at the regional level.

PEER 4

2019
End of PEER 4

Section 2 NSET's Major Contributions in 25 Years

Post-Earthquake Reconstruction: From 2001 Gujarat Earthquake to 2015 Gorkha Earthquake

Background

One of the major losses during earthquakes is the collapse of buildings and infrastructures. In addition, most of the casualties during earthquakes are due to collapsed buildings. In most of the cases, half of the total direct loss during earthquakes comes from the damaged houses. Housing reconstruction is therefore, major task for earthquake rehabilitation.

For housing reconstruction, at one hand, the large scale need for constructing hundreds of thousands of houses create big problem because of lack of existing human/economic capacity and, on the other hand, the situation provides a tremendous opportunity of constructing large number of disaster resilient houses in the short run and establishing a culture of safety in the longer run.

Except few experiences and studies after 1993 Latur Earthquake and 1999 Chamoli Earthquake, NSET first experience on earthquake reconstruction was after 2001 Gujrat Earthquake. Starting from then, NSET continuously involved in different scale in several earthquake reconstructions in different Asian countries. This chapter highlights NSET involvements in earthquake reconstructions and as well as the major learning from all those events.

2001: Reconstruction in Gujarat, India

NSET began activities to support earthquake recovery and reconstruction in Gujraat, India from August 2001. "Nepal Gujarat Masons Exchange and Training Program" (NGMETP) was formulated as a joint program by NSET and SEEDS in August 2001 and continued till the completion of Patanka Navajeean Yojana (PNY) to replicate the past experience of NSET in identifying and implementing simple earthquake resistant construction technology transfer at the grassroots level through awareness and training. Also the post-earthquake reconstruction program at Patanka under the PNY was a great opportunity for NSET to learn from the Gujarat experience of rebuilding.

Analyzing the existing situation, assessment of the existing rehabilitation process, planning appropriate interventions and initiating them, upgrading construction quality with focus on workmanship,

quality control, seismic strengthening of existing buildings were the major activities carried out by NSET in Gujrat. Other activities like; conduction of training programs for skill upgrading of practicing masons and shake table to demonstrate the effectiveness of earthquake resistant components in a building, organizing and facilitating exchange visits of Nepali and Gujrati masons to Patanka and Kathmandu to interact and learn from the experience of various seismic retrofitting works were implemented by NSET. The Technical Assistance involved Nepalese Masons, trained by NSET in earthquake-resistant construction, imparting hands-on training to their Gujarati counterpart masons, in ways of improving construction quality and practice.

Learnings

Effective technical intervention was possible with the technological exchange approach at the grassroots level and language was not a barrier to the technology exchange among masons of different countries were the major learnings for NSET while working in Gujrat's owner-driven approach (ODR) reconstruction.

In 2004, an independent household survey compared citizens' satisfaction with different reconstruction approaches following the 2001 Gujarat Earthquake. The highest satisfaction was achieved with ODR with financial assistance and technical assistance from government, complemented by additional material assistance from local NGOs. All families whose houses were built using this model reported that their housing situation was better than before the earthquake.

Results

- Need and importance of technical support at grassroots level i.e. masons training was highlighted
- Among the several approaches, owner driven approach proven better

2003: Reconstruction in Bam, Iran

Iran was hit by 6.6 magnitude quake struck on December 2003, devastating Bam, killing 26,000 people and leaving 75,000 homeless. Nearly 80 per cent of Bam's infrastructure was damaged. Soon after the earthquake, NSET made an institutional contract with UNDP/Iran to implement the Up-streaming Community Based Approaches for Promoting Safer Building Construction program in Iran. The overall objective was for up-streaming community-based approaches for promoting safer building construction. Later in 2006, NSET provided technical assistance to Asian Disaster Preparedness Center (ADPC)/Thailand to implement the UNDP-Iran Joint National Program for Strengthening Capacities for Disaster Risk Management, a five-year program.

The project was formulated and implemented jointly by UNDP-Iran and NSET considering mainly three following facts:

- Community-based approaches are necessary, especially in not-so-well organized construction sector, where control mechanisms for construction do not ensure 100% safety and quality of buildings, and the compliance with codes and by-laws is poor and especially when the main work is being done by lower-category contractor (Petty contractor).

- Up-streaming of community-based approach is necessary also to improve seismic performance of existing, already built, non-engineered constructions, prevalent especially in rural areas.
- Engineering and control mechanism is excellent in Iran, the need is to internalize the excellence into daily life and strengthen the compliance with the well-developed codes through encouraging demand for safety among people and filling the gap of technical knowledge between building workers and engineers.

Results

- System of masons training started
- Masons training piloted
- Shaking table demonstration done and importance of simplifying technology for communities awareness was highlighted

Now it is said that Bam is the most quake-proof city in the country, noting houses had been rebuilt with stronger construction material but that traditional architecture had been respected.

2004: Reconstruction in Indonesia

As one of the worst natural disasters in the history to hit the Asia-Pacific region, the 2004 earthquake and tsunami wrecked Indonesia killing hundreds of thousand people.

NSET provided technical assistance to the World Bank/Indonesia in association with Building Research Institute (BRI) of Japan to conduct a shake table demonstration of model buildings in Banda Aceh, Indonesia in July 2006 in order raise awareness on earthquake resistant construction practices and promotion of safer houses in Aceh.

The Shake Table Demonstration was a part of the training to the housing facilitator of the World Bank in Banda Aceh, Indonesia. The program period was for a month for making the model buildings and conducting the shaking table demonstration.

Results

- Shaking table demonstration done and importance of simplifying technology for communities awareness was highlighted
- Confidence increased safety due to simple changes on construction techniques highlighted

2005: Reconstruction in Pakistan

NSET involvement in Earthquake Reconstruction after Kashmir Earthquake in Pakistan was much bigger in comparison to other previous involvements in other incidents. The earthquake measuring 7.6 on the Richter scale that jolted northern Pakistan on October 8, 2005 resulted in Pakistan in the death of over 73,000 people. Another 83,000 were injured. The quake also rendered more than 3.3 million people homeless. To support the reconstruction process aftermath earthquake NSET implemented 4 major programs in Pakistan with support from various agencies.

Capacity Building for Reconstruction of Earthquake-Affected Areas of Pakistan (Bagh and Muzaffarabad)

NSET provided technical assistance to UNDP/Pakistan to demonstrate people-centered, cost effective, environment-friendly rubble removal and emergency housing strategy that facilitate incorporation of earthquake-resistance in transitional as well as permanent reconstruction of the building which ensured sustainable livelihoods and habitats for the earthquake-affected communities.

Technical Support for Earthquake Resistant Housing Reconstruction in Pakistan

With support from USAID/OFDA, NSET provided technical support to Earthquake Reconstruction and Rehabilitation Authority (ERRA) of Pakistan working in close coordination with UN-HABITAT. The activities included policy support in developing strategies for Earthquake Reconstruction and Capacity Building for Earthquake-resistant reconstruction, and technical support in capacity building including development of training curricula and training of partnering organization and their Master Trainers, Mobile Teams for reconstruction as well as monitoring of the training activities throughout the earthquake-affected areas.

Capacity Building and Knowledge Management: Institutionalization of Earthquake Preparedness in School of Earthquake Affected Areas of Pakistan (CBKMP)

With funding support from UN-ISDR, NSET implemented the project in close collaboration with Focus Humanitarian Assistance Pakistan (FOCUS). The overall goal of the project was to contribute to building resilience of communities to disasters through capacity building of teachers and students in earthquake affected areas in Pakistan.

Major Lessons

- Considering earthquake safety even during transitional shelter construction help constructing earthquake resilient reconstruction
- Constructing core room (part of permanent building) as a transitional shelter with possibility of horizontal/vertical expansion was the major approach and lesson learned from this activity

Efforts in Nepal before 2015 Gorkha Earthquake

Based on lessons from involvement in various reconstruction efforts, NSET involved itself in some initiatives taken before Gorkha earthquake which made the reconstruction efforts more organized.

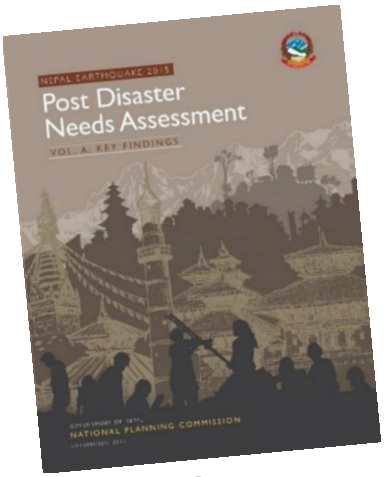
Damage Assessment Trainings and Mason Trainings

After the 2011 Sikkim Earthquake trainings were organized for Engineers/practitioners on assessment of buildings damaged in earthquake to determine the earthquake effects and the extent of damage requiring the building to be repaired, retrofitted or demolished. The training was able to raise the need of Damage assessment of Buildings among the engineers from different Municipalities, DUDBC & Engineering colleges from different part of Nepal. And it was able to transfer the knowledge and skill of performing building damage assessment. The training was organized by DUDBC, supported by UNDP and technical support was provided by NSET.

Before the Gorkha Earthquake, Government approved Damage Assessment guideline was developed and there were number of professionals trained on damage assessment. With the approved mason training manual, many thousands masons were already trained specially focusing on urban buildings, which eventually worked in reconstruction of urban houses after Gorkha Earthquake.

15 Years of Experience: Pavement to reconstruct Nepal Better and Safer

With more than 15 years of experience in reconstruction, NSET assisted Nepal Government to plan the reconstruction process soon after the 2015 Gorkha Earthquake which wrecked the country killing almost 9000 people, damaging almost 8 hundred thousand houses and affecting millions of people. Additionally, more than 7000 schools and 3000 more public buildings got ruined by Gorkha Earthquake.



Whether it be the process in formulating or executing Post Disaster Needs Assessment (PDNA) or it be in setting the principles of Owner-driven Reconstruction (ODR) approach for Build Back Better, NSET played a significant role in supporting Government of Nepal (GoN) being grounded on the past international experience. Basically the experience gained at Gujraat, Iran and Pakistan eased NSET in suggesting GoN and get involved in developing policies, guidelines and manuals for safer reconstruction efforts. Indeed the 15 years of international experience of NSET have laid a stone to move to the direction of rebuilding Nepal Better and Safer.

Assessment after Gorkha Earthquake

After the 2015 Gorkha Earthquake struck the central Nepal on April 25, 2015, NSET conducted rapid visual assessment of critical facilities like hospitals, offices, hotels, apartments, schools and residential buildings based upon the request. In so doing, NSET worked together with the Department of Urban Development and Building Construction (DUDBC) in the early days of assessment to maintain the consistency in methodology and evaluation results. The major purpose of this assessment was to check the usability of the building so that the buildings can be re-occupied and re-used and the life returns back to normal.

A total of 667 buildings were assessed before the major aftershock on 12th May among which 380 were Residential Buildings, 123 were Office Buildings, 72 were Hospitals, 41 were Banks, 31 were School Buildings and 20 were Hotels and Apartment Buildings. As per

the guideline, assessed buildings were categorized into three categories: inspected (green), Restricted use/ Limited Use (Yellow) and unsafe (red). NSET again conducted assessment of altogether 115 buildings of different office, banks, schools and residential buildings were assessed following the May 12 Aftershock of M7.3. Most of the buildings were found safe to occupy though.

With the view to identify the damage scenario of April 25 earthquake, a "Detail Damage Assessment (DDA)" of Kathmandu Metropolitan City, along with thirteen municipalities including one VDC carried out in close technical collaboration with NSET under program of Public Private Partnership for Earthquake Risk Management (3PERM).

A Pilot work on Technical Support for Earthquake Safer Housing Reconstruction

As a pilot work for reconstructing Nepal, NSET implemented the Technical Support for Earthquake Safer Housing Reconstruction (TSESHR) program with the funding support from US Office of Foreign Disaster Assistance (USAID/OFDA). TSESHR was a short term intervention commenced on 1 July and was completed by the end of October 2015. TSESHR was designed to cater the immediate requirement in planning, developing and piloting the potential methodology of technical support for earthquake safer reconstruction. Three major activities carried out during the life of project were Policy Planning, Capacity Building/Training and Building Community awareness/Mobilization. TSESHR was the foundation stone of the rehabilitation and reconstruction process after the earthquake. TSESHR made a positive impact with its awareness and training programs on the necessity and importance of training of masons to ensure earthquake resistance of every building reconstructed. It was also useful in pursuing the government line agencies to initiate the establishment of district level technology center to raise awareness and train concerned professionals on earthquake resistant construction technology

Ensuring Safer Reconstruction: Efforts through Baliyo Ghar Program

To support ongoing efforts of the Government of Nepal (GON), National Reconstruction Authority (NRA) and other ministries and departments engaged in post-earthquake reconstruction, with the support from United States Agency for International Development (USAID), NSET is implementing Baliyo Ghar Program meaning 'Strong House' with the goal of promoting earthquake safer housing reconstruction through owner-driven approaches. The five-year (October 2015-September 2020) program is providing blanket technical assistance to the earthquake affected people to ensure safer reconstruction. The program is implemented in selected villages/municipalities of 4 districts (Dhading, Nuwakot, Dolakha and Kathmandu) out of 14 severely earthquake affected districts.

In shorter-term, the program aims at ensuring disaster resilient reconstruction of all houses in the program areas where for longer-term, the program aims to establish a system of disaster-resilient construction to achieve the goal of disaster-resilient communities in Nepal. The goals will be achieved by providing technical assistance for reconstruction, and in future, for disaster-resilient housing designs and construction, and by supporting the GON's plan to achieve long-term disaster resilience. This project does not fund housing reconstruction, but provides technical assistance necessary for owner-driven reconstruction.

Baliyo Ghar provided significant support to NRA in developing systems, policies and programs in regard to reconstruction process. Baliyo Ghar assisted in development of Fund Disbursement Guidelines, developing Information Booklets, Posters and Pamphlets related to the grant distribution. Baliyo Ghar contributed in preparing Standard Operating Procedure (SOP) for inspection, manual for inspection, Technical Posters incorporating 10 Tips for Earthquake Resistant Building Construction etc. Under the guidance of DUDBC, Baliyo Ghar contributed to develop separate curricula for urban and rural masons with 7 days training course duration each.

Baliyo Ghar Program assisted National Reconstruction Authority (NRA) conceptually and physically to launch the distribution of Housing Reconstruction Grant to eligible quake affected households which began from March 13, 2016 from Singati Dolakha.

During inspection, many houses in earthquake hit-areas were found to be non-complaint with minimum requirements as per the National Building Code. These buildings were therefore vulnerable to future earthquakes. In order to bring these houses to compliance, corrective measures were required. To address the problems, Correction and Exception Manual was developed in which NSET had significant contribution. The manual supported engineers in compliance inspection process and provided guidance for corrective measures. The corrective measures were implemented successfully in Lamidada, Dolakha to make the beneficiaries to be eligible to receive the subsequent tranches of housing reconstruction grant.

The houses rebuilt in Lamidada, a village in Kalinchowk Rural Municipality, Dolakha were found not meeting the government standards. So the families didn't receive Second and 3rd trance of government grant. NSET advised them to correct their houses as per the guidance of correction manual. After getting the information about corrective measures, the beneficiaries were excited to correct their house. Basically the houses lacked the plinth band and in some cases horizontal and vertical band were missing. In presence of DUDBC engineer, Baliyo Ghar technical team helped the beneficiaries of Lamidada in making their houses earthquake resistant.

Strengthening coordination among the stakeholders and imparting knowledge in grassroots

To strengthen coordination among the stake holders involved in reconstruction Baliyo Ghar has been pivoting the process through National Reconstruction Technology Center (NRTC). NRTC is a concept of working together by all concerned stakeholders, especially on technical matters to identify technical problems and draw consensus solutions. And with the active involvement in Housing reconstruction and Recovery Platform (HRRP), Baliyo Ghar is working closely with partner organizations. Likewise, District Reconstruction Technology Centres (DRTCs), established in Dolakha, Dhading and Nuwakot are serving as main hub for training and technical support activities.

DRTCs support develop instructors in government organizations and other partner organization in districts through Training of Trainers (TOTs) and provide necessary technical support and guidance to partner organization to standardize the training and technical support system. Also DRTCs support districts team on effective implementation of the Baliyo Ghar program. Similarly, Local Reconstruction Technology Centres (LRTCs) have been established in 6 places, 2 each in Dolakha, Dhading and Nuwakot covering a group of rural municipalities depending on the geographic situation and accessibility to the areas. LRTCs are supporting organize mason trainings and Mobile Teams mobilized in local level.

Mobile teams have been imparting knowledge, transferring technology and other technical assistance activities in every households of the program areas to ensure safer reconstruction.

Building Capacities of Technical Professionals, Construction Technicians and Social Workers

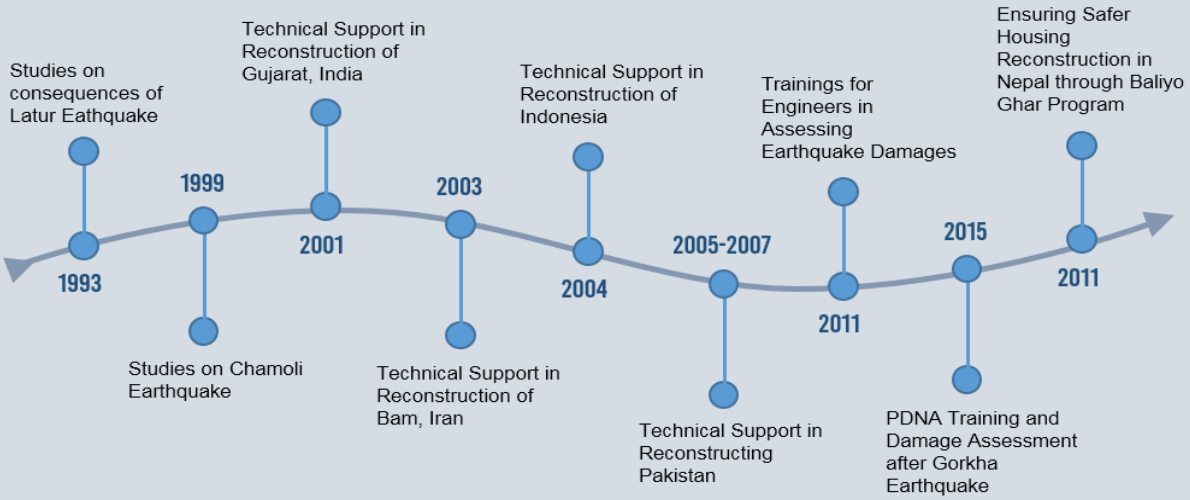
One of the major activities of Baliyo Ghar is capacity building. Baliyo Ghar is providing extensive trainings for Technical Professionals, Construction Technicians (Masons) and Social Workers. 7-days TOT is being conducted to enhance the technical knowledge and capacities of technical professionals (Engineers, Architects, sub-engineers) deployed by government for reconstruction activities. The trained technical professionals are the potential to conduct mason trainings in grassroots.

Likewise 7-days end user training is being conducted for existing masons to enhance their skills. 5-day training is being conducted for social mobilizers to enhance their skills in facilitating the community in earthquake resistant construction.

As the demand of skilled masons for housing reconstruction is grew, Baliyo Ghar is involved in developing new masons through On-the-Job training (OJT). OJT is a capacity building training for the persons who are working in construction field though with no skills. OJT program intends to produce new masons to help constructing earthquake resistant housings in post-quake reconstruction campaign. The 7-days mason training program is for the practicing and existing masons, who already were working in housing construction. This system of on-the-job training (OJT) is actually a transitional arrangement for the production of huge number of skilled masons. Baliyo Ghar is organizing 50-days OJT in program areas through its regular program activities whereas in rest of the areas of program district, OJTs are carried out through vendors.

Additionally, training to the Local Authorities (Elected Representatives) have been carried out in program areas to build better understanding on the process and igniting the role of local government for sustainable reconstruction and apply building code in local level.

NSET's Timeline of Lessons learned, Lessons NOT forgotten, Lessons used in Gorkha Earthquake Recovery and Reconstruction



Lessons Learned

Working in different countries in post-earthquake reconstruction NSET has collected tremendous lessons which of them are as follows:

- Reconstruction Agency should be set up as soon as possible to facilitate, coordinate and address all the problems regarding reconstruction.
- The countries hit by large earthquakes have adopted different approaches in reconstructing the communities. Among them Owner-driven approach has been very effective in ensuring seismic safety, and sustainability.
- There is an assumption that local government cannot handle being in charge of relief and reconstruction tasks because its buildings and people are themselves damaged or destroyed. But if, on the one hand, local governments have little capacity and knowledge for relief and reconstruction, they can handle it as the development agencies (be they state or non-governmental) will not stay there for longer.
- Political support is crucial in ensuring safer reconstruction.
- Housing reconstruction starts earlier than other sectors after the earthquakes. Hence to ensure safer housing reconstruction and guide the house-owners, it is important that policies, standards, and support systems should back them at earliest. The policies shouldn't follow the house-owners.
- Consistency in messaging regarding the reconstruction process and regulations is must. One-door policy in messaging or coordination mechanism can help in propagating the uniform message.

Stories

Aalampu turning to be a Seismic Resilient Village

Aalampu is one of the villages (Ward 6) in Bigu Rural Municipality-Dolakha which earlier was a single VDC in itself. The village is an alleged integrated settlement, one can see its whole landscape like glued in the chest of enormous hill. Almost 600 houses were destroyed by the Gorkha Earthquake and for 2 years temporary shelters made with zinc sheets dominated the beauty of inclined hill. But now the scenario has changed.

On the lap of the hill, lies the house of Mr. Purna Thami. His wife Mrs. Sukhamaya Thami along with her colleagues was in the kitchen garden picking the vegetable stuffs. Their only son has reached France for abroad study and 2 daughters have been already married. One of them is in her postpartum period hence has arrived to her father's home for rest. This family stayed beneath the temporary shelter for 2 years but now happily living in a seismic resilient house. But the newly built house have been received after a long haul as Purna says.

"We are now back to our normal life but to arrive here, we have passed so many dark days and night. We remained under the plastic tunnel prepared for vegetation for more than 2 years. Now many villagers have rebuilt their houses to get back in the life before Gorkha Earthquake," Purna said.

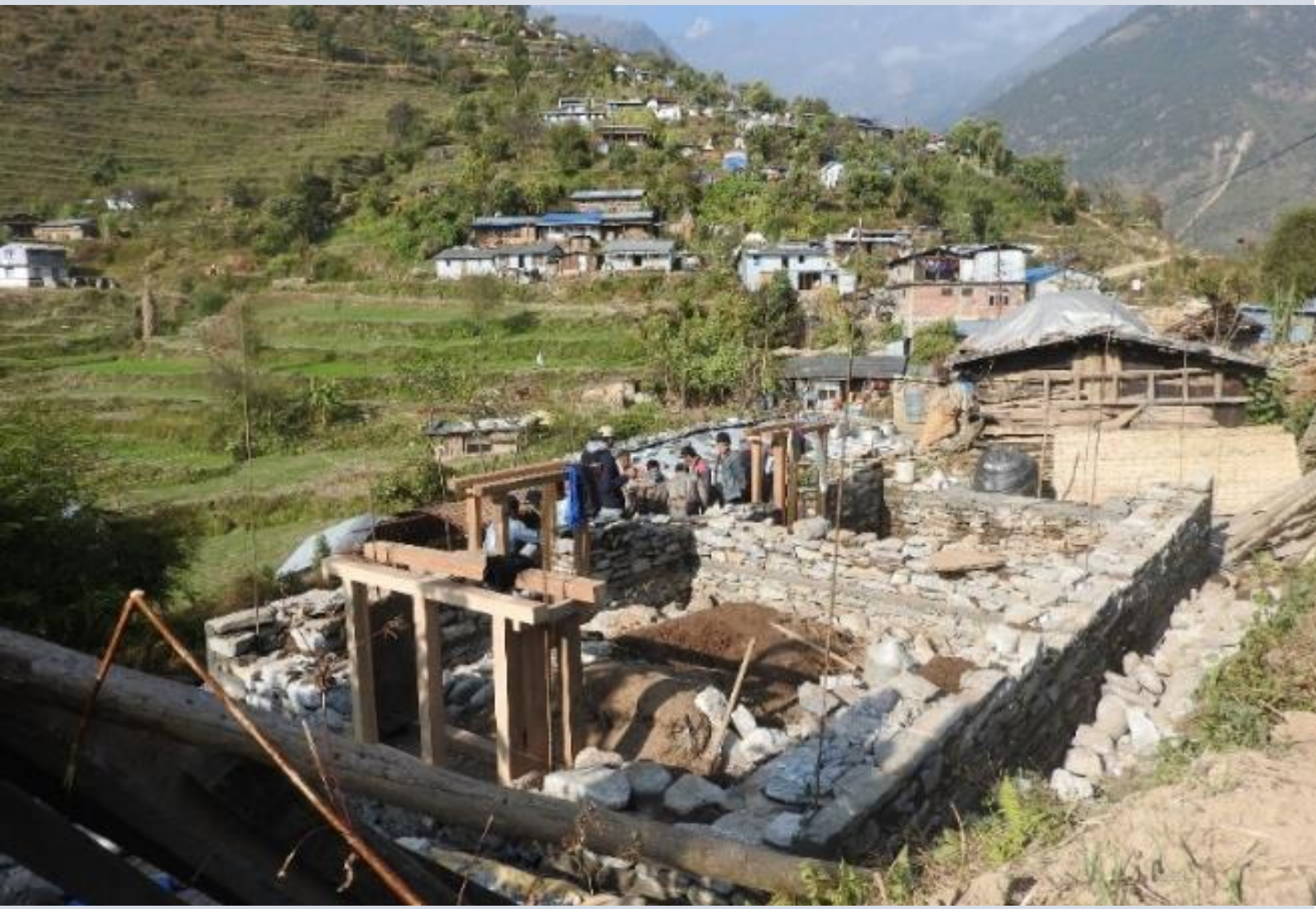
Family of Mr. Purna and Sukhamaya comes back to their normal life after rebuilding quake safe home

Purna is not only the one who rebuilt his house with earthquake resistant elements incorporated, all of the Aalampu dwellers have rebuilt earthquake safe houses. In the initial days after Gorkha Earthquake they were unaware of the earthquake resistant houses and the government grant receiving procedures. Many of the villagers were perplexed in the traumatic circumstances. Building a seismic resilient house to receive government grant was like a great deal for them. Soon after Baliyo Ghar Program began to provide technical assistance in the village after 9 months after the major shake, their confusion and state of suspense was eradicated. Mrs. Shanti Thami, neighbor of Mr. Purna said, "After a group from Baliyo Ghar came to our doors, we came to know about the process to receive government grants and after a mason training was conducted in this village, we came to know what exactly was an earthquake resistant house would be." As Purna says, earthquake resistant house is not a big deal, just they need to involve trained masons in rebuilding their homes. Mr. Purna informed, all of the earthquake beneficiaries started rebuilding their home after the first mason training held in Alampu in the last days of 2016. He doesn't

blame government for anything. He knows, the government grant worth Rs. 3 Lakhs is not the compensation to the beneficiaries rather it's just a help to inject earthquake resistant elements in the house. "And of course, building earthquake resistant home doesn't cost high as supposed and rumors spread but a least a trained mason is most," he added.

Significantly, villagers who once thought the stone masonry would not resist earthquakes have changed their perception. They now are convinced houses built from locally available materials like, stone and timbers can also resist earthquakes. "Necessarily, the techniques of construction depends on its resiliency and sustainability," says Birkhe Thami, a trained mason.

Till last May 2018, in total 597 houses collapsed, 350 more houses have been rebuilt, 100 plus are under construction in Aalampu. "At least 10% of the flattened houses are being rebuild as the house owners have already shifted to district headquarters or country capital, Kathmandu," villagers say.



Aalampu being built better and safer

Section 2 NSET's Major Contributions in 25 Years

Enhancing engagement of Private Sector Businesses in DRR

Context

The private sector has a vitally important role to play in averting disasters, safeguarding economies of nations, communities, and themselves. From the disaster risk management perspectives, private sector entities have two-fold role: 1) building resilience of their businesses; and 2) contributing as a part of corporate social responsibility in enhancing community resilience. The participation of the private sector is essential, and should be a perpetual process. Therefore, it is necessary to raise awareness of the private sector, convince that earthquake risk management is much more than "charity", demonstrate the economic, social and corporate feasibility of investing on disaster risk reduction, and persuade that it is a sound investment to be done.

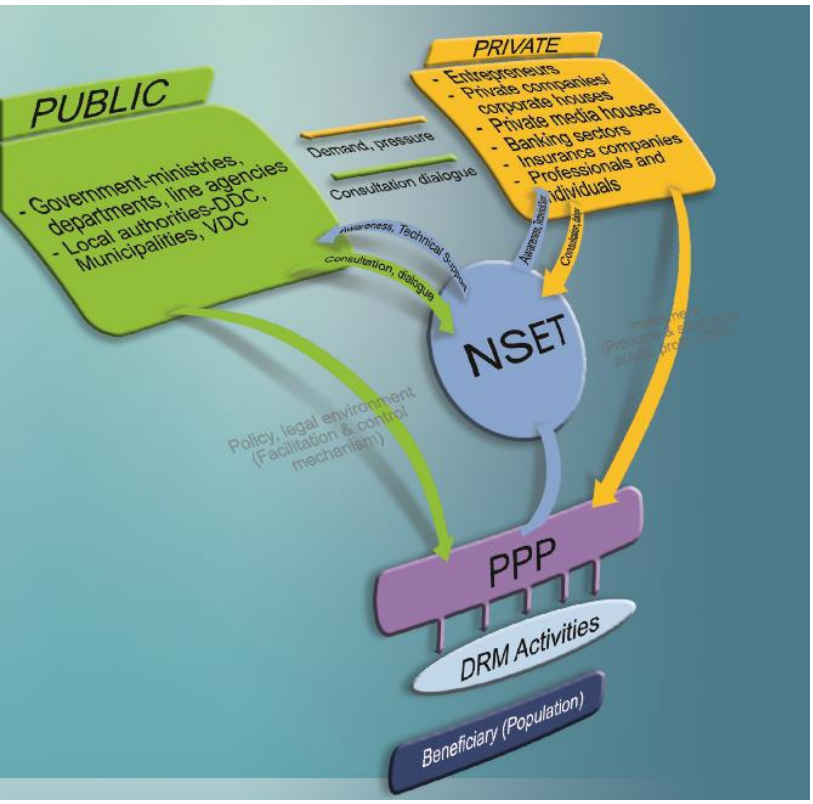
Although, it is a relatively new concept in Nepal, the engagement of the private sector in DRM is a well-practiced concept globally. In developing countries like Nepal where the effects of natural hazards are often severe, Public-Private Partnerships (PPPs) offer a promising alternative to conventional practices. However, despite having vast potentiality, Nepali private sector's contribution is limited largely in post disaster relief and response on an individual basis, charities and ad hoc post disaster reconstruction. Besides contribution on the post-disaster assistance, relief distribution and building understanding, it has been felt that the private sector has also important role to play in pre-disaster efforts.

NSET Efforts

NSET has been seeking every opportunity to make involvement of private sector businesses in Disaster Risk Reduction efforts since its pioneer works were launched in late nineties or early two thousand. Be it whether Earthquake Orientation events conducted in communities or School Earthquake Safety Programs or mega events like Earthquake Safety Day; or in Mason Training events conducted at various localities, NSET wanted to bring private sector also on board so that their contribution and ownership would be well established. Not the big ones but small scale works could be possible at community level. NSET later started also working with big houses and various business sectors on both aspects; first help make them resilient, i.e. securing their infrastructures and business operations; and secondly encourage them contribute on building community resilience.

In 1999, Nepal started marking Earthquake Safety Day (ESD) annually on 2nd Day of Magh, the 10th month as per Nepali Calendar (i.e. January 15 or 16) commemorating the Great Bihar – Nepal Earthquake of 1934. This is the Government led multi-stakeholder event aimed at re-affirming national commitment towards enhancing earthquake safety of Nepali communities. NSET is serving as Member Secretary for organizing national programs. Private sector has been

one key stakeholders to join ESD events. They have been main contributor for Earthquake Safety Exhibition in most of the episodes. That has been opportunity for private sector to enrich connectivity with people of various social walks, showcase their products and innovative ideas and contribute to awareness raising on building culture of safety. Many manufacturers and construction business sector have joined in the ESD events. The first school retrofitted in Nepal received part of construction materials, steel and bricks from private producers.



In 2010, NSET collaborated with Jagadamba Steels Pvt. Ltd. for a wider media campaign on promoting Earthquake Safety in Nepal. Under the joint initiative, series of Earthquake Resistant Construction Techniques have been massively disseminated through National broadsheet Newspapers & periodicals. The concepts and ideas shared are simplified versions of construction technologies based on scientific studies and year-long experiences of NSET & many other institutions. The messages were developed in such a way that it could be individually complete & clear as well as together comprise a set of safe construction techniques in sequence. Also the collaboration conducted television campaign with the similar purpose. Television PSAs have been produced and disseminated through different Television Channels. Another avenue, "Mobile Clinic" aimed at conducting site visits at different construction sites and give consultation to under-construction buildings' owners/ contractors. The campaign had been named as "OPERATION SAFE CONSTRUCTION". On such occasions, NSET Professionals served door to door campaign to brief on & impart safe construction knowledge & techniques to the working people and house owners. This joint initiative has been found to be an exemplary model for Public-Private Partnership (PPP).

In a more organized way, NSET, with the support from USAID/OFDA, implemented a comprehensive program with private sector businesses with the program name "Public Private Partnership for Earthquake Risk Management (3PERM)" during 2011-2016. Main objective was to increase disaster awareness and promote public private partnership for earthquake risk management in Nepal. This is the first ever program in Nepal that targeted the private sector businesses for enhancing their involvement in the mainstream of earthquake risk management activities in the country. The main aim of the program was to tap the vast potential of private sector for contribution to earthquake risk reduction in Kathmandu Valley as well as throughout the country. It also aimed at increasing disaster awareness and promote public-private partnerships and investment in disaster risk management in Nepal. Capacity development of the stakeholders was also a focus of the program.

Initially conceptualized as a three year program, 3PERM, was later extended in view of the success of the program and also due to the need to address urgent needs of the Post-Gorkha Earthquake situation, mainly to assist the private sector businesses to respond to the earthquake emergency situation.

This program provided an organized approach towards mobilizing the private sector businesses in enhancing their earthquake disaster awareness, disaster preparedness, and implementing the first steps towards propagating the concept of Business Continuing Planning (BCP), Urban regeneration in the historic city core areas and the potentials of private sector involvement in urban regeneration was another key component. The program covered the whole territory of Nepal; however, its main focus was in Kathmandu and other urban centers as well as urbanizing areas of Nepal.

This program basically had 3 main components, namely, conducting Massive Awareness Campaign on Earthquake Risk Management (ERM) through Public Private Partnership. Enhancement of Public Private Partnership for Earthquake Risk Reduction and Feasibility Study of Urban Regeneration of a part of Kathmandu Core City Area as a DRM activity.

Under first component 'Conducting Massive Awareness Campaign on ERM', through Public Private Partnership various activities were carried out such as production and broadcast of weekly radio program through 28FM Radio Stations and Radio PSAs from all over the country, production and broadcast of weekly TV programs, TV PSAs and Telefilms, conducting print media campaign through PSAs, Articles/Columns, Reports, publicizing hand Books, Guideline on earthquake safety construction methods, Posters & Fliers, conducting internet campaign/E-bulletin (Monthly), arrangement of display boards (hoarding boards) with earthquake safety messages in 18 locations in 5 municipalities of Nepal and carrying out door-to-door campaign (mobile clinics) to building construction sites and organizing street drama and other demonstrations, production and distribution of Short Thematic Video films, development and distribution of CDs/DVDs on Earthquake Preparedness.

As part of 'Enhancement of Public Private Partnership for Earthquake Risk Reduction' component, various activities were carried out including one-on-one meeting with the top twenty private sector businesses in Nepal, consultative Meetings, Invited lectures in Rotary Clubs, jointly design, develop and implement of DRR Programs and Promotion of Urban Regeneration.

Likewise, the activities carried out under the component 'Feasibility Study of Urban Regeneration of a Part of Kathmandu Core City Area as a DRM' were collection and analysis of relevant data and information, earthquake Risk Perception survey, Survey and Analysis for Tourism potential, identification of alternatives for Urban regeneration: Technical alternatives, Cost Benefit analysis, Consensus-building meetings with different target groups such as a) local residents, b) social leaders, c) local and central level government agencies and others, Sharing workshops, Production and distribution of Information, Educational and Communication (IEC) materials production.

- Light Search and Rescue (LSAR), Basic Emergency Medical Response (BEMR), Damage Assessment Training (DAT) and Non-Structural Mitigation (NSM) training courses organized by NSET in Kathmandu in 2014 where 25 people participated representing different hotels.
- Federation of Nepalese Chamber of Commerce and Industries (FNCCI) and NSET organized an Interactive Presentation Session on Earthquake Risk Reduction and Business Continuity Planning in 2015 in Kathmandu.
- Orientation on earthquake risk and preparedness to staff of Nepal Pharmaceuticals Laboratory Pvt. Ltd (NPL) held.
- Several consultative meetings with the private sector stakeholders from FNCCI, CCI, Travel and Tourism Industry, Hotel Industry, Telecommunications Industry, Banking and Insurance Industry, Construction Industry, Retail Business Association, Media sector, Rotary Clubs and Lions Clubs on partnership approach to do disaster risk reduction activities in Nepal.

- Workshops held as part of series of sectoral workshops with Banking and Insurance sector stakeholders in 2011 to know on their existing emergency response system and level of disaster preparedness.
- Organized a short interactive presentation session on "Disaster Recovery and Business Continuity Plan for Banking Sector" in 2014 jointly with Nepal Bankers' Association (NBA) to push developing the Disaster Recovery and Business Continuity Plan for their respective banks.
- Organized a half-day workshops in collaboration with Butwal Chamber of Commerce and Industries (BCCI) as well as with Kailali Chamber of Commerce and Industries (KCCI) on 'Understanding Potential Impact of Natural Disaster in Private Sector and the Need for Preparedness' in 2013.
- Organized half-day workshops in collaboration with Nepal Travel and Tours Association (NATTA) and Nepal Tourism Board (NTB) to raise the awareness level and to discuss on the need of disaster preparedness of travel and tourism sector stakeholders in 2013.
- Organized a half-day workshop in association with Federation of Contractors' Association of Nepal (FCAN) to raise their awareness level on earthquake risk of Nepal and make them realize the need for preparedness.
- Nepal Retailers' Association (NRA) and NSET organized a half-day interactive presentation session on "Earthquake Risk of Nepal and Need for Preparedness in 2013 to raise their awareness level on earthquake risk and encourage them to increase the level of earthquake disaster preparedness.
- Together with Nepal Telecommunications Authority (NTA) organized a half-day workshop on "Earthquake Risk of Nepal and Need for Preparedness of Telecommunications Industry" in 2014.
- NSET had organized several earthquake orientation sessions for various Rotary Clubs as well as for Lion Clubs under 3PERM program for raising awareness on earthquake risk of Nepal and encouraging stakeholders from different walks of life for disaster preparedness.
- Organized an earthquake orientation session for the employees of Kathmandu Guest House (under KGH group of hotels) in 2013.

Lesson Learned

Massive Awareness Campaign on Earthquake Risk Management

- Investing in community radio and TV for awareness raising has yielded more worth in terms of generating and education at large scales
- Establishing closer connectivity with community people
- Enhancing local actions on risk reduction
- Contributing build local capacity, develop ownership and promote multi stakeholders' engagement
- Massive awareness raising activities work more effectively with enhanced engagement and contribution of many stakeholders.

Enhancement of Public Private Partnership for Earthquake Risk Reduction

- Buying in by private sector on DRR, outside of their regular business, requires long term continuous engagement,
- Approach on starting from small and tangible to longer and bigger worked better.

Feasibility of Urban Regeneration Sites in Kathmandu Valley

- For urban regeneration process, there is a need to have a Community discussion Forum. Local Authorities should plan to establish such forum.
- There is a need felt for formulating Urban Regeneration Law essential to ensure private property of individuals and preserve ancient heritage.
- A clear understanding of institutional responsibilities along with supportive legal provisions is crucial for the effective implementation of urban regeneration activities.

Section 2 NSET's Major Contributions in 25 Years

Ensuring Inclusion in DRM Efforts

Background

Gender Equality and Social Inclusion (GESI) is one of the approaches to address special needs of disadvantaged groups, including women. NSET places gender aspects, gender equality and social inclusion as an effective means and approach to reducing earthquake risks in making safer communities in Nepal. Sendai Framework for Disaster Risk Reduction (SFDRR) (2015-2030), the global guidance framework for Disaster Risk Reduction has underscored on the critical importance of gender considerations and women's leadership role to achieve its expected outcomes. SFDRR specifies that 'women and their participation are critical to effectively managing disaster risk. Designing, resourcing and implementing gender-sensitive disaster risk reduction policies, plans and programmes and adequate capacity building measures need to be taken to empower women for preparedness as well as build their capacity for alternate livelihood means in post-disaster situations. Priority area 4; 'Building Back better' states that empowering women to publicly lead and promote gender equitable response, recovery rehabilitation and reconstruction approaches are keys. Earlier, Hyogo Framework for Action (2005-2015) had also very well recognized the fact that women face greater vulnerabilities during disasters in comparison to men in the society.

It is a well proven fact that disadvantaged groups of the society including women are more vulnerable to the impacts of disaster events. Gender issues are commonly prevalent in the Nepalese society. Deep rooted perceptions of women and girls as weak and inferior have resulted in the exclusion of women in all aspects of disasters. Consequently, gender-based inequalities often lead to a complex status of vulnerability across all social and age categories of women, placing them at greater degrees of risk to disasters, including the risks of sexual violence and abuse. This fact was clearly manifested in 2015 Gorkha Earthquake as the deaths and injuries of women was higher than men. Women, in particular single women, female-headed households, women with disabilities and older women, often face more discrimination in access to relief and information in such disasters.

NSET recognizes gender equality and social inclusion (GESI) as integral to achieving its disaster resilience goals and hence aims at mainstreaming GESI strategies into all stages of its disaster risk management efforts, be it disaster preparedness, disaster reduction, disaster response and recovery as well as post-disaster reconstruction.

NSET GESI efforts

NSET focuses to promote women and socially excluded groups not only as beneficiaries, but also as change agents and leaders of the communities. The main objective is to make the communities safer from earthquake risks through awareness, capacity building and implementation of earthquake-resistant construction, non-structural mitigation and preparedness measures.

GESI is important for building positive workplace culture as it encourages diversity, innovation and prosperity of organization and nation. NSET has formulated a GESI Strategy and Action Plan aiming at mainstreaming GESI within the organization as well as throughout its program. It focuses on creating GESI friendly environment in its day to day works and activities as well as capacity building and awareness raising efforts at various levels through various means with GESI considerations. More importantly, this strategy also provides guidance on integrating gender equality in all aspects of NSET policies, structures, and project/program implementation. There are GESI considerations in major activities at NSET. All Projects/programs at NSET aspire to be GESI friendly. NSET believes that the vision of sustainable development in terms of Disaster Risk Management can only be achieved by the equitable and meaningful participation of people of all gender, sexuality, race and ethnicity in all phases of project formulation. An in-house GESI expert at NSET formulates policies, monitors the effective implementation of those policies and develops GESI mainstreaming strategies.

Integration of GESI consideration in program/projects

NSET has been implementing disaster preparedness activities through various programs with the view to create and enhance the culture of preparedness in Nepal and beyond. While doing so, the participation of female as well as socially marginalized groups have been ensured in various activities such as simulation exercises, planning (national, city, family, community and institutional), capacity enhancement programs and earthquake orientations to communities, organizations, schools, house owners and special groups.

NSET has been conducting regular earthquake orientation programs with major focus on women and disadvantaged groups under various programs and projects since its establishment for a different level of stakeholders in Nepal.

Disaster Preparedness and Emergency Response (DPER) program of NSET conducted, more than 363 orientations from 2001-2018 benefitting nearly 8500 females out of 22,500 people from different communities. A total of 3362 individuals benefited from 72 earthquake simulation exercises where 2153 males including 1209 women, Janajatis and PWDs participated among others. Similarly in the building code Implementation (BCI) program, over 3500 female and socially disadvantaged groups have been benefitted through orientations. So far 36785 female members have benefitted house owner orientations. It has yielded very good results in terms of educating community people on earthquake risks from the Baliyo Ghar Program.

Similarly, since 2012, a total of 71 female masons were trained on earthquake resistant construction so far through the Building Code Implementation program. A total of 559 females have been graduated on Community Search and Rescue (CSAR) through 72 trainings conducted in Nepal during 2012 to 2018. Likewise, it has also produced 234 female Basic Emergency Medical Response (BEMR) responders from 25 trainings during the same period. There have been also 99 females graduated from Damage Assessment Training (DAT-1001) in the period.

In 2010, NSET conducted a detail vulnerability assessment of the structural and non-structural safety of Bheri Zonal Hospital, Banke. People with Disabilities (PWDs) along with people with reduced mobility, pregnant women, sick people, children and elderly people are more vulnerable to natural disasters. Keeping that in mind, the issues of accessibility PW) were also included while preparing the emergency response plan in the hospital making sure the implementation of activities to support the plan as far as possible.

GESI strategy in Baliyo Ghar program

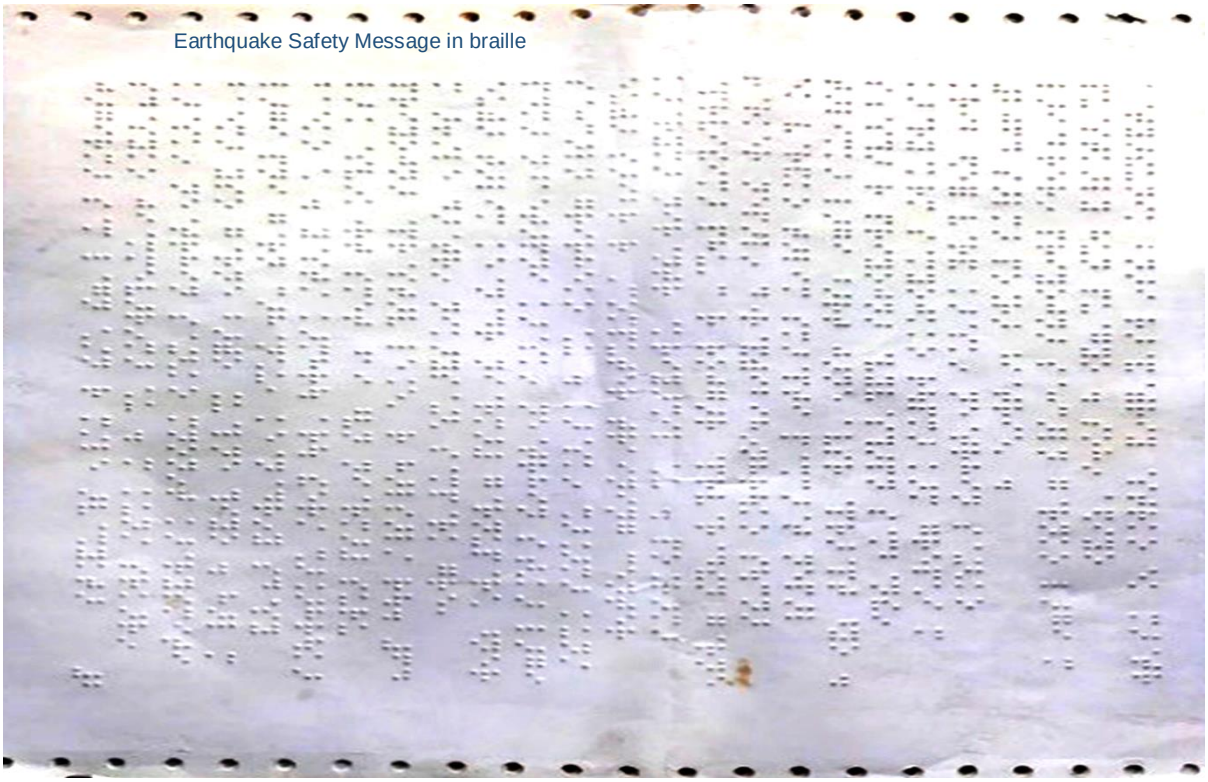
Baliyo Ghar program is an initiative to support the government's goal by providing technical support on a wide range of activities implemented by NSET and supported by USAID. GESI has been envisioned in 'Baliyo Ghar' program to foster socially inclusive housing reconstruction in the country by addressing the special needs of disadvantaged groups, including women. The key guiding principles of this strategy are "*Equal opportunity for all and Equity for Equality*".

Similarly, various GESI activities in Baliyo Ghar program include

- Conduction of Baseline survey (identification- what, how many and where),
- Development of GESI Strategy and Action Plan,
- Development of GESI friendly standards and guidelines,
- Awareness raising at various levels through various means with GESI considerations,
- Implementation of Activities as per Action Plans,
- Monitoring GESI tasks in conjunction with M&E Plan of Baliyo Ghar and Impact Assessment.
- Here follows the data of capacity building of women and different social groups under the program,
- 230 female masons have been trained on earthquake resistant construction
- 997 new female masons have been produced through OJT
- 313 female social mobilizers have also been trained as Training of Trainers (ToT)
- 22 females have received Training for Instructors (TFI)

NSET collaboration with National Association of the Blind (NAB)

In 2013, NSET and NAB came together for a collaboration. The major objectives of this collaboration was to increase disaster awareness of blind and partially sighted (BPS) people, support persons and communities through production and distribution of disability friendly IEC materials, conducting orientation lectures and periodic drills, mobilizing mass media as well as new media to propagate the message of disability considerations and executing range of activities feasible and suitable to the Blind and partially sighted (BPS). IEC materials in braille were developed during this collaboration. Similarly, Earthquake Risk Reduction and Preparedness Orientation was provided by NSET during the general assembly of NAB held at Butwal in 2013.



Earthquake Safety Message in braille

Disability Inclusive Walkathon

Disability Inclusive Earthquake Safety Walkathon has been one of the events organized in the Earthquake Safety Day (ESD). The program is organized with a view to drawing the attention of various stakeholders and aware the risks and problems facing by PWDs. The major objective of organizing Walkathon is acknowledging the cause of

people with disabilities (PWDs) and to focus on disability consideration in Nepal's DRM efforts as PWDs of different kinds are more vulnerable to the disaster incidents including earthquake.

In making the earthquake preparedness activities GESI inclusive, NSET has also been conducting earthquake evacuation drill at different Old Age Homes including Old Age Home running in Pashupati Area Development Committee at Pashupati Temple premises.

Community Resilience through women

In an effort to expand the earthquake preparedness and mitigation activities at grassroots level involving and targeting women's groups in a collaborative approach for long-term results, NSET initiated '**Enhancing Earthquake Preparedness of Communities through Women's Network: A Collaborative Initiative.**'

It is a part of a collaborative initiative to expand the earthquake preparedness activities at the grassroots level involving and targeting women's group in a collaborative approach. This collaborative effort has brought organizations such as NSET, Lumanti, and National Network of Women for Community Resilience (NNWCR) of which a number of women's' organizations and networks such as Community Women Forum (CWF) of Thankot and Kirtipur Women's Network (KWN) are the members to work together to enhance community resilience. Under this initiative, capacity enhancement of women's group, implementation of safer construction technology, non-structural mitigation technique and activities on earthquake preparedness and planning through the engagement of women in the community is being conducted. s. The collaboration has helped enhance the capacity of members of women's group on safer construction technology, non-structural mitigation and earthquake preparedness planning and implementation through series of training courses and instructors' development courses.

It has significantly helped increase women's assertiveness as well as gained recognition from family and community. It has also helped ensure meaningful participation of women in local DRR structure, economic empowerment of women, the transformation of knowledge into practice and securing fund in the local government annual budget for DRR among others. We started working in teams in our communities and conducted door-to-door campaigns. With individuals and family members, we share ideas on what to do before, during and after earthquakes. We also helped them fix nonstructural items so that there would be no harm in case the ground shakes.

One interesting incident that happened is that the same night after the training, we experienced a minor quake in the area. This actually speeded our planned campaigns on the next day itself. Small tremors

made people listen to us. Safety messages with illustrations are more useful so that people who can't read are also able to understand it. Calendars with such messages are so effective that people have safely kept previous year's calendar due to the inclusion of such important messages.

People are really impressed with the concept of Go Bag and have managed it in their homes. They are also interested in non-structural mitigation with few households even committing to fixing their cupboards. Our efforts have been recognized by our communities and local government. Some of us are now even contributing to Community Level Disaster Management Committees.

Women's efforts are more result-oriented and sustained

We are Bindu Shrestha, Sita Shrestha, Astamaya Shrestha and Namrata Shrestha affiliated with Community Women Forum (CWF), Thankot and Sumita Shakya from Kirtipur Women's Network (KWN). We are actively engaged in various activities of women empowerment and social welfare. Our settlements are vulnerable to earthquakes. Our experience says women's efforts are more result-oriented and sustained. We are now more involved in organized ways to reduce the risk and also improve the level of preparedness of our communities through trainings conducted on Non-Structural Mitigation (NSM), Earthquake Go-Bag and ToT Refresher Course. Also, trainings on Community Search and Rescue (CSAR) and Basic Emergency Medical Response (BEMR) followed.

Achievements

- More than 200 female members benefited from 4 Orientation programs conducted on 'Earthquake Risk and Preparedness' in two communities, Kirtipur and Thankot
- 36 participants got 5-day 'Training of Trainer (TOT)'
- 6188 Households have been reached under Door to Door Campaigns
- Non-structural mitigation in 32 households of the two communities Kirtipur and Thankot with the involvement of the master trainers of the women network
- 52 Go Bags produced by the Women's Group to enhance the emergency response capacity at a household level.

Campaign for Earthquake Non-Structural Mitigation through Women's groups

NSET in coordination with Shapla Neer Citizens' Committee in Japan for Overseas Support implemented the program from June 2015 to June 2016. The major tasks accomplished are:

- Media Campaign for Earthquake Disaster Prevention Messages through Radio Public Service Announcements (PSAs), flex boards on tempos and micro/mini buses demonstrating prevention methods, documentary shows,
- Training Program for Community Leaders through an "Earthquake Information Booklet" to create interest in Disaster Risk Reduction at community level,
- Door-to-door visits conducted in above 250 households and furniture stoppers,
- DRR Workshops of local Women's groups held.

School Construction with PWD friendly infrastructure

After the 2015 Gorkha Earthquake, a program "Building Back Safer Schools for Nepal Earthquake Response 2015" begun as a consortium between PLAN Nepal and NSET in 6 districts; Kathmandu, Lalitpur, Sindhuli, Sindhupalchowk, Dolakha and Makawanpur with the financial support from Department of Foreign Affairs and Trade (DFAT) during October 2015 - March 2017. A total of 12 schools site were selected for disaster resilient demonstration schools through new construction/ reconstruction/retrofitting and disaster preparedness and risk reduction activities. Out of those 12 school buildings, 5 schools are Integrated Resource Schools which include disability considerations for children with hearing impairments. These Schools are considered as model schools for Comprehensive School Safety.

Handrails and tile for persons with disabilities at Sitka Secondary School, Dolakha

Nepali Sign Language Course

In order to facilitate communications/ interactions of PWDs, Deaf and Hard of Hearing (NADH) in particular, NSET hires and manages sign language interpreters during program events. Riding on this, NSET conducted a Nepali Sign Language course for the organization's staff with the support of National Association of the Deaf and Hard of Hearing (NADH). The course helped deliver the message about

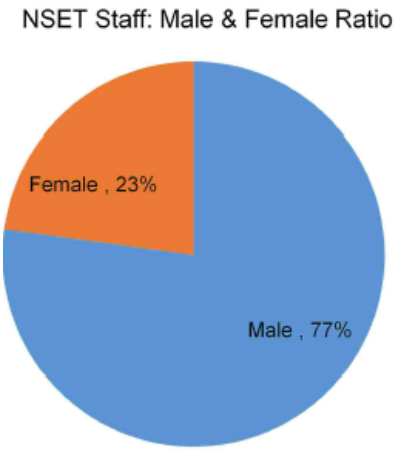
disaster management effectively to NADH communities through sign language interpreters making NADH more accessible towards DRM efforts as well as enabling them to deliver trainings in Nepali sign language itself.

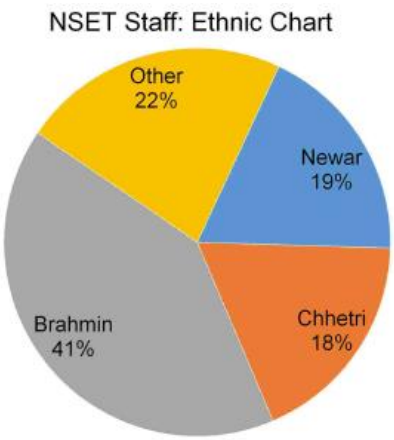
GESI considerations in Organizational structure

To address GESI in its organizational structure, NSET is putting its efforts to ensure representation of 33 % of female in its total number of workforce aiming at promoting equality within the organization and in its programs/projects. Likewise, it has also given the priority to People with Disabilities (PWDs), Ethnic Janajati, Dalit and Madhesi among others. NSET has also put efforts into making the facilities at central office friendly to PWDs.

Challenges and Lessons Learned

When it comes to disasters, being prepared alone will not work for others. It needs to be spread among the community. And even after the message is spread, what works for one person will not work for others, as there are people with differences in the community. People with Disability (PWD) groups require special attention, in terms of mitigation, early preparedness and awareness regarding disasters. NSET has been conducting regular orientation amongst the community members, however, the PWDs need to be given a special focus in terms of what behavior they should adopt before, during and after disasters. We often come across orientation programs which describe a hazard and their mechanism, that it important, however, one should not be lost around the technicalities, it is important to orient them about safe behavior practices before and after disasters. Similarly, it is widely seen that women are more vulnerable in terms of the impact of disasters, however when it comes to the knowledge, they are often quite behind than men. The Women's groups are great initiatives in altering this situation as the knowledge imparted is delivered by women themselves.





Section 2 NSET's Major Contributions in 25 Years

Monitoring, Evaluation and Learning at NSET

Background

National Society for Earthquake Technology Nepal (NSET), in the year 2014, established the Monitoring and Evaluation (M&E) Unit to track implementation and outputs systematically, and measure the effectiveness of its activities. Through the M&E Unit, a systematic monitoring, evaluation and learning practice has been ensured in all programs and activities of NSET. The main aim of NSET M&E Unit is to establish a common structure and standard that govern the application of effective and timely monitoring, evaluation and learning. M&E Unit has been analyzing performance and whether the targets set have been met, ensuring the five core standards of 'relevance', 'effectiveness', 'efficiency, 'impact' and 'sustainability'. The objectives of M&E Unit at NSET has been outlined as:

- *Monitoring the progress:* To ensure effective and efficient implementation of the activities and delivery of the intended results.
- *Learning and Improvement:* To study the extent to which intended results are achieved or not achieved and provide corrective actions accordingly.
- *Accountability:* To enhance creditability of NSET in the eyes of client, donors, partners and people by holding NSET staff and its partners responsible for their performance.
- *Evidence-based Management:* To serve as an important input to decision making within wide range of management process at NSET.

Main areas of work under M&E

- Standard setting and implementation
- Routine data collection and reporting of the activities
- Qualitative and Quantitative data collection and analysis as per the need of the NSET's programs
- Periodic Assessment and Evaluation
- Preparation of program specific M&E plan
- Ensure data quality through Data Quality Assessment Guideline and Gender Equality and Social Inclusion (GESI) in development and implementation of M&E plan
- Establish a feedback loop by providing and receiving feedback to and from all stakeholders, concerned and follow-up

Major Recent Accomplishments

Building Code Compliance Survey under Building Code Implementation Program in Municipalities of Nepal (BCIPN)

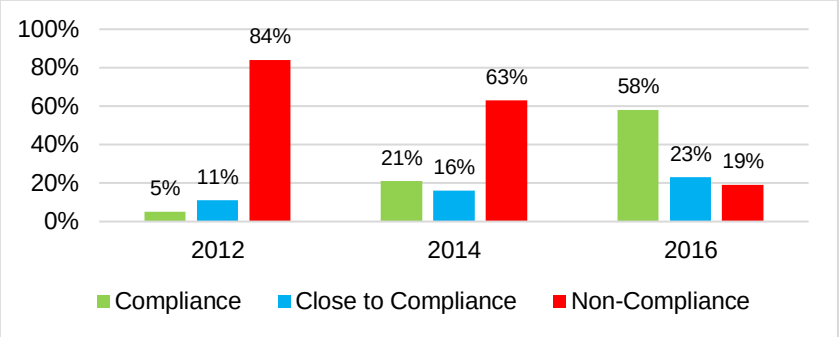
Introduction: Implemented during Sep 2012 to June 2017, BCIPN was dedicated to enhance earthquake resilience of communities in Nepal through technical assistance in the municipalities. NSET implemented the program in 30 municipalities of Nepal under the guidance and directives of the Department of Urban Development and Building Construction (DUDBC) and the then Ministry of Federal Affairs and Local Development (MOFALD) with funding support from the United States Agency for International Development/ Office of Foreign Disaster Assistance (USAID/OFDA). Activities under the three major components of the program viz. raising awareness, capacity building and institutional improvement were expected to achieve the targets set.

Four major indicators were set to measure the progress of the program activities in the M&E plan of BCIPN. Building Code Compliance Survey (BCCS) is one of the four surveys planned for measuring the progress related to the set indicators. The BCCS was carried out during the program period to understand the change in building drawing and construction practices, to identify the existing non-compliance parameters for monitoring and planning for building code implementation system. The survey was conducted to assess the structural provision of building code for the earthquake safety of building, thereby measuring codal compliance rate of sampled drawings and buildings actually constructed in the field.

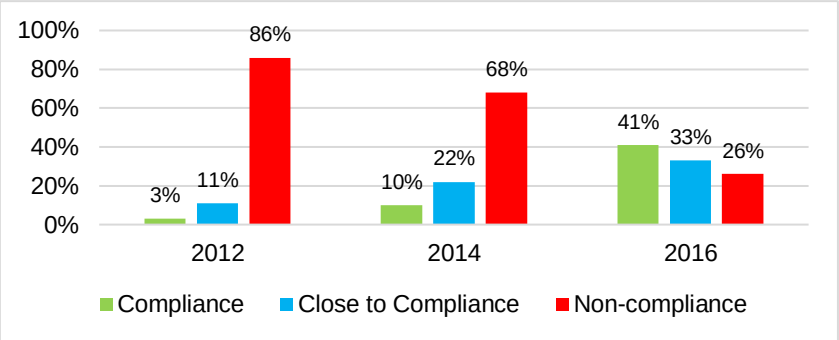
Methodology: Building Code Compliance Survey was conducted using a handbook titled "Handbook for Evaluation of Design and Drawing", developed by BCIPN, based on different seismic codal provisions, guidelines like FEMA, ATC, IITK and NSET's experience in seismic survey of buildings. The questionnaire developed based on the handbook studied three dimensions i.e. configuration, strength and ductility of the buildings both in drawings as well in the field. Each dimension had different parameters and each parameter had different variables. The parameters were given compliance factor range from 0 to 1 according its variable matching with existing condition of drawing or building. Zero was given for non-compliance condition and 1 for compliance condition. Again, each parameter had weightage system based on its contribution on overall system of building. Multiplication of parameter weightage and compliance factor resulted the compliance score of that parameter. The summation of all dimension compliance score was set to 100 marks. Configuration, ductility and strength carried 50, 25 and 25 respectively. Overall compliance of the building was determined with the following criteria.

If the compliance score lies between 80-100, 70-80 or 0-70 out of 100 then the building is assumed to be compliance, close to compliance or non-compliance respectively.

Key findings: A total of 8,133 buildings: 4,440 building on drawings and 3,693 buildings on field were assessed in 30 program municipalities during the BCIPN program period. Of the total building drawings assessed, 41% were one storey, 35% were two storey and the remaining 24% were more than two storey. Similarly, 48% of the buildings inspected in field were 1 storey, 30% were 2 storey and 22% were more than two storey. The survey found a noteworthy improvement in the percentage of buildings complying with the National Building Code over the years.



Compliance rate over the years-In building drawings



Compliance rate over the years-In field

Conclusion: The progress in compliance rate can be observed through the survey conducted among buildings constructed in three different years. Compliance rate of the building in configuration related attributes was higher than ductility and strength related attributes. Although there has been improvement in overall compliance rate, there are areas for improvement in the future. Therefore, activities related to BCI (capacity building, awareness raising) are must along with a strict regulatory institutional system in the municipality. The survey recommends that focus should be given on field supervision to achieve higher compliance rates of the buildings constructed.

Majority of the buildings comply to National Building Code: Engineer from Bharatpur Municipality

Surya Prakash Lama, a civil engineer, is the Head of the Building Code implementation and Disaster Management Division at the Bharatpur Metropolitan City where he has been working for the past 17 years. During his service at the municipality, Lama attended several trainings, seminars and other programs related to the earthquake risks and safe construction. He has also been sharing the knowledge and ideas to others including householders, contractors, masons, social workers, political parties, professionals and others with view to contribute in the earthquake safe construction practice. While sharing his vast knowledge, he is not limiting himself within the Bharatpur Metropolitan City but also conducting training programs in other municipalities as well. Bharatpur was one of the BCIPN program municipality and hence received continuous technical support from the program.

According to Lama, municipality's decision to implement the building code was not well accepted at the initial stage. Locals even accused him of enforcing the mandatory building code compliance to place extra burden to them. Such attitude of the people, however, gradually changed due to various awareness raising programs as the time passed on. The impact of the 2072 earthquake also motivated people about the need of following the building code as many people lost their lives due to collapse of weak infrastructures like houses, walls, temples and others. Seeing the transformation in the construction practice, Lama is extremely delighted now. "The increasing level of understanding on the part of people regarding safe construction practice gives huge satisfaction," shares Lama. According to

him, almost 90% of the buildings have been constructed according to the National Building Code in the municipality area.

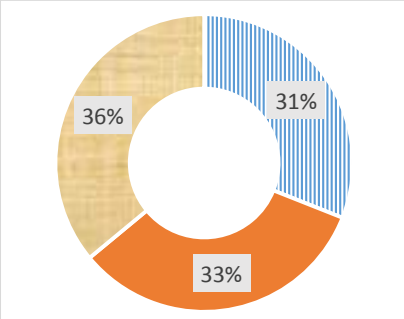
Building Code implementation in Bharatpur Metropolitan City is progressing rapidly and in a well-coordinated manner. The enforcement of penalties has also been set for those who breaches the Building Code rule. Lama says that he is thankful towards the municipality for believing and giving responsibility to him. "I am also grateful to NSET for encouraging and inspiring me to work relentlessly. If the current co-ordination and joint work between NSET and municipality continues, building code implementation will achieve immeasurable success", adds Lama.

Risk Perception Survey of the residents of BCIPN program municipalities

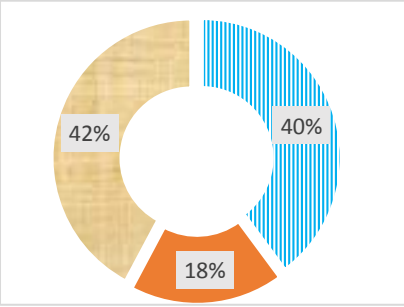
Introduction: Risk Perception Survey of the residents of BCIPN program municipalities was conducted with an objective to measure the residents' perception of risk to earthquakes, their level of preparedness and the earthquake risk reduction activities they are implementing. The survey was conducted in two phases, one during 2013/14 as Baseline and later in 2017 as End line. KAP Survey approach was employed in both phases of the study. KAP is an acronym that stands for Knowledge, Attitude and Practice.

Methodology: The survey was conducted using structured questionnaire among sample respondents selected using random sampling based on Stratified Systematic Area Sampling Procedure. Sample units were taken proportionately from each ward of the target municipality ensuring the inclusion of people from different professions, ethnic groups, economic status group, etc. The questionnaire attempted to measure respondents' demographic characteristics, knowledge about earthquake and risks in their community, their attitude towards earthquake risk reduction and uptake of precautionary measures (practice). The questions were weighted differently based upon their relative importance and accordingly different scores were assigned to different questions. A respondent would score a maximum of 100 and a minimum of 0 upon his/her response to the set of questionnaire. Same set of questionnaire was administered in both the surveys.

Key findings: Respondents in both phases of the survey considered earthquake to be the most threatening disaster in their communities. A high proportion (88%) of the respondents had at least some information on being safe from the threatening disaster in the End line survey (2017) compared to 70% of the respondents in the Baseline (2013/14). Also, 53% of the respondents in the End line survey considered weak house as the main cause of risk compared to 61% of the respondents in the Baseline. This is an indication of the fact that the houses built in the recent years are safer against earthquake risk. People were also found to have developed safe behaviors to perform during earthquakes. Besides that, people are aware about the safety as larger proportion of those who feel that their houses are at risks, have the willingness to make their house safe.

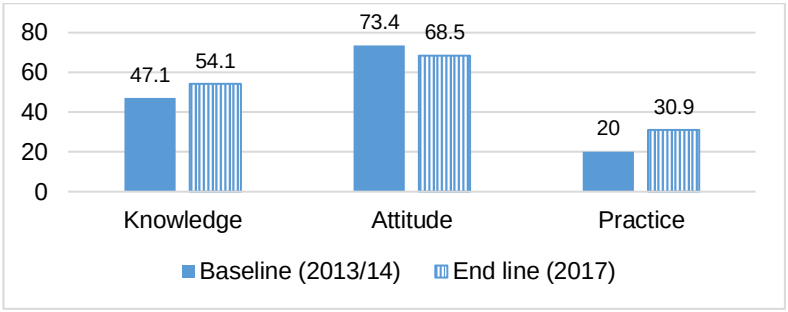


Thought about making house safer-Baseline (2013/14)



Thought about making house safer-End line (2017)

One of the major objectives of the survey was to assess the change in the knowledge, attitude and practice of the people residing in the survey municipalities. A number of trainings and household orientations conducted in the municipalities were expected to increase the KAP scores of the respondents in the survey areas. The chart below presents the mean KAP Scores of the respondents during the Baseline and End line surveys.



Comparison between Baseline and End line KAP Scores

Rise in knowledge and practice scores of the respondents from Baseline to End line survey time can be observed from the chart. The mean knowledge score rose from 47.1 in Baseline to 54.1 in the End line survey. There has also been a considerable rise in practice score-20 in the Baseline to 30.9 in the End line survey. However, the attitude score of the people have decreased following to the confusions created due to the decision of building code implementation in the municipalities. Since the implementation of building code is governed by many factors associated with the house owners who build new houses such as economic conditions, availability of trained construction workers and engineers, and factors such as manpower, budget and institutional mechanisms associated with the municipality, people were found to have a confused opinion regarding building code implementation. Although a decrease in the attitude score, the positive attitude of the people towards the importance of earthquake safe construction was noted in the survey.

Conclusion: In addition to the increase in knowledge and practice score of the respondents, their safe behavior during the Gorkha Earthquake was also noticed upon the analysis of the data. Besides that, the construction practice has also improved in the last two years as indicated by the improved pillar and beam size in RC buildings built after the Gorkha Earthquake. Despite the positives, the survey still identifies the need of reaching to public to raise awareness about minimizing earthquake risks.

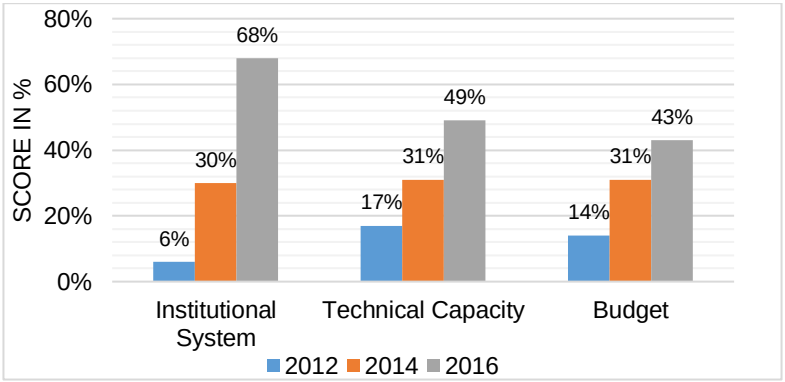
Building Code Implementation Status Survey in BCIPN program municipalities

Introduction: A sound institutional system, capable manpower within and outside the municipal office, and budget are vital for the effective implementation of building code in the municipalities. With an objective to assess the potential of municipalities for building code implementation, a survey was conducted among the BCIPN program municipalities. The status of municipalities was studied in terms of institutional mechanisms, technical capacities and budget allocation for building code implementation. The survey was administered in three different years 2012, 2014 and 2016 to continuously monitor and

evaluate the changes in the aforementioned three parameters considered essential for the effective implementation of building code.

Methodology: Based on three major components identified as a result of previous experiences and interactions with the municipalities, a questionnaire was developed to measure the factors associated with the component. The factors were weighted on the basis of their relative importance to the whole component and accordingly scores were assigned. The three major components and associated factors studied for the assessment of BCI status are**: i) Institutional System on Building Permit Process,** measuring the institutional mechanism, system and capacity of the municipality towards implementing building code, and the system for overall disaster risk management **ii) Technical Capacities/Human Resource,** measuring the availability of technical capacities within the municipal office as well as within the entire municipality, and iii) **Budget Allocation for BCI,** measuring the budget allocated for building code implementation as a proportion of revenue generated from building permit process. Each of the three components was measured on a scale of 0 to 5 based on the performance of factors under each component.

Key findings: The respondents of the survey were particularly the municipal engineers. The adjoining figure depicts the scores (in percentage) obtained by the municipalities during the survey conducted in 2012, 2014 and 2016. The increase in scores shows that there has been a significant improvement in the three vital aspects: Institutional System, Technical Capacity and Budget Allocation, of the building code implementation.



Municipalities score on BCI components in 2012, 2014 and 2016

Conclusion: Significant improvement in key components of BCI was observed during the program period. Readiness of the municipality to accept changes, leadership role, positive attitude and continuous support to the municipalities through BCIPN program made possible to achieve this change. The municipalities require further strengthening of the institutional system, increase technical capacities and allocation of budget to achieve better results in building code implementation.

Evaluation of the Earthquake Safety Day (ESD)-2018

This year the country marked the 20th Annual Earthquake Safety Day on 16th January 2018. With an objective to assess the effectiveness of the programs organized during ESD and to collect recommendations (if any) for enhancing the effectiveness for the future programs NSET

M&E team conducted various surveys during the annual ESD events this year. The respondents of the survey comprised of representatives from the Government of Nepal, Civil Societies, various organizations working for Disaster Risk Reduction and the general public.

Altogether 82 randomly selected respondents: 64 male and 18 female were interviewed on the ESD 2018. The responses were collected using two methods: hard copies of the survey form and KOBO App. 78% of the respondents were aged 20-50 years, 12% were attending the event for the first time while other had already attended in the past. The major findings of the survey were:

- 72% of the respondents felt that the program met its objectives stated before.
- 8% of the respondents felt that the overall management of the program was very good, 61% felt it good and the remaining 31% found satisfactory.
- According to the large group of respondents, exhibitions and Radio/TV programs about earthquake safety should to be continued in the future
- 84% of the respondents rated overall ESD program as Satisfactory, 10% rated very Satisfactory.

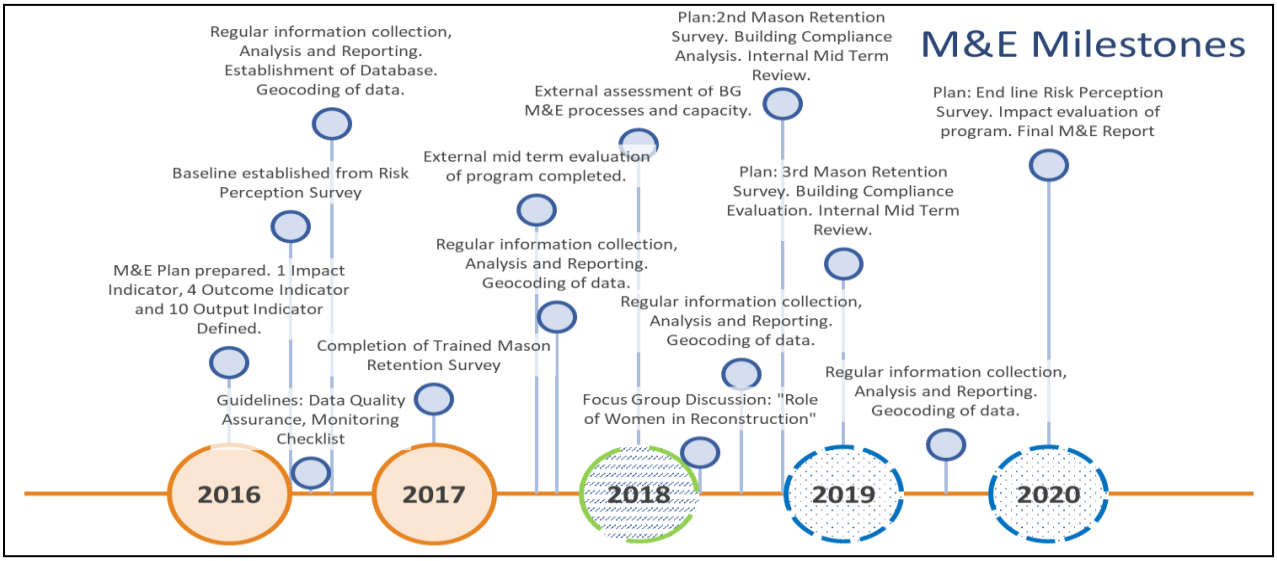
The respondents of the survey also made recommendations for enhancing the effectiveness of the ESD programs in the future. Some of the recommendations made were:

- Program should target rural area and people
- Youth focused programs should be held
- Local government should also mark the day with effective programs
- Better management of the volunteers
- April 25 Earthquake should also be marked as it caused great loss of lives and assets

As a regular event of Earthquake Safety Day, National Symposium on "Earthquake Disaster Management and Risk Reduction in Nepal" was held at Teku, Kathmandu during 21-22 January, 2018. The two days long event had 12 thematic sessions and was attended by 225 more professionals from various governmental and non-governmental organizations. NSET M&E Unit conducted a survey to evaluate each thematic sessions through a set of structured questionnaire. The responses were collected from 257 attendees who rated the level of appropriateness, time allocated, management aspect and overall sessions of the symposium. A high proportion of the respondent considered that the overall program was fruitful and every sessions were worth attending.

Continuous Monitoring and Evaluation under Baliyo Ghar Program

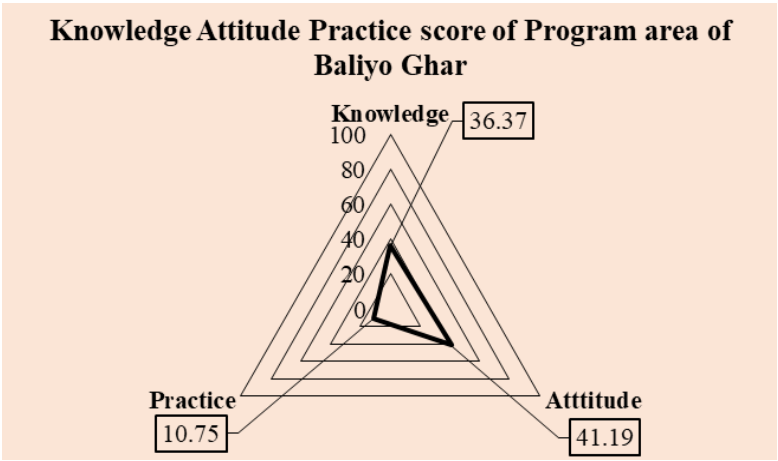
The overall success and failure of a program is ascertained by its ability to reach the outputs of the activities that it had set. The regular monitoring and evaluation of performance ensures that the activities will be able to reach to accomplish the goal of program. The learnings from program provide evidence for informed decision. Figure below shows Baliyo Ghar M&E milestone achieved and future plan of milestones.



The achievement of M&E milestones and plan for milestone achievements of Baliyo Ghar Program during its life

In order to serve the purpose of monitoring and evaluation, regular information and data are collected through standard forms and formats. To assure data quality, Data Quality Assurance guideline is developed and is in regular use. An activity monitoring checklist is in use to ensure quality and effectiveness of program activities.

Under the project, the baseline figures have been set for two major indicators. First, the practice of building construction for which the baseline value is obtained from regular compliance survey, retrospective information from house owner and damage from Gorkha Earthquake. The null value is indicative baseline value for this indicator. Second, the perception of the people towards disaster resilient construction for which the baseline value has been set from risk perception survey. From this survey, people's Knowledge, Attitude and Practice (KAP) towards Earthquake risk resilience is measured. At the end of program, these two indicators will be re-measured and the difference between end line and baseline value will reflect program impact and change achieved towards sustainable earthquake reconstruction.



Baseline KAP score of the respondents in Baliyo Ghar program area

Mason Retention Survey

Mason Retention Survey is the measurement of trained masons' current working status and their level of knowledge retained after the training. This survey examined the masons' opinion in continuing their profession and retention of technical knowledge. The targeted group of this survey were construction work force who were involved in housing construction trained for disaster resilient construction from the Baliyo Ghar Program before September 2016 in different program areas. Retention in work means, construction workforce continuing their work in the earthquake affected areas, a year after the mason training.

Mason Retention Survey was carried out among 1,286 randomly selected masons who were trained on earthquake resistant building construction technology under Baliyo Ghar Program, one year before the survey. Of the total sample size, 98% were male and the remaining 2% were female. Sample of mason retention survey were selected from 21 earlier VDCs of Dolakha, Dhading and Nuwakot along with three municipalities were covered during the survey. The survey was conducted from 10-31 August, 2017.

Findings

- The survey results indicate that majority (88%) of the masons have been working as a mason in respective VDC/Municipalities after participating the mason training conducted by Baliyo Ghar Program.
- The mean knowledge score of trained mason after one year was 80 out of 100, which indicates that the average knowledge score of respondents was very sound.
- Extensively huge number, 90% of the total respondent replied that they will continue their profession in the days to come.

Program for Enhancement of Emergency Response (PEER)

M&E plan of PEER 4 is focused on a performance evaluation methodology and approach. The Theory of Change set for PEER 4 is,

"PEER Stage 4 will enhance emergency response capacity of PEER countries by developing qualified emergency responders and instructors in each country provided that the countries are willing to accept and internalize PEER course within their system".

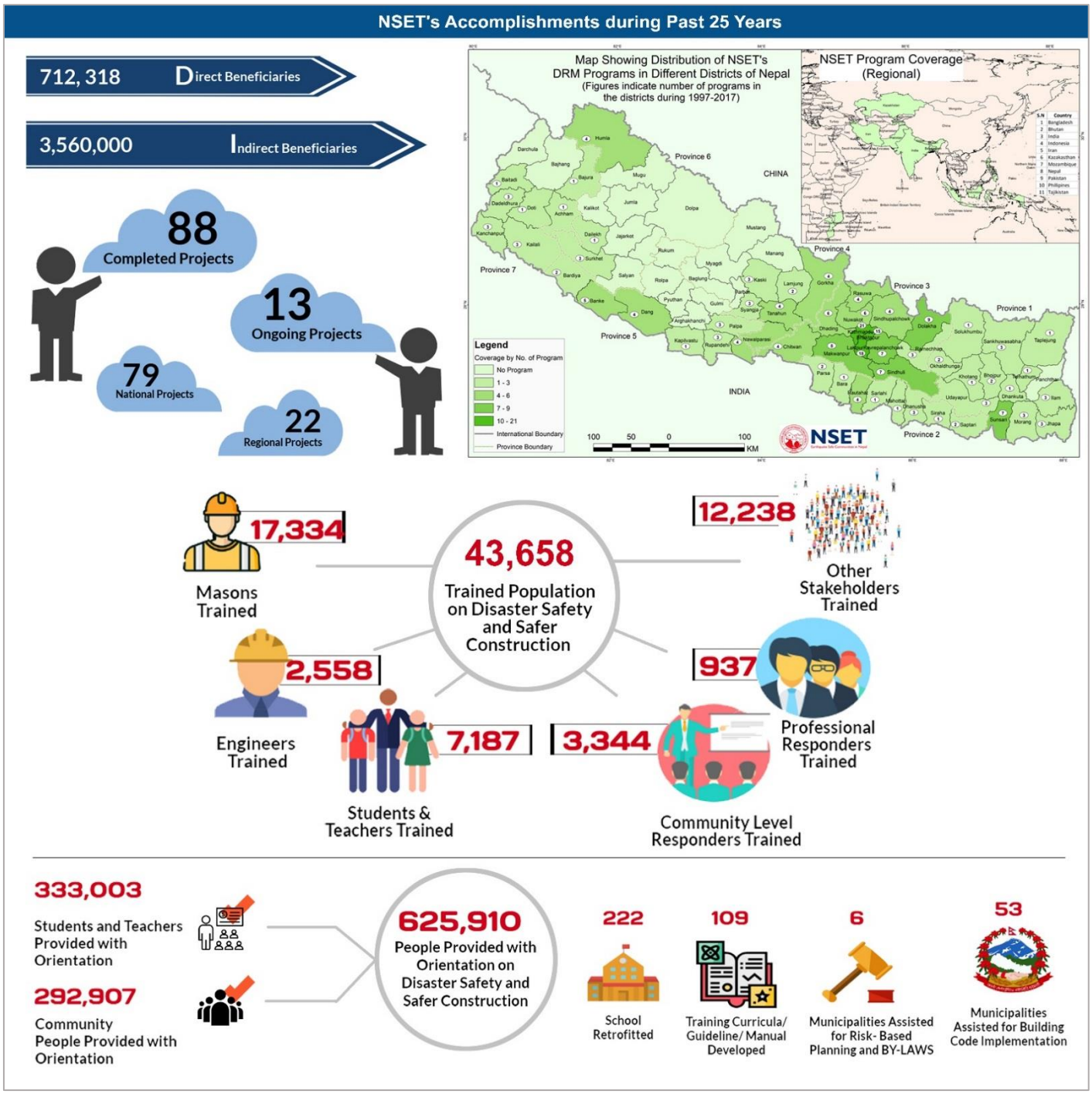
A total of 15 indicators (6 Outcome, 9 Output) will be used to measure the results of the program. The following three elements of the PEER 4 baseline has been established.

- Baseline of current status of partner institutions in terms of institutional mechanisms and technical capacities
- Baseline of current status of PEER Graduates in PEER countries
- Baseline of current status of nodal agencies in PEER countries

The three types of surveys as done for the baseline will also be conducted for the end line survey towards the end of the program. These surveys will provide a means to compare how the program did or did not bring about changes in the targeted countries.

Conclusion

Since its inception in 2014, M&E Unit has been carrying out regular monitoring and evaluation works, particularly as defined by the M&E plan of the particular project. The unit has been successful in tracking the inputs, activities, outputs and outcomes of the various NSET projects. Through M&E, standards have been set for effective and efficient delivery of the efforts, thereby ensuring the achievement of desired results. In addition to the project specific monitoring and evaluation, the unit has been continuously working for developing standards, systems at NSET and for its various other activities, thus serving as one of the inseparable component of the institution.



Section 3 Milestones of NSET journey

NSET is 25 years now. In this long glorious journey, it faced several ups and downs, but overall it has been achieving its targets. A retrospect at this silver jubilee juncture shows that there were several turning episodes that provided directions to the development and growth of NSET. Nine of such milestones appear important and worth revisiting.

Udaypur Earthquake 1988 and development of Nepal Building Code

The Udaypur Earthquake, an earthquake 6.6 magnitude event, took place on August 1988 with an epicenter located near Murkuchche of Udayapur District. More than 6,000 classrooms and thousands of public infrastructures such as health centers, local government (village development committee) buildings, and hundreds of culverts, bridges, hill irrigation systems were damaged. The earthquake shook 22 districts of eastern Nepal. But actually, it shook the entire nation- questions started being asked where we are in terms of Earthquake Risk Management (ERM). A consensus opinion emerged: Nepal has to have a National Building Code (NBC) for the design of buildings. Till then, engineers used to refer to Indian standards whenever necessary, they would use those for design. Consequently, the government initiated planning building code (NBC) development project. And professionals from Department of Mines and Geology (DMG), basically seismologists, geophysicists and geologists, advocated for comprehensive understanding of the seismic hazard of the country and the vernacular building typologies to base the NBC upon. They become successful. The first of the three components of the new building code development project (BCDP) was an assessment of seismic hazards and risks of Nepal. The second component was a development of material standards to go to the building code and the third component was a study into the building construction materials and technologies prevalent in Nepal. The consultants worked to define seismic hazard after making analysis of the several potential sources of earthquake using secondary information.

That way, a fundamental study was done for assessing the hazard and that led to the development of the hazard spectra for different return periods for 3 soil types. This analysis for Kathmandu was extrapolated

to the whole country based upon a good understanding of the seismo-tectonics of Nepal.

The project also led to a better understanding of prevalent building construction practices, non-engineered character of Nepalese building and use of traditional materials like mud mortar and unbaked bricks. And our understanding about the problems of masonry structures, and the lack of detailing in the concrete frame structure also improved. This helped to understand the problems that the building code was to address, which led to the classification of entire building stock of Nepal into four categories, namely; 1) **State-of-art structures** which essentially refers to large hotels, conventional halls or other modern buildings, 2) **Professionally engineered buildings** larger than 1000 sq. ft of plinth and taller than three-story, 3) **Owner-built Non-engineered Buildings** constructed using traditional process led by local masons, and which needed pre-engineering of the design to develop " Rules of Thumb" for both masonry and pillar construction (Concrete Frame), and the 4) **Rural Buildings** whose seismic performance could be enhanced if certain guiding process were followed. Accordingly, the National Building Code prescribed both materials and process standards for all four categories of Nepalese buildings. The pre-engineered processes for non-engineered buildings were termed "**Mandatory Rules of Thumb (MRT)**". MRT may sound strange and unacceptable to many professional engineers whose building universe consists of the buildings made up of modern construction materials in urbanizing settlements. But for the rural settlements and also for the buildings belonging to the lower – middle class urban population, these MRTs and the Guidelines have done wonders in Nepal not only in enhancing seismic performance of new buildings significantly, but also widely inculcating a sense of confidence in accepting and complying with the national building code among the house-owners and also the local governments. So, this four-pronged strategy was adopted with the understanding that Nepal does not have required human resources and the capacity to administer the professionally engineered buildings given the fact that 93 percent of existing building stock is non-engineered ones. Such participatory process of practical building code development created enthusiasm for its implementation. However, questions arose: who is to help implement the building code? How to develop required capacity or the institutional mechanism?

Realization of this lack of capacity but the need of implementing the building code gave rise to need of having an institution who can help the government as well as municipalities and the people to improve the seismic performance of new building. This felt-need formed the basis for the establishment of NSET in 1993 although the process was started in 1992, together with the start of the National Building Code development process. NSET got its formal registration with the government on 18 June 1994. This was the first milestone of NSET.

Kathmandu Valley Earthquake Risk Management Project (KVEREMP)

From 1994 onwards, the need for advocating for the implementation of building code became apparent. This demanded good institutional capacity for designing and implementing appropriate awareness, advocacy and education programs requiring significant financial resources. The first Project, NSET bid for and was awarded, was the KVEREMP three years later. This was the Nepal part of a regional

Asian Urban Disaster Mitigation Program (AUDMP) executed by Asian Disaster Preparedness Center (ADPC) with core funding from the US office of Foreign Disaster Assistance (OFDA). KVERMP was influenced by a similar work of earthquake risk assessment done in Quito of Ecuador in which GeoHazards International (GHI) was involved. NSET established contact and invited GHI to partner for conceptualizing KVERMP, which ultimately was developed and implemented successfully. KVERMP consisted of three components, namely, a) developing a simple earthquake damage scenario for the level of shaking similar to what Kathmandu valley experienced in 1934 earthquake, b) a School Earthquake Safety Program (SESP) that could demonstrate how the schools in Nepal could be improved to withstand the earthquake impacts – the whole ideas was to go to the six million houses in Nepal through demonstrating improvement in seismic performance of school buildings and to propagate earthquake awareness from teachers to students, from students to parents and from parents to communities. Earmarked for 18 months with a purse of 250,000 USD, the KVERMP project continued for more than 32 months with NSET performing the tasks under the guidance and technical handholding by GHI under the project oversight of ADPC. This new model of collaboration among a national, a regional and an international agency for earthquake risk management was unique, productive and it could deliver a lot more than what was conceptualized as a project.

KVERMP developed a simplified earthquake damage scenario for Kathmandu Valley and an action plan for reducing the identified risks. The simplified loss estimation showed potential deaths of 40,000 people, injury to 95,000 people to the extent of requiring hospitalization and about half of the critical infrastructures like electricity supply, water supply or bridges being non-operational for several weeks, months and days. This result was overwhelming: initially, it was difficult to decide whether we should publish it, test if it should create panic in the society. But people accepted it in a very positive way. Operators of critical facilities sat down with NSET for the next several months to identify the actions and develop action plans towards the end of 1998. It was big milestone for Earthquake Risk Management in Nepal. The process came up with several innovative ideas. For example; it has proven that retrofitting of very poorly constructed non- engineered building with weak traditional materials as unburnt brick with mud mortar can also be seismically treated for enhancing seismic performance to the extent of life safety.

Another innovation came out was the **training of masons and owner-builders on earthquake resistant construction**. The third innovation was the training to the architects, engineers, and technicians National Building Code for earthquake resistant construction.

Earthquake Safety Day

Observing the **Earthquake Safety Day (ESD)** as a reminder every year of the earthquake risk in Nepal was another innovation of NSET.

During KVREMP implementation, while looking for innovative tools for earthquake awareness, NSET requested the government of Nepal to declare January 15 as national ESD in commemoration of the devastating 8.4 Magnitude Earthquake of 1934. The Government of Nepal liked it, constituted an ESD National Committee headed by Home Minister with several government officials as members. There is a well-articulated process, accepted as a government regulation that defines roles and responsibilities for ESD to the different concerned government, non-governmental organizations. NSET is designated as Member Secretary to provide its continuity every year.

ESD is a unique process or event observed in every January. The ESD falls on either 15th or 16 of January. Earlier, it used to be observed only in Kathmandu but for the past 10 years it is being observed all over Nepal especially district headquarters. The day typically starts with the message over radio by Home Minister. A morning rally draws in common people, students, women, people with disability and people from religious institutions. The rally usually culminates into meeting; national meeting in Kathmandu, as well as municipality level meetings in respective settlements.

1st Earthquake Safety Day program in 1999

In Kathmandu Valley, people congregate prior to meeting before start of rally in two monuments devoted to 1934 earthquake in Nepal. One of them is located in New Road Kathmandu and the other one is in Durbar square, Lalitpur. The municipalities organize memorial meetings where people from different walks of life including government, Nepal Army, Police and commoners gather together, pay homage to the victims of past earthquakes and read out the inscriptions in the stone tablets which warn people against the earthquake hazards and encourage to be prepared for earthquake. The rally culminates in a national meeting that publicly expresses the commitments usually from the Prime Minister. The participants to this are high level officers from department, ministry as well as representatives of international communities, donor agencies, bilateral aid agencies. The national meeting usually ends with the inauguration with Earthquake Safety Exhibition. All the major operators like emergency response organizations or mitigation organizations such as the building code implementer, training institutions, academia or innovators, they exhibit their materials. It usually runs for three days. This way the ESD is observed all over the country centered in district headquarters with memorial program, rally, radio programs, drama and meetings for expressing continued commitments towards efforts for earthquake safety in country.

The Shake Table Demonstration

Background

The Shake Table Demonstrations that NSET uses is an innovative idea of bringing research equipment out from the laboratories to vulnerable communities, and improve the technology by adapting it to the local situation. This is the technology that demonstrates all the engineering concepts of earthquake resistant building construction in a simple way, and convinces the audience of the feasibility of earthquake preparedness. The Shake-Table designed by NSET is an award-winning model for technology transfer and to spread awareness on the effectiveness of earthquake-resistant construction. The demonstration model has also won the San Jose Tech Museum Award under Microsoft Education Award Category in 2004.

This low-tech innovation has been highly effective in educating people about the structural shifts in buildings during earthquakes and for raising awareness about safe building construction. The Shake Table demonstration is essentially a building built to a given scale and mounted on a table which is put through certain force to see the effects of similar jolts that buildings go through during an earthquake. NSET professionals built on thant and developed different versions for different building typologies. NSET demonstrated its first Shake-table in January 1999. It has so far been demonstrated in many countries of the Asia-Pacific region including Afghanistan, India, Indonesia, Iran, Pakistan, and Tajikistan. NSET has also assisted many partner institutions to design their own Shake-Tables to spread awareness on safe building construction. NSET also supported UNCRD in the organization of special sessions on Shake-Table demonstration at the World Conference in Disaster Reduction (WCDR), Kobe, Japan in January 2005.

Objectives

- To convince people about earthquake resistant construction
- To demonstrate how risk-reduction techniques in construction can help buildings withstand the forces during an earthquake
- To convince the people on the simplicity of integrating earthquake-resistant elements into the buildings

The Demonstration Model

The Shake-table essentially has two identical buildings of the same shape and size scaled to 1:10 of the actual sizes. One of the buildings is built using earthquake resistant techniques and the other is done traditionally – or without taking any special measures. Both the buildings are placed on the same shaking platform (table) and thus exposed to forces similar to that the buildings have to endure during earthquakes. Increased load is applied to the table through which the force is transferred to the scaled models, and the weaker one made without earthquake-resistant elements progressively collapses. The tables are used to demonstrate how risk-reduction techniques in construction can help buildings withstand the forces during an earthquake and convince them of the simplicity of integrating earthquake-resistance into the buildings. NSET has conducted more than 50 such demonstrations in Nepal.

Program Output

The shake table has always been a big crowd-puller.

It could be used effectively to impart earthquake education to a wide cross section of the population, even to the illiterate masses. This is the technology that demonstrates all the engineering concepts of earthquake-resistant elements of building construction in a simple way, and convinces the audience of the feasibility of earthquake preparedness and provides solutions to the problems of earthquake safety.

The technology is worthy of recognition not only because it is a successful adaptation of a sophisticated research equipment for the use by common people, but also because of its simplicity in construction, its flexibility of use even in remote areas, its acceptability in all region with diverse cultural, linguistic, and building construction traditions.

Nepal-Gujarat Mason Exchange Program

Mason Training conducted by NSET in Gujrat

Very soon after 1998, news on earthquake risk reduction efforts of NSET went far and wide in the region and we started being invited to international meetings that discussed methodologies and strategies on ERM. During this vibrant days struck the 2001 January Gujarat Earthquake. NSET was drawn in as one of the members of international groups organized by the World Seismic Safety Initiatives (WSSI) and the Earthquakes & Megacities Initiatives (EMI), in which we shared our experiences informally and formally in Gujarat earthquake damage area. Back in Delhi, NSET was invited to take part in high level meeting where NSET was asked by the government representatives to share knowledge and experiences in reconstruction in Gujarat. NSET ended up developing a simple project for helping national and local NGOs of India to implement earthquake-resistant reconstruction of rural buildings. NSET dispatched an engineer with two trained masons who were trained in earthquake resistant construction of non–engineered buildings.

This was the core of the Nepal Gujrat mason exchange program where NSET facilitated the exchange of masons from Nepal to Gujarat and Gujrat to Nepal for mutual understanding and sharing of knowledge. This was a low-cost and successful program. Several masons from Gujarat came to Kathmandu and our two masons worked in Patanka, a village of Patan district of Gujarat for three years helped reconstruct about 300 houses in Patanka village of Patan district. Thanks to our partnership with SEEDS-India, NSET could visit an earthquake theatre to learn.

In Gujrat, NSET did learn a lot. It learned not only earthquake damage of vernacular buildings, but also how knowledge and experience could help people to face devastation due to earthquake shaking of weak houses, and how to resurrect back from the devastation, how to recreate happiness, how to reconstruct the houses and society after an earthquake. This learning and experience became very valuable for NSET's subsequent works in the aftermath of the 2005 Kashmir Earthquake in two provinces of Pakistan, and then down the line after the 2015 Gorkha Earthquake in Nepal.

Program for Enhancement of Emergency Response (PEER)

USAID /OFDA decided to bring in their rich experience of Urban Search and Rescue (USAR) developed for Latin America and Caribbean to Asia, both NSET and ADPC overwhelmingly welcomed the program which was renamed as the Program for Enhancement of Emergency Response (PEER). The program was initiated by OFDA, implemented by ADPC and NSET since 1998.

PEER initially covered 4 countries and later number of countries grew up. The program consisted initially of conducting training programs on Medical First Responders (MFR), Collapsed Structure Search and Rescue (CSSR) and Training for Instructors (TFI). The idea was to develop locally compatible training system on MRF and CSSR. The second idea was to develop instructors by working with the training institutes so that this process becomes sustainable and the countries could generate responders and instructors in a sustained way. This helped create an instructor's development process. The project provided training for instructors TFI basically teaching on elements of adult education and pedagogy. The program developed curricula for MFR and CSSR instructors training in the form of course instructor's

workshops that combined the skills of being an instructor with the skills of being able to teach MFR, CSSR and TFI courses.

While in the earthquake theatre in Gujarat, it become very clear that South Asia and also South-east Asia were not adequately prepared for proving needful emergency response.

The PEER program is still continuing in its stage-4. NSET has been implementing the MFR, HOPE, CSSR, and SWR courses. At present an understanding has been reached under which ADPC is implementing the basic course of HOPE while NSET is imparting instructors training HOPE-TFI to the graduates of HOPE course in South Asian Countries. In all countries, the PEER course curricula on MFR CSSR, HOPE have been adapted both as end users' course as well as instructor's development course as well as Instructor's workshop. PEER has been a successful example.

Virtually the core of the emergency response capacities in the PEER countries is formed by the graduates of PEER Program as evidenced by their contribution during time of disaster or during the drills. That's the milestone for NSET.

Reconstruction support after Pakistan Earthquake 2005

After Pakistan Earthquake that struck on Oct 8, 2005, NSET got involved in Pakistan Earthquake Response and Recovery since the very first week. NSET joined Damage Assessment and Response Team (DART) of USAID/OFDA. In November 2005, UNDP asked NSET to provide technical support in early recovery programs in Bagh and Muzaffarabad of Ajad Jammu and Kashmir (AJK).

Mason Training on Earthquake reconstruction in Pakistan

During work in early recovery, NSET got linked with Earthquake Reconstruction and Rehabilitation Authority (ERRA) of Pakistan, the newly formed Government outfit to address earthquake reconstruction. The early recovery part of NSET ended in June and very soon we embarked upon providing technical assistance to develop strategy for capacity development, and also in developing training curricula and in imparting training to different stakeholders in aspects of earthquake resistant reconstruction of damaged buildings. NSET worked for almost 2 years working very closely with UN Habitat, headquarters and field office of ERRA and the engineering units of the Pakistan Army. USAID/OFDA provided the financial resources for this technical assistance. NSET provided training for damage assessment, for vulnerability assessment, for reconstruction and for compliance checking. In the two years of NSET's engagement in Kashmir earthquake reconstruction, NSET provided technical assistance to ERRA in training about 5,000 masons in order to develop more than 1,500 instructors and 28 master instructors.

Being involved in Pakistan Earthquake response and recovery was again a great learning opportunity for NSET. While working in the two heavily damaged provinces of AJK and Khyber Pakhtunkhwa (KPK)

then NWFP, NSET further sharpened knowledge and improved our confidence in earthquake risk management. We learned that disaster response form SAR and relief to early recovery and reconstruction actually is a series of closely interrelated continuum process and thatearthquake reconstruction presents a wonderful opportunity for massive and well-spread risk reduction.

The good thing for NSET about working in India and Pakistan was that language was not a barrier. NSET could develop messages in order to explain earthquake risk to the common people, and we could conduct trainings for engineers, masons, house-owners, politicians, administrators in their own language. We learned that our language is a common resource. Based upon our experience, about 20 different curricula were developed.

With the experience of reconstruction, later NSET assisted the ERRA in organization of an international conference in earthquake risk management (ICRM) in order to showcase the excellent rural reconstruction of damaged buildings in Pakistan.

Developing NSDRM

After the Hyogo Framework of Action initiatives, UNDP Nepal commissioned to develop the draft of the National Strategy for Disaster Risk Management (NSDRM), a Nepal version of Hyogo Framework of Action. NSET could develop NSDRM through adopting an evolutionary process, consisting of about 35 structured interviews with operators of critical facilities, decision makers and policy makers with half day workshop for each of the 16 sectors of economy drawing stakeholders to identify the main directions and main streams of works for DRM. This was the national strategy for disaster risk management, 29 major directions of DRR initiatives and a concept on the institutional arrangement for DRR that could respect the global realization of the need for a paradigm shift from disaster response to disaster risk reduction, from assessment of damage to assessment of vulnerability and reduction of vulnerabilities.

NSDRM Workshop

Together with the cross-cutting issues like, gender and social inclusions, environmental considerations, prioritization of disabled population and development of ideas on community-based initiatives for disaster risk management. NSDRM was a milestone again. It became very clear that the level of risk faced by country is so enormous that it requires quite some time for tackling this.

Based upon the NSDRM, Government launched Flagship program that carried on efforts on the School and Hospital Safety, Flood Hazard Reduction, Emergency Response, Community Based Disaster Risk Reduction Program, and program for Enhancing the Policy and Legal environment of Nepal.

National NGOs continued working on raising awareness by working with local radios, working with community people, helping the government in the development and testing of District level Disaster Preparedness and Response Plan (DPRP) and the Local Disaster Risk Management plan for the Municipalities and villages, and many more.

NSDRM not only provided awareness and education in disaster risk reduction and enhanced risk perception but also it attracted the attention of many development institutions working in Nepal. We are proud that NSET was a part of this DRR milestone of Nepal.

Taplejung Earthquake 2011

Sikkim Earthquake impacts

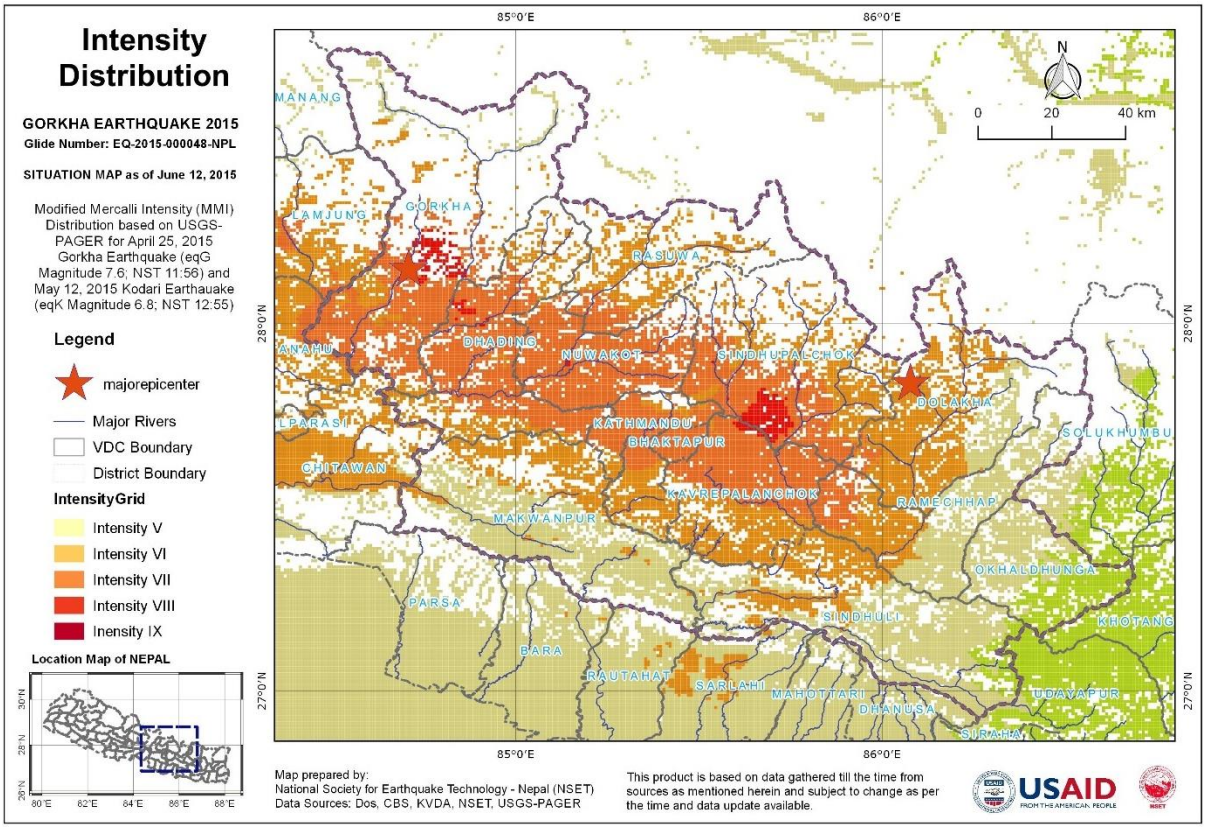
There was a 6.9 magnitude earthquake in Sep 2011 with an epicenter in Kanchenjunga area. Death toll was 6 in Nepal with 30,000 buildings damaged to grade 3 and 4. Hundreds of schools were damaged. NSET mobilized 8 teams to assess the damage. It was the first effort for NSET to understand the behavior of buildings to earthquakes. It was major earthquake since the establishment of NSET, where we could go out to the damage area to study the damaged buildings to understand their performance during seismic loading. Our 8 teams visited all the affected districts along the major hill trails where we collected data on buildings. We worked with Ministry of Urban Development (MOUD) of Nepal to estimate the need for reconstruction. Among the 30,000 damaged buildings, some need to be reconstructed and some to be retrofitted. Total estimated budget for reconstruction and retrofitting was $ 100 million. Through the assistance of various development partners, affected people received support in retrofitting of schools, capacity building, and awareness raising. NSET was involved in several of such programs. We are very happy that our efforts resulted in the training of 75,000 school teachers and thousands of school children. Again, it was a milestone as this expertise primed NSET to the needs of Nepal including policy bracing.

2015 Gorkha Earthquake

NSET eagerly awaited this earthquake because we sincerely worked to test our hypotheses and assumptions that we were forced to make in view of lack of scientific researches – even the empiricism contained the national building code required to be tested physically by an earthquake because we don't have any credible structural laboratory with a shaking table to test building performance under stimulated loading. This was necessary as most of the approaches for earthquake risk reduction in Nepal we took were based upon empiricism. Unless proven by real earthquake, the teachings could have no meaning. In fact, people were actually skeptical, professors used to ask us question - how can you say that a trained mason can improve the seismic performance of building?

What is the scientific basis for you to confirm improved seismic performance of a non-engineered building? How do you test the performance? These were valid questions. In that way, Gorkha Earthquake was a litmus test for almost 25 years of implementing NSET's hypothesis, postulations and efforts for disaster risk reduction. We are happy to report here that we have largely passed the test - the 300 more school buildings that we worked with government and the school management committees to retrofit, including those located in the earthquake affected areas, stood unaffected during the Gorkha Earthquake. These building were safe to "functional" level, and hence used to serve as emergency shelters to affected population.

While Gorkha Earthquake positively tested our postulations we also confirmed our learning that earthquake risk reduction is basically a combination of 3 components: i) Raising awareness to create demand, ii) capacity development for addressing the demand and iii) institutionalization of DRR, and it demands improvement in legal and policy environment at different levels. The earthquake enhanced image of NSET as people saw the proofs of what we preached for the past 25 years. People started asking for NSET services more and more.



For almost two decades, NSET worked with the national emergency response institutions, the Army, the Armed Police and Nepal Police towards enhancement of emergency response capacity in order to reduce mortality during a disaster. We were very proud that the capacity development programs, medical first respond, collapsed structure search and rescue, hospital preparedness for emergencies and community based skills of emergency response were found very useful during Gorkha Earthquake.

Moreover, many of the team of formal responders that came from India were also trained as per the PEER training system of NSET and it was easy for the rescuers from both the countries to work together. NSET offered services for assessment of damage and for providing the SAR services working closely with the communities at Patan, Kirtipur, Bungmati among others. After the emergency phase was over, NSET worked with the National Planning Commission to design emergency shelters. We helped train engineers in building assessment working with Nepal Engineers' Association and in tracking the affected buildings. We also contributed to PDNA. We were active before the earthquake in shelter cluster, school cluster and WASH cluster so we continued to work in these clusters, at times also taking the lead.

At the same time, we continued our research in earthquake damaged buildings of different typologies at various intensities of shaking. For a technical analysis of earthquake damage, we did a preliminary assessment of damaged buildings and very soon we started surveying buildings in detail to conduct a detailed damage assessment (DDA) of 220,000 buildings in the worst-affected 14 districts. This is a huge data set on the performance and behavior of different typologies of buildings in an earthquake theatre in a developing country.

Apart from our services in emergency response and early recovery, we also were drawn into earthquake reconstruction. NSET implemented Baliyo Ghar Program with the support from USAID. The program is essentially targeted to assist the government in providing technical assistance in reconstruction which means bringing the knowledge of science and technology to every household-damaged in a blanket way. NSET developed the concept of 3-member "mobile teams" consisting of an engineer, a trained mason and a social mobilizer, which would regularly visit every impacted household to ensure all the elements of building safety as demanded by building code and directives of National Reconstruction Authority (NRA) has been adhered to. We also provided technical assistance to NRA in developing the entire philosophy of reconstruction, helping them to develop the methodology and regulation to assist people for reconstruction. Also, we provided training to the operators of reconstruction including I/NGOs involved in reconstruction. For an efficient assistance, NSET mobilized the mobile teams under the coordination of the "Local Reconstruction Technology Center (LRTC)" 6 of which were established in all the 3 program districts. A district level hub, called "District Reconstruction Technology Centre (DRTC) coordinated policy and technical coordination among national and international partners at the district level. DRTCs worked in close collaboration and under the government guidance and the district government offices.

This process in ongoing. We have developed capacities of more than 200 young Nepalese scientists, engineers and social scientists for helping people with reconstruction. We have developed several curricula, and draft procedures for compliance check mechanism for quality control.

And in this process, we also realized that NSET should also itself be subject to quality control, so we did several institutional development exercise of including Organizational Capacity Assessment (OCA). We also did revisit on our mission, vision and objectives including our gaps. Internally we are looking back trying to help develop ourselves revising policies, update our system, our lapses, and procurement and quality control policies. At the same time, we are striving to observe and internalize globally accepted norms and human values, GESI stipulations, inclusions, the right of disable persons for safety and helping government for disaster risk reduction.

Section 4 Ongoing Major Programs of NSET

Build Back Better: Efforts through Baliyo Ghar

Background

The catastrophic earthquake of 25 April and subsequent aftershocks led to the unprecedented loss of lives and properties in Nepal. Approximately 9,000 persons lost their lives, more than 22,300 persons got injured and more than 700,000 houses were damaged with millions of people affected. Additionally, more than 7,000 schools and 3,000 government buildings were collapsed. As mandated by law, National Reconstruction Authority (NRA) is leading overall reconstruction process in Nepal.

Till May 2018, 161116 houses have been rebuilt and 483141 are under construction. Among the 718986 beneficiaries signed with an agreement for a government grant in 14 earthquake most-hit districts and 17 least-hit districts, 710331 have received the first tranche of grant, 408029 have received the second tranche of grant and 138408 have received the third tranche of grant. Likewise, among the 237085 registered grievances 205584 have been redressed according to NRA.

Introduction

USAID supported and NSET implemented Baliyo Ghar program is part of the reconstruction campaign led by government to promote earthquake safer housing reconstruction. The Baliyo Ghar program is providing blanket technical assistance to the earthquake affected people conducting awareness and training activities to build seismically safer homes. This is a five-year (October 2015 – September 2020) program implemented in 3 districts out of 14 severely earthquake affected districts; Dolakha, Dhading and Nuwakot and also in one Municipality in Kathmandu.

The program has two-fold goals:

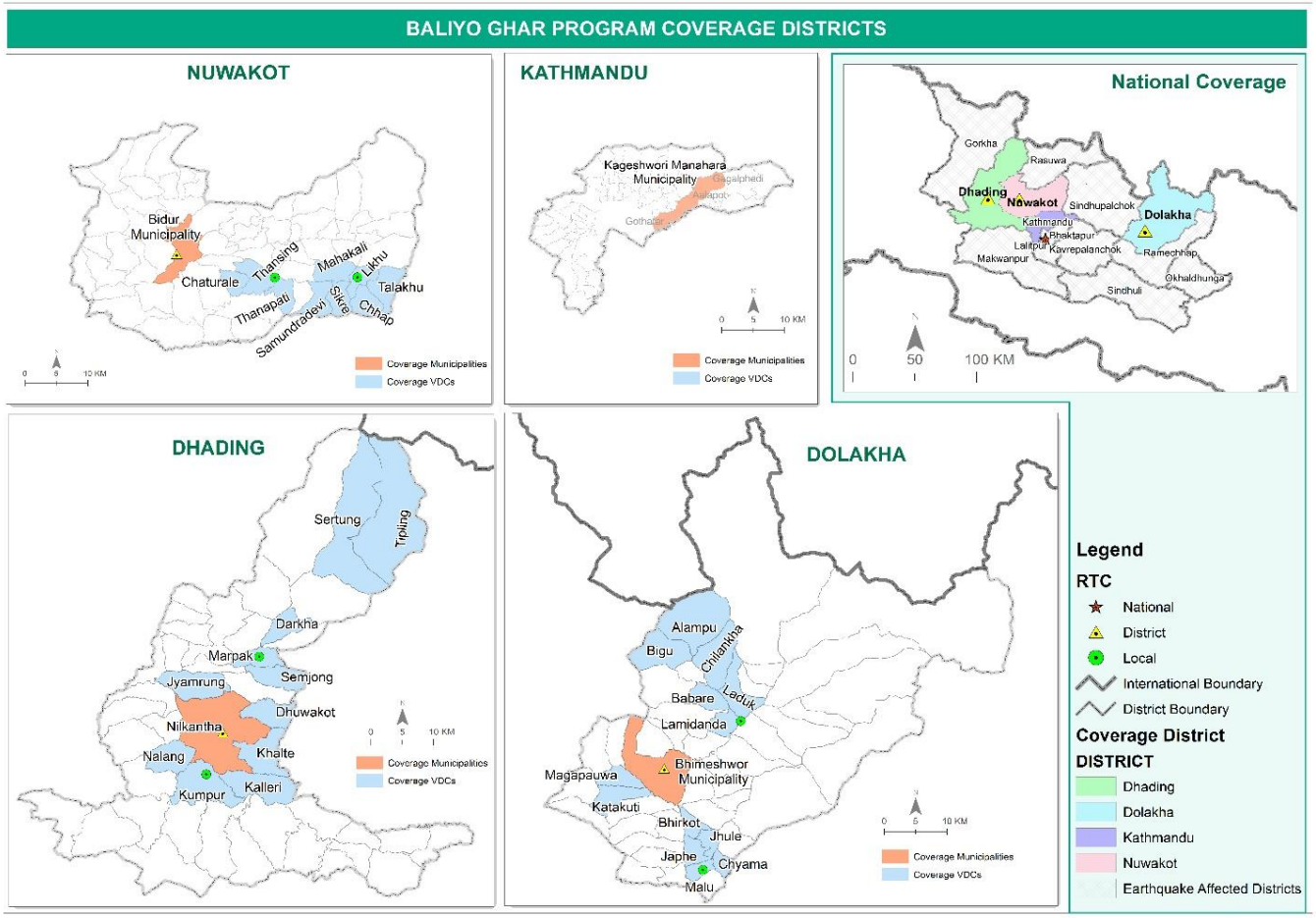
1. In shorter-term, the program aims at ensuring earthquake safer construction of all houses being reconstructed;
2. For longer-term, the program aims to establish a system of disaster-resilient construction to achieve the goal of disaster-resilient communities in Nepal.

With 6 components of technical assistance; assisting in policy making, capacity building trainings, community orientations, mobile clinic, awareness raising, On-the Job Trainings, Baliyo Ghar has been supporting earthquake affected population to ensure safer and better reconstruction. Baliyo Ghar provided technical support to NRA in

developing guidelines and procedures of grant disbursement, correction manual, retrofitting and other manuals along with physical and intellectual support during enrollment processes. Likewise in close coordination with Ministry of Urban Development (MoUD) and Department of Urban Development and Building Construction (DUDBC), Baliyo Ghar assisted in developing mason training curricula each for urban masons and rural masons.

Training to construction workers, technical professionals and also urban/rural municipal officials and technical support to the house-owners through the door to door mobile clinic has influenced them to build back better. The encouraging rate of reconstruction and code compliance rate in the program areas is the evidence to say that components of technical assistance through Baliyo Ghar has been impactful.

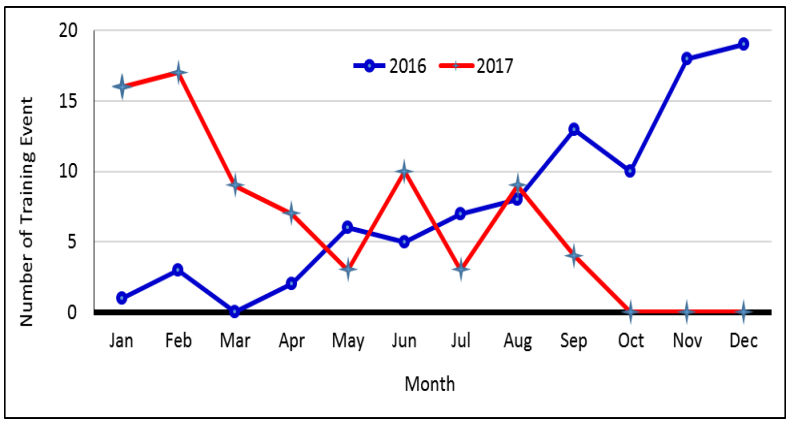
Baliyo Ghar Program Coverage Area



Capacity Building through Different Trainings

Mason Trainings

Baliyo Gar Program is enhancing the knowledge and skills of construction workers on earthquake-resistant construction technology through 7-Day Mason Training Course. This training course is provided to practicing construction workers. In principle, practicing masons have the basic knowledge and skills to build a house, however they may lack the knowledge and skills regarding earthquake-resistant technology. Altogether 5476 masons have been trained from 181 mason trainings in four program districts till the end of May 2018. The graph below illustrates the number of accomplished mason training from January 2016 to October 2017. Overall, the number of mason training are gradually increasing in 2016 and the number of trainings slightly decreased in 2017. Just after the tremendous devastation of Gorkha earthquake there was the extensive demand for mason training hence numerous trainings were accomplished.



On the Job Mason Trainings (OJT)

As the reconstruction was increasing there was the shortage of trained masons observed in many areas. The existing number of trained masons in local level are inadequate in accomplishing the reconstruction needs. As the demand for trained and skillful masons increased, the supply side was in deficit. To fulfill the number of skilled masons required, On the Job Training (OJT) has been an effective training tool. OJT includes unskilled construction actors who have either working experience as a laborers in a construction site or as just bystanders.

Baliyo Ghar is conducting OJT in program areas through regular program activities and in other areas of program districts through vendors. Up to the end of May 2018, Baliyo Ghar program produced 1562 new masons through 260 events through regular program activities as well as 3700 more new masons from 654 events outside of Baliyo Ghar program VDC/Municipality in Dhading, Dolakha and Nuwakot district through OJT implementing vendors. At the end of third year of program the number of new skillful trained masons will be 6400. These masons will really fulfill the gap of masons at the local level.

Training to the Technical Professionals

To enhance the technical knowledge and skills of technical professionals expecting to contribute in earthquake-hit areas in conducting mason trainings and OJT trainings, Baliyo Ghar has been providing trainings. Under Baliyo Ghar Program Mason Training of Trainers (TOT) is 5-day course targeted to engineers, architects and sub-engineers of partner organizations and selected training service providers for OJT. Altogether 1340 engineers, sub-engineers, architects were trained from 44 Mason Training for Trainers, Basic Technical Training, Basic Retrofitting Training and Advanced Engineer Training.

Social Mobilizers Trainings

Engineers training on “Basics on Repair and Retrofitting of Buildings” in Dhading

Baliyo Ghar has been deploying social mobilizers in its program areas to examine social and environmental aspects in reconstruction and to influence and convince the house-owners on the long-term benefits of safer reconstruction. Government bodies have also been mobilizing social mobilizers to promote build back better. Social mobilizers are catalyzing agent to change the perceptions of people on the feasibility and affordability of earthquake resistant construction. Hence to enhance the capacities of social mobilizers, social mobilizer's training is being conducted under Baliyo Ghar.

Baliyo Ghar Program provided social mobilizer's training for the fresh social mobilizers for promoting earthquake technology in the local level. Likewise, 5-days Social Mobilization Training of Trainer’s (SMTOT) course is also being conducted to develop instructors for social mobilization training. Potential participants are selected for SMTOT who have already successfully completed the 5-day Social Mobilizers Training course. By the end of March 2018, 506 social mobilizers were trained through 17 different events. In addition, two more SMTOT have been accomplished with 53 social mobilizer instructors developed.

Training for Instructors (TFI)

Baliyo Ghar Program has conducted 3 Training for Instructors (TFI) courses in its 2 and half years of program implementation. Altogether 83 instructors; Engineers and Social Development Officers engaged in post-earthquake activities participated in the rigorous 5-day long instructor development course.

The purpose of the course is to provide the participants with a training methodology and specific personal skills that will assist them in improving their knowledge and skills to develop, present and manage effective training programs.

Among the participants, the majority of them were from NSET programs and divisions and rest of them were from Housing Reconstruction and Recovery Platform (HRRP), Bhimeshwor Municipality, Dolakha, Kageshwori Manahara Municipality-Kathmandu, Earthquake Safety Solutions (ESS) and Architect Sans Frontier (ASF).

Achievements

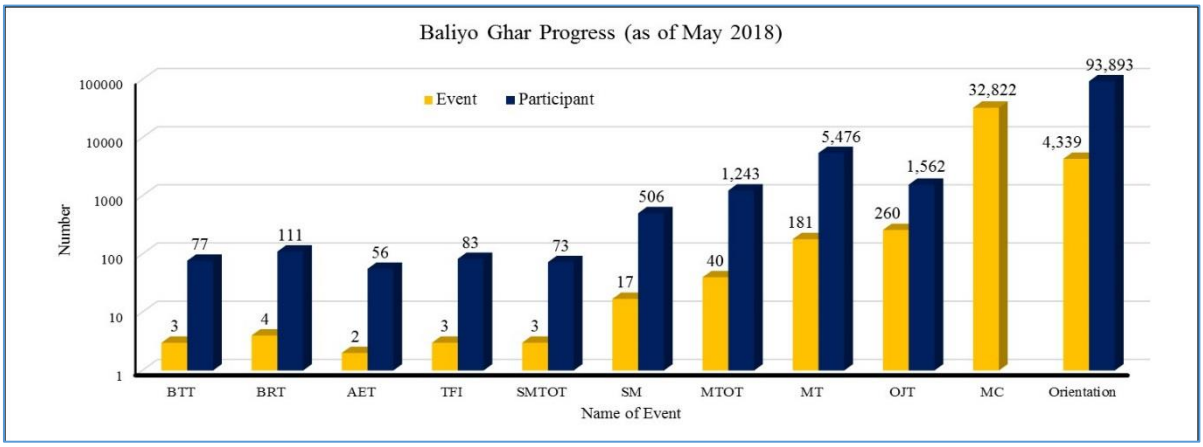


Figure 3: Baliyo Ghar Program Progress Up to the end of May 2018

BTT = Basic Technical Training
BRT = Basic Retrofit Training
AET = Advanced Engineer Training
TFI = Training for Instructors
SMTOT = Social Mobilizer Training for Trainer
SM = Social Mobilizer Training
MT = Mason Training
OJT = On the Job Training
MC = Mobile Clinic

Importance and Impact of Mobile Team

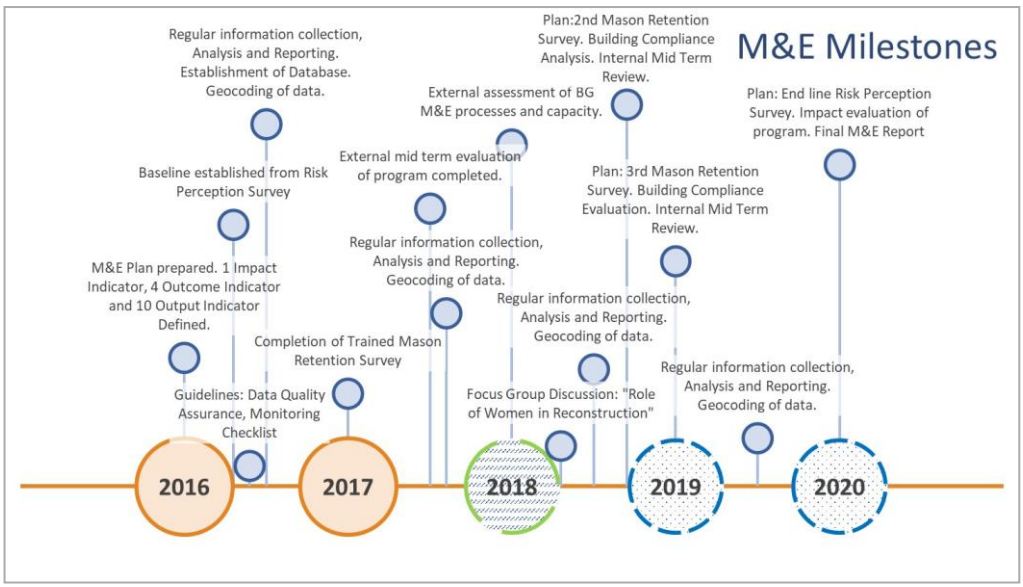
Interaction with Masons and House owners regarding the safe construction techniques. (Dhading)

A Mobile team in the Housing Reconstruction Technical Assistance Program is a squad of Technical cum Social Professionals to assist in reconstruction through their mobility. Under Baliyo Ghar, Mobile teams are based at the VDCs/Municipalities. They are responsible to conduct orientations and help-desk sessions in order to create awareness among the beneficiaries, visit the construction sites to facilitate the masons / house-owners and enhance skills through the help of Mason Trainings in order to impart earthquake resistant techniques to the working masons. Altogether 40 Mobile Teams are currently working. Furthermore, the Mobile Teams also conduct surveys as needed.

In the context of Nepal, it has been found that more than 90% of the buildings are constructed solely under the supervision of the head mason/petty cash contractor's only. A frequent supervision, training to the workforce and creation of awareness among the house owners is necessary in the post-earthquake reconstruction, as this will assist the society to cope with future disasters. The aforementioned tasks can be performed only by a dedicated and committed team which works in close coordination with the elements of society as well as governmental bodies and which is easily accepted by them. Hence, considering the cumbersome volume of ongoing reconstruction and realizing the responsibility to make it multi-hazard resilient, presence of a Mobile team is of a great essence. Impacts of Mobile Team can be easily seen in Baliyo Ghar program as the rate of reconstruction is far better with presence of quality in construction materials and technology

Continuous Monitoring and Evaluation

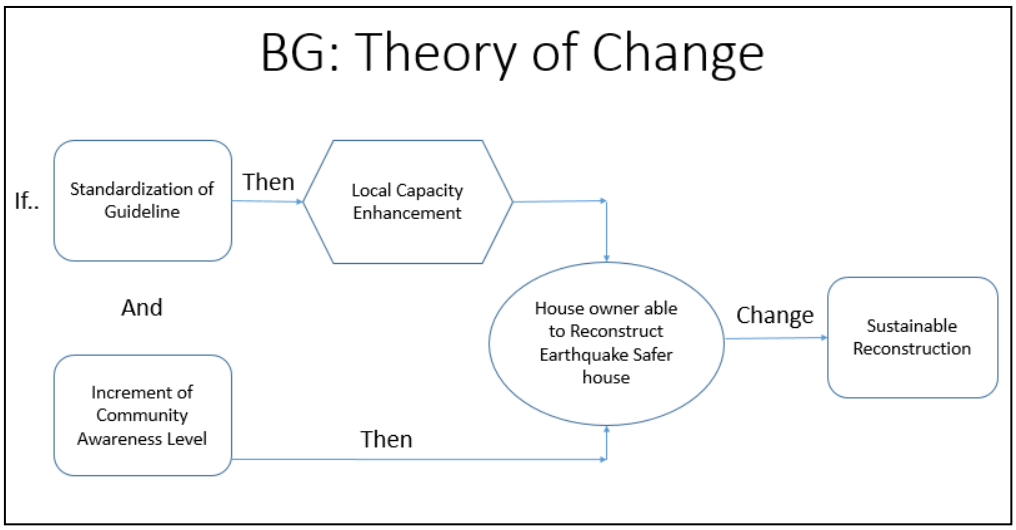
The overall success and failure of a program is ascertained by its ability to reach the outputs of the activities that it had set. The regular monitoring and evaluation of performance ensure the activities will able to reach the goal of program and change happened. The learnings from program give evidence for informed decision. The figure shows the Baliyo Ghar M&E milestone achieved and future plan of milestones.



The achievement of M&E milestones and plan for milestone achievements of Baliyo Ghar Program during life of project

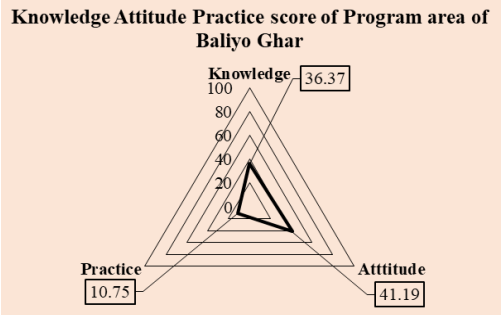
The M&E plan of Baliyo Ghar describes how the whole M&E systems of program functions. It has set 1 impact indicator, 4 outcome indicators and 10 output indicators. The developed Theory of Change (TOC) presented in figure. The standardization of guideline, enhancement of local capacity and raising awareness to common people lead to sustainable earthquake reconstruction.

The baseline has been set for two major indicators. One, the practice of building construction: The baseline value sets on retrospective date of building construction. The regular compliance survey, retrospective information from house owner and damage from Gorkha Earthquake are a basis to set baseline value. The null value is indicative baseline value for this indicator. Likewise, Second, the perception of the people towards disaster resilient construction. The baseline value set from risk perception survey. From this survey, People's Knowledge, Attitude and Practice (KAP) towards Earthquake risk resilience measured. The baseline KAP value presented in figure. At the end of the program these two indicators will be re-measured. The measurement will reflect program impact and change achieved towards sustainable earthquake reconstruction. In the mean-time, mason retention survey, external mid-term evaluation and external assessment of M&E process and capacity of BG program were completed.



The diagram describe the Theory of Change i.e. how the activities undertaken contribute to a chain of results that lead to the intended impacts

Mason Retention Survey:

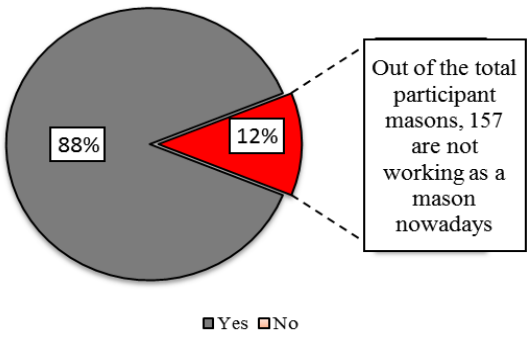


The KAP value of community in BG program area as a baseline for the program.

Mason Retention Survey is the measurement of trained masons' current working status and their level of understanding after the training. This survey examined the masons' opinion in continuing their profession and retention of technical knowledge.

The Mason Retention Survey was carried out among 1286 masons who were trained for earthquake resistant building construction technology under Baliyo Ghar Program one year before the survey conducted. Of the total sample size, 98% were male and the remaining 2% were female. Out of the total surveyed masons, 26 female trained masons were included in this survey. A sample of the mason retention survey were selected from 21 earlier VDCs of Dolakha, Dhading and Nuwakot along with three municipalities were covered during the survey. Mason Retention Survey was conducted from 10-31 August, 2017.

Findings:



Professional retention of mason

The Mason Retention Survey results indicate that the 88 % of total participants in the survey has been working as a mason in respective VDC/Municipalities after participating in the mason training conducted by Baliyo Ghar Program.

- The mean knowledge score of trained mason after one year was 80 out of 100, which indicates that the average knowledge score of respondents was very sound.
- Extensively huge number, 90% of the total respondent replied that they will continue their profession in the days to come.

Mid-Term Evaluation by Externals

Highlights of Evaluation

- Baliyo Ghar's support to the GON has been critical in streamlining housing policies during reconstruction.
- The Baliyo Ghar-trained masons are in high demand.
- Baliyo Ghar's awareness-raising activities have played an important role in the activity's success at the local level. Mobile teams, social mobilizers and local technicians have been integral to this success.
- The homeowners highly regarded the customized-on demand support by the mobile team as the most significant component leading to seismic resilient houses.

CAMRIS International on behalf of USAID completed an external mid-term performance evaluation of the program. The purpose of this evaluation was to determine whether the BG activity is on track to accomplish its intended goals and objectives and recommend any necessary course corrections.

As the Monitoring, Evaluationa and Learning activity of USAID/Nepal, CAMRIS International carried out the assessment of M&E process and capacity of NSET implemented Baliyo Ghar program to understand M&E strengths and identify the gaps. The assessment yielded a good result and concluded as follows:

- Further capacity is required in qualitative data analysis.
- The level of skill and confidence in TOC/RF/LF and performance monitoring through coaching and mentoring should be increased.

The progress in reconstruction and building of compliant houses are the impact of the project. The effect of change theory should be realized at the program end.

Coordination at National Level and Local Level

Reconstruction Technology Centers and Mobile team are set up and mobilized for providing technical, training and social counseling and support for safer construction of houses. For the smooth implementation of the program and to maintain transparency and accountability Baliyo Ghar has been continuously coordinating with local authorities, district authorities and at the national level.

National Reconstruction Technology Center (NRTC) is working in close coordination with Department of Urban Development and Building Construction (DUDBC), CLPIUs/DLPLIUs and National Reconstruction Authority (NRA) providing support in developing systems, policies and programs. Total of Eleven national level policy documents was developed, approved and implemented. Among which BG fully contributed in two documents and with a partial contribution in nine documents. Four awareness and training curricula were developed until 3rd year 2nd quarter. District RTCs established at district headquarters serve as the main hub for training and technical support activities that are going on at district and local levels. Local or area level RTCs are established covering a group of VDCs which support in organizing mason trainings and Mobile Teams mobilized in local level who are facilitating reconstruction activities.

Interaction meetings with Local Representatives

Baliyo Ghar organized interaction and coordination meetings with the local bodies in Dolakha, Dhading and Nuwakot including Kageshwori Manahara Municipality of Kathmandu after the local election was over. The main purpose of those meetings has been to introduce, share and explore ideas on ensuring effective reconstruction efforts in the areas.

Interaction Meeting with the representatives of Likhu Rural Municipality, Nuwakot

Realizing the ground reality of reconstruction in the quake hit districts, efforts of government, non-government and newly elected bodies in promoting safer reconstruction, relevancy and importance of technical support in reconstruction, managing working environment to ensure better reconstruction were some of the agendas of the discussion.

Increasing Public Awareness Through Various Tools

Baliyo Ghar TV/Radio Programs, forum to set agenda and advocate for problem solving

In promoting safer reconstruction by sharing and disseminating information, knowledge and ideas on technologies and other aspects of reconstruction process, awareness raising through mass media has become a significant influencing component of Baliyo Ghar program. BaliyoGhar is collaborating with media partners in program districts and also in Kathmandu for the central and national level media advocacies and campaigns. Media efforts under the program comprise the activities through radio and television stations.

TV and Radio program has been a forum for agenda setting and advocating to solve the problems. Baliyo Ghar TV Program and Radio program team reached the quake hit areas and visited the beneficiaries to collect the actual stories from grassroots. Baliyo Ghar TV Program advocated to develop correction manual after collecting multiple

voices of earthquake beneficiaries who aspired to build their houses with slight changes in the set standards. Likewise, TV Program advocated about the problem of "Guthi" land in Kageshwori Manahara Municipality of Kathmandu, which now have been solved.

Radio partners in program implemented districts have been bridging between the local authority and beneficiaries. (See the impact of Radio program in box)

Apart from these, BaliyoGhar is coordinating with other independent mass media in raising social awareness on reconstruction. Coordinating with National Broadsheets, National Radio stations and organizations, local mass media and media personals has also been a regular activity of BaliyoGhar Communication helping them find cases, stories of the earthquake affected people and achievements in reconstruction. Also, social media has been massively used to disseminate the messages of safer reconstruction.

Happy house-owners in front of reconstructed house in Bigu Village of Dolakha District, NSET implemented "Baliyo Ghar" program provided technical support

Impact stories of Baliyo Ghar Radio Program

Baliyo Ghar Radio Program reporter of Janasanchar FM 107.9 Bhaktapur preparing field reports in Bhaktapur

Shiva Khadka, 39, resident of Nagarjun Municipality, Kathmandu was worried about the soft loan government provides to the earthquake affected people to erect the flattened house. 18 months being in the temporary house, Khadka planned to reconstruct his house but had no enough money. He had the first tranche of government grant worth Rs. 50 Thousand in his hand and he was to get Rs. 150 Thousand in the near future afte the base of his house was prepared. But only 3 Lakhs amount from government would not be enough to reconstruct his house, he thought to take soft loan that government had proclaimed for the beneficiaries. He was completely unknown about the soft loan, its amount, its procedure and all. He was tuning Mero FM 93.5 at his house when he heard Baliyo Ghar Radio Program talking about the safer reconstruction. After the program, he called to the radio station and recorded his problem and the way he wants to get.

On the next episode of Baliyo Ghar Radio Program, his queries were addressed by Dr. Bhisma Kumar Bhusal, Deputy-Spokesperson of National Reconstruction Authority (NRA). He then proceeded for the government soft loan to rebuild his home. He thanked Mero FM, BaliyoGhar program team for addressing his queries within few days. Now, he is building earthquake resistant house in Nagarjun Municipality.

Gopal Krishna Prajapati, 45, resident of Bhaktapur Municipality -09 had collected Rs. 30 Lakhs to rebuild his flattened house in Bhaktapur. He faintly heard about the government standard to build earthquake resistant house and the process to receive government grants. He was in dilemma, what exactly the building code meant, how to get the engineers to inspect his home during construction. And also, he was unknown about the soft loan that government announced to provide.

Prajapati is regular listener of Radio Janasanchar 107.9 at Bhaktapur. He used to listen Baliyo Ghar Radio Program aired through the station. One day, he came to radio station for inquiry about the construction of houses that were collapsed during Gorkha Earthquake. Baliyo Ghar Radio team recorded his inquiries and on-aired through radio program along with the answer from NRA officials. Prajapati was quenched regarding his thirst of making earthquake safe home.

These are the representative stories on impact of Baliyo Ghar Radio Program. All of the 13 partner radio stations have helped beneficiaries in connecting with concerned authorities and some beneficiaries have been constructing their houses just listening to the Baliyo Ghar Radio Program aired through local radios in quake-hit districts.

Orientations to the House-Owners to Promote Safer Reconstruction

Baliyo Ghar is involved in making the house owners aware on the need for earthquake-resistant construction, feasibility of constructing safer house, proper construction techniques, selection of proper building typology and proper construction materials.

Baliyo Ghar's Mobile Teams visit and conduct community orientation programs. The Mobile Team conduct door-to-door mobile clinic campaigns. Apart from door-to-door campaign, the people in the community are gathered and provided with social, technical aspects of build back better concepts. More than 85000 people participated in 3883 different orientation programs held in program areas during the 2 and half years of program implementation.

Media Workshop Energized Journos engaged in Reconstruction

Spokesperson of National Reconstruction Authority (NRA) Mr. Yam Lal Bhusal in his session during Media workshop

With the view to share ideas and experiences on reconstruction, build better and common understanding in reconstruction and explore the possible issues to focus on Radio and TV Program Episodes, Baliyo Ghar Program conducted a two-day Media Workshop on "Promoting Safer Reconstruction". The workshop organized at Tewa in Lalitpur on 2nd-3rd November 2017, intensively discussed the reconstruction issues and priorities. The two-day workshop had seven thematic sessions in total with two group discussion sessions where various facets of reconstruction process in Nepal and media's roles were discussed. A total of 30 journalists representing All Three Media Ghar, the Baliyo Ghar television program production Agency from Kathmandu; and 13 FM Radio stations from Dolakha, Nuwakot and Dhading and Kathmandu valley participated the program. Apart from that, the communication focal persons of NSET-Baliyo Ghar from district along with USAID/Nepal and HRRP communication staffs observed the process. DRR Professionals and Communication Experts facilitated the thematic sessions.

The participants shared that it energized them to produce quality and effective programs in the days to come. According to them, the workshop has inspired them to dig out the virgin stories of the quake victims, motivated on need of holding discussion among colleagues

before selecting program issues, production of more field based program production and to focus on issue of non-approved houses among others.

DRTCs and LRTCs Serving as Information Hub

District Reconstruction Technology Centers and Local Reconstruction Technology Centers established in the BaliyoGhar program implemented districts have become the information hub and a resource center to the earthquake affected people, stake holders and others. Those centers provide information regarding the ideas and techniques of building earthquake resistant houses, collect the updates of reconstruction progress, collect and analyze the problems faced by beneficiaries and misunderstandings regarding the process.

The technical professionals and social mobilizers provide the beneficiaries with necessary ideas, knowledge and share the information. The unsolved problems in local level are transferred to the NRTC and authorities concerned and again the solution is disseminated to the target audience. Hence, DRTCs and LRTCs are bridging the beneficiaries and concerned authorities involved in reconstruction. Also, those centers have become the source of information of mass media and other people in need. Baliyo Ghar mobile team have been working in close coordination with municipal representatives establishing information center in Urban and Rural municipalities premises and assisting the beneficiaries in choosing the right technology, methods and ideas of building earthquake resistant houses.

Success Stories

Bahun Dada, Dhading where Reconstruction Thrived

Bahundada, a village once known as Jogi Dada in Khalte of Nilkantha Municipality-05, Dhading has now changed it identity. All of the 35 houses in Bahun Dada got collapsed during 2015 Gorkha Earthquake. Now, almost all of them have been rebuilt stronger than before.

Mrs. Gita Bidari is one of the members of quake affected families in Bahun Dada who spent 2 years of miseries after she lost her house. No skills in hand and poor economic status; she could not manage to erect her house. She used to get involved in construction works but had no knowledge about measuring, laying the foundation, walls and other parts of house. Without skills she made the temporary shelter, rebuilt the damaged toilet.

She wished, someone would come to train her so that she could rebuild her own house by herself. Few days later she wished, NSET-Baliyo Ghar conducted mason training in her locality where she got participated.

"I tried my best to achieve all knowledge and skills during mason training. I had do household works, look after the cattle and take care of children but I did it. Now I have planned to sell all these faunas to get fully engaged in reconstruction works. My husband earns Rs. 800 per day and I am being paid Rs. 1000 " – Gida Bidari, Trained mason of Bahun Dada said.

Mrs. Gita plans to involve in rebuilding the houses of neighbor village as she has finished her own house and her village has been rebuilt.

The whole village has been rebuilt within 7 months. Mrs. Gita and Mr. Dil Bahadur Thapa have contributed lot to rebuilt Bahun Dada better and safer. After the 7 days mason training, Mr. Dil Bahadur has been involved in rebuilding houses restlessly.

"Simultaneously we have rebuilt 2 dozen houses. In parallel, I have laid the foundation of 12 houses. Lack of construction materials, timbers and other problems in every house has eased us to get involved in many houses at the same time" Dil Bahadur Thapa, Trained Mason explained.

The trained masons have applied all of the knowledge and skills gained through mason trainings to make the every houses earthquake resistant.

"It was like competition to reconstruct the houses. Every house-owner was very much excited and reconstruction was like celebration" Bishnu Prasad Agasti, Beneficiary of Bahun Dada said.

Like Agasti, every family is now feeling safe and satisfied to get earthquake resistant houses. To make the village, a seismic resilient village, mobile team of Baliyo Ghar did tireless works to aware and inspire villagers, to build capacities of local masons and continuous technical assistance in each household.

Baliyo Ghar team has continuous technical support in rebuilding Bahun Dada. "At first, we conducted orientations on earthquake safety, preparedness and safer construction technologies. And then we organized 7-days mason training where masons enhanced their technical skills and knowledge and had regular mobile clinic in each house" Bijesh Kaiti, Engineer, Baliyo Ghar program informed.

No progress is possible if one remains tongue-hold and only seeks the favor from others. But Bahun Dada did the progress by itself. The pro-activeness of villagers, the local masons like Mrs. Gita and Mr. Dil Bahadur who contributed their best and the regular supervision of Mobile Team has made possible to rebuild Bahun Dada Safer and Better.

Section 4 Ongoing Major Programs of NSET

Technical Support for Building Code Implementation in Nepal

Background

Past earthquakes have evidenced that large proportion around 80% of human deaths is due to the collapse of buildings structures. Analysis of building damage data from recent 2015 Gorkha Earthquake revealed that more than 98-99% of the human casualty is due to the damage or collapse of buildings. It is because those buildings were owner-built unreinforced masonry structures as well as poorly built non-engineered reinforced concrete structures. Nepal is urbanizing rapidly. More and more residential and commercial buildings are coming up every day particularly in urban and urbanizing centers in Nepal. Unfortunately, a majority of the buildings are still not being constructed complying with the National Building Code (NBC), and hence are extremely vulnerable to earthquakes.

Mobile clinic team member inspecting an under construction house

Nepal formulated the National Building Code (NBC) in 1994 and was made the NBC mandatory for all municipalities and urbanizing settlements in the country through Nepal Building Act 1998. Despite that it remained unimplemented until 2003 until Lalitpur Sub-Metropolitan City took the initiatives for NBC implementation. Even nearly two decades after that, all the Municipalities in Nepal are not fully capable enough to fully implement the code and exercise effective control over the building permit and building inspection processes due to lack of appropriate mechanisms and capacities for building code implementation. Lack of awareness among the population is another reason for the failure of building code enforcement. As a result, a significant proportion of existing building stock in Nepal is highly vulnerable to earthquakes.

Based on the experiences of NSET works with Lalitpur, Dharan and few more municipalities and with a view to addressing the need to support municipalities mainly in their efforts to implement the NBC, NSET implemented the Building Code Implementation Program in Municipalities in Nepal (BCIPN) during 2012-2016. BCIPN was largely successful in developing and piloting methodologies for building code compliance in 30 municipalities and urbanizing settlements of Nepal. The progra demonstrated the feasibility of

ensuring safer building construction through building code implementation.

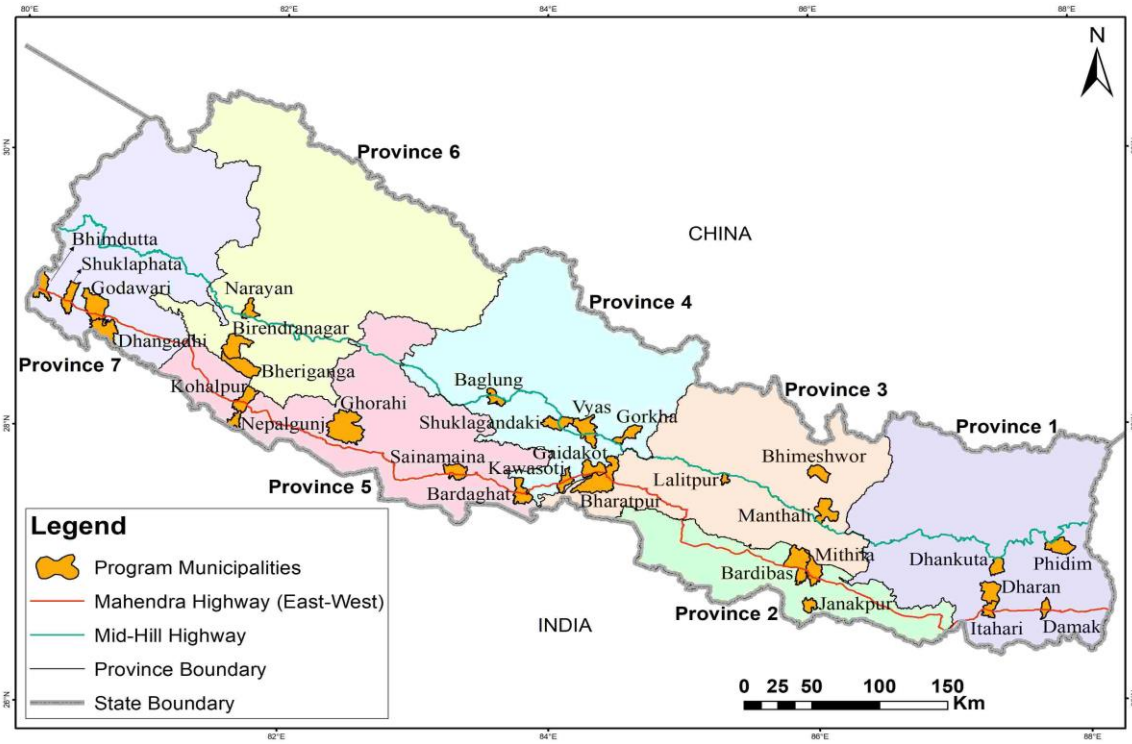
There are now 293 municipalities (including Metro, Sub-metro and municipalities) in Nepal and the process needed to be scaled up, consolidated, replicated and institutionalized in all remaining municipalities. However, implementation process of building code in all the municipalities has not yet firmly been streamlined. Most of these municipalities require continued support in order to support on institutional strengthening of the municipalities.

To continue the success and institutionalization of the process, NSET is now implementing the program **Technical Support for Building Code Implementation in Nepal (TSBCIN)** with funding support from the United States Agency for International Development / Office of U.S. Foreign Disaster Assistance (USAID/OFDA) in 30 Municipalities during 2017-2019. The program focuses on assisting the municipalities in enhancing their capacities to appropriately develop and adequately administer the building permits and control systems to ensure the improved seismic performance of all new building construction.

The overall goal of TSBCIN is to build the disaster resilient community in Nepal through technical support for building code implementation. It aims to support Building Code Implementation (BCI) through awareness, capacity building, institutionalization, and networking. This program focuses on improving building permit system, building code implementation mechanism, and risk based planning and implementation system, enhancing capacities of masons, contractors, engineers, municipal professionals on safer construction and raising awareness of communities for safer construction practices.

Coverage of the program

This program is being implemented in 30 municipalities covering 7 provinces of Nepal.



Geographical coverage of TSBCIN Program

List of TSBCIN Municipalities

Level	Number of municipalities	Municipalities
Level 1	13	Shuklaphanta, Kohalpur, Narayan, Mithila, Godawari, Dhankuta, Bardibas, Bardaghat, Kawasoti, Sainamaina, Bheriganga, Phidim, Shuklagandaki
Level 2	10	Baglung, Nepalgunj, Janakpur, Bhimeshwor, Gorkha, Gaindakot, Manthali, Itahari, Birendranagar, Bheemdatta
Level 3	7	Dharan, Bharatpur, Vyas, Ghorahi, Damak, Lalitpur, Dhangadhi

Based on the experiences of the BCIPN program, the municipalities have been grouped into three categories as the target municipalities of the program.

- Municipalities with Building Code Implementation Status Level 3 (BCI-L3): The municipalities which have already started implementation of Building Code and have achieved a higher level of success in building code compliance.
- Municipalities with Building Code Implementation Status Level 2 (BCI-L2): These are the municipalities where Building Code Implementation has just started. They have started enforcement of building code, however the compliance rates in these municipalities are just fair.
- Municipalities with Building Code Implementation Status Level 1 (BCI-L1): These are the municipalities where Building Code Implementation and Building Permit System are not in place Depending upon the BCI Status, level of the municipalities' program activities are planned and the target of the indicators (Impact, Outcome and Output) has been set

Implementation process

TSBCIN program is being implemented under the overall guidance and directives of the Department of Urban Development and Building Construction (DUDBC), Ministry of Urban Development (MOUD) and the program municipalities.

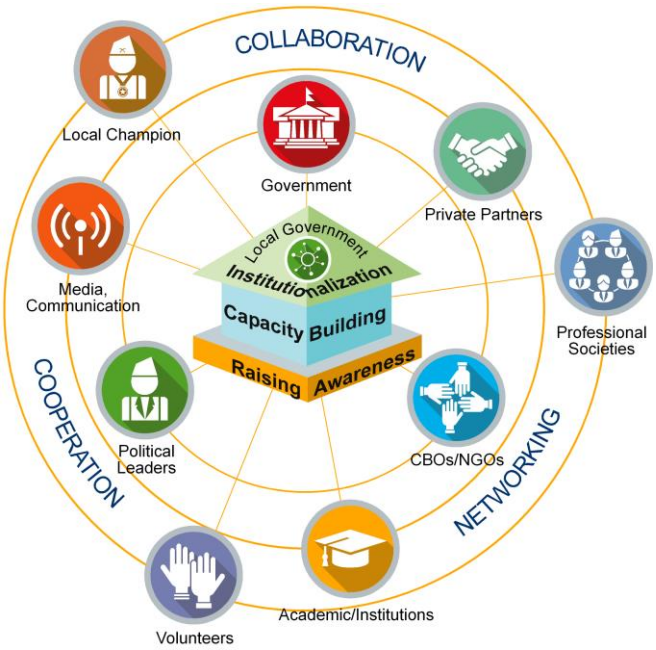
Information Collection about the potential municipalities was carried out at the initial phase of program implementation and then a preliminary list of Municipalities was prepared based on the evaluation of collected information and the strategic priorities suggested in National Urban Development Strategy (NUDS) developed by Ministry of Urban Development (MoUD). A selection criterion was developed for the evaluation of the municipalities. As per the criteria, the municipalities from all 7 provinces have been grouped into three categories as the target municipalities of the program. NSET has taken into consideration the municipalities' urbanization status, highway access, the possibility of Provincial Capital as well as building construction rate while selecting the municipalities.

Municipalities grouping system in every province				
	Criteria	**Tier 1**	**Tier 2**	**Tier 3**
1	Urban Regions	Matured and identified urban regions	Evolving and identified urban regions	Evolving and matured urban corridors
Scoring System				
	Criteria	**Scoring System**		
1	NUDS Strategic Investment	Score 1: Cities with high/ medium priority strategic investment Score 0: Cities of Low priority strategic investment		
2	Highway access	Score 1: Along East-West highway, Mid-hill highway and Postal road Score 0: Not along East-West highway, Mid-hill highway and Postal road		
3	Possibility of Provincial Capital	Score 1: High Score 0: Low/No		

On the basis of the preliminary selection list, various exploratory visits were carried out for selecting and finalizing municipalities. Finally, finalization of program municipalities was done based on the observations, findings, strategic importance and several other criteria. As the program municipalities finalized, a Memorandum of Understanding (MOU) was signed between NSET and government agencies (Department of Urban Development & Building Construction (DUDBC) and selected municipalities) to facilitate the effective implementation of the TSBCIN program. The scope of MOU covers the joint works in the areas of raising public awareness of National Building Code (NBC) implementation and capacity building for the effective implementation of NBC.

Implementation strategy

TSBCIN adopted the four main strategic components to implement the program: Raising awareness of local community, related stakeholders and government representatives on the root cause of earthquake risk in Nepal and possible ways of mitigating the risks.



Building the capacities of the construction workforce- local masons and contractors in earthquake-resistant construction technology; and building capacities of engineers and technical professionals to design and supervise construction of the safer building. Build the institutional capacity of municipalities to effectively enforce building code and institutionalize the code compliance system. Expand the concepts, cooperation and networking from ongoing successful municipalities to nearby new municipalities, collaboration with local organizations including other NGOs, CBOs, technical colleges, local media among others as well as the use of existing local capacity, accelerating local community interactions and generating local resources for the BCI efforts.

Major Activities of the program

Earthquake Awareness and Sensitization Programs

As part of Earthquake Awareness and Sensitization Programs, various activities including awareness and sensitization programs for house owners, Municipal staff, Political/Social leaders and other Stakeholders through Safety Campaigns, Mobile Clinics, Local Radio campaign etc. are being conducted.

Capacity Enhancement Programs

Under Capacity Enhancement Programs category, Training on safer construction practices for masons, contractors, engineers, municipal engineers, municipal staff, officials and elected representatives are being conducted.

Program for Improving Institutional System

As part of improving Institutional System, consultation Meetings and Thematic Workshops, Development of Local Disaster Risk Management Plans, Earthquake Loss Estimation, Risk-Sensitive Land Use Plan and Mobile Application are being conducted.

Collaboration/Cooperation/Networking

Under the Collaboration/ Cooperation/ Networking categories, various activities including meetings, sharing workshops, joint research works, collaboration with local private organizations, exchange portal, international sharing visits/conferences are being conducted.

Monitoring and Evaluation (M&E)

M&E has been incorporated as an important component of the TSBCIN program. A strong reporting, monitoring and evaluation system has been developed to monitor, standardize and compile all data related to the program, technical support activities provided through the program and compliance monitoring. Monitoring and evaluation is being carried out based on the indicators developed in the Results Matrix Framework.

Program Indicators

Depending upon the BCI Status level of the municipalities' program activities are planned and the target of the indicators (Impact, Outcome and Output) has been set accordingly. The following are the minimum level of target the program is expected to achieve.

Impact Indicators

- 50% of constructed buildings will comply to Nepal Building Code (NBC)
- 70% of building drawings and designs submitted for building permits will comply to NBC

Outcome Indicators

- 50% of shelters adopt DRR measures
- 70% settlements adopt DRR measures
- 60% of people who attended awareness and training sessions retain knowledge after two months of training
- 70% of trained construction workforce continues practicing earthquake-resistant construction in subsequent years
- Risk perception-score on the disaster-resilient construction of communities/population will increase by 20%.

- 50% of program municipalities will have improved institutional systems and process for risk based planning and enforcement of building code
- Mechanism of Collaboration, Cooperation and Networking for building code implementation at the local, national and regional level will be established and strengthened

Output Indicators

- Sensitized Political leader, Municipal staff, House-Owners

Increased awareness on safer construction practices

- House to House campaigns conducted
- Earthquake safety campaigns conducted
- Media campaigns conducted
- IEC materials produced

Enhanced Capacities of Stakeholders

- Construction workforce (Engineers involved in building construction and design, architects, masons, contractors) trained
- Policy decision maker sensitized
- Social advocates and leaders trained

Improved Institutional systems and process

- Consultative meetings and workshops conducted
- Improved building permits system and BCI
- Developed local disaster risk management plan
- Developed system for building code implementation

Mechanism for Collaboration and Networking

- Meetings and workshops conducted
- Collaboration with stakeholders in joint research and efforts
- Participation in national/ international conferences
- Knowledge exchange portal

Intended Beneficiaries

- Direct beneficiaries - 65,000 people
- Indirect beneficiaries - 300,000 people
- 1,200 house owners, 320 engineers 950 masons trained
- 1,200 people benefitted through earthquake awareness, Orientation programs and workshops
- 112 municipal staff and 120 municipal officials trained
- 50,000 people benefitted from radio programs; 7,500 people from mobile apps; and 7,500 people benefitted from mobile clinics.
- 168 Social Mobilizers and Social Advocates trained
- 64 Media Professionals trained

Major Accomplishments

During august 2017- May, 2018, various tasks have been accomplished so far. The activities accomplished are as follows.

Awareness Programs

As of May 2018, a total of 8 orientations have been organized for Municipal executives and 120 people (103 male and 17 female) benefited from the orientations. The number of orientations held for social/political leaders is 30 under the program so far and 1481 people have been benefited from the orientation sessions. Two orientations for community people have been conducted and 54 persons (41 male and 13 female) have been oriented. Likewise, a total of 6 orientation sessions have been conducted for mason, 155 masons (149 male and 6 male) got benefited.

Capacity Enhancement Programs

Upon request from the municipalities, TSBCIN provided technical support to conduct training courses for house-owners and masons during the reporting period. Total 11 mason trainings courses have been organized by the program municipalities with technical assistance from TSBCIN.

From those trainings, a total of 331 masons have been trained on earthquake resistant construction training.

National Symposium

During the period, TSBCIN organized National Workshop on issues related to building code and urban resilience as part of the annual Earthquake Safety Day (ESD) events. Separate sessions were organized during the National Symposium Workshop to discuss on three major issues/themes:

- Building Code Implementation and Building Permit Systems
- Experiences and lessons of Building Code Implementation; and Launching of Technical Support on Building Code Implementation in Nepal (TSBCIN) Program
- Urban Planning and Resilience in the context of Nepal

Stakeholders from different professional and academic backgrounds participated in the sessions. Senior government officials, Academicians, relevant professionals from national and international organizations, elected representatives from different municipalities, engineers and the professionals were the major participants. In the background of past experiences on building code implementation and the way forward, TSBCIN program was launched among the stakeholders.

Developing Training Curricula

A specific Training Curricula Development Team, comprising of various professionals within NSET, has been working to review and formulate training courses for a political leader and civil engineers.

Building Permit Software Installation

Building permit software was developed during BCIPN. That software was updated to the present need and building permit process of municipalities according to changed context of Nepal. This updated software was installed at Bharatpur Metropolitan City Office. The municipal office is now utilizing the software in full-fledge.

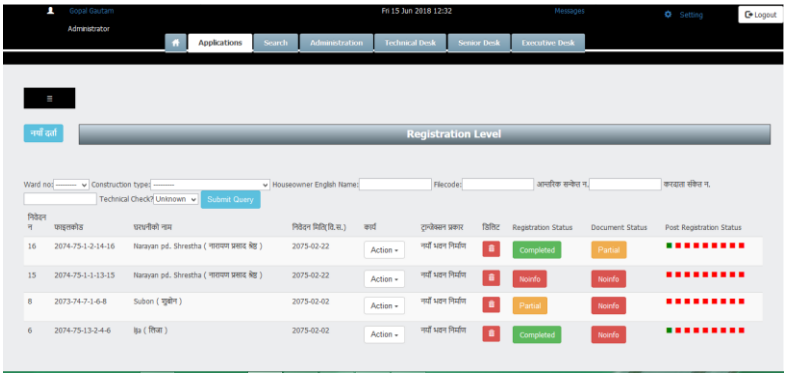
This software has been developed with the objectives of:

- Creating and maintaining a full-fledged Building Permit Process Database

- Assisting municipalities for analysis and reporting of Building permit process
- Assisting municipalities in the field monitoring
- Ensuring easy and efficient Building Permit certifications.
- Effective tracking of building information

TSBCIN Online Database System

The online database system has been developed to record the program activities and beneficiaries. The major objective of this database system is to capture, store, analysis and share program activities data.



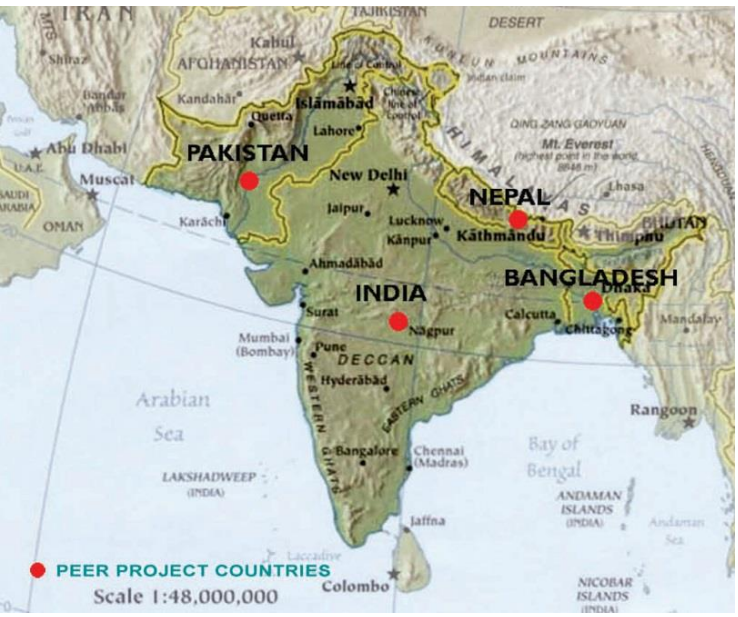
Section 4 Ongoing Major Programs of NSET

Program for Enhancement of Emergency Response (PEER)

Background

NSET's PEER 4th stage works with emergency services in Bangladesh, India, Nepal and Pakistan to enhance their emergency response capabilities. PEER's overall goal is to reduce death and increase survival during disasters in program countries. To achieve this, PEER works under the overall guidance of national disaster management authorities and implements the programs with assigned partnering agencies and also with local authorities to enhance local and regional disaster preparedness and enhance the response capacities of vulnerable Asian countries. PEER Stage 4 is started in October 2014 and will run until September 2019.

The United States Agency for International Development (USAID)/Office of U.S. Foreign Disaster Assistance initiated PEER program in India, Indonesia, Nepal and the Philippines in 1998. Since then, it has trained over 9,800 emergency responders and trainers from Bangladesh, Cambodia, Indonesia, India, Laos, Nepal, Philippines, Pakistan, Thailand and Vietnam.



Through international competitive bidding, USAID/OFDA awarded NSET to implement the fourth stage of PEER in South Asia. PEER Stage 4 is presently being implemented by NSET in Bangladesh, India, Nepal and Pakistan. It is a continuation of PEER Stage 1, 2 and 3 that NSET implemented in the past. PEER Stage 4 is addressing the need to further strengthen emergency response capacities of people and governments of these countries, with the possibility of the program to expand also in Afghanistan, Bhutan, Maldives and Sri Lanka.

The objective of PEER Stage 4 is to work with South Asian countries to take ownership of, extend and adapt the program through their own in-country institutions and regional networks. In addition to MFR and CSSR courses, Community Action for Disaster Response, Hospital Preparedness for Emergencies, and Swift Water Rescue (SWR) training will be provided and further adapted to national contexts.

Activities under PEER stage 4

The major activities of the program being implemented under the PEER Stage 4 are CADRE, CSSR, HOPE, MFR, SWR and Training for Instructors (TFI). CADRE training course can teach anyone how to prepare for disasters in their communities. CSSR course is to provide individuals with collapsed structure search-and-rescue with the knowledge and skills necessary to safely and appropriately search for, stabilize, and extricate victims trapped in collapsed structures. HOPE is a training course for hospital staff and medical and non-medical health care personnel to prepare health care facilities to respond effectively to emergencies involving a large number of casualties. MFR course provides individuals with first response knowledge and skills necessary to assess, treat, and transport sick or injured patients following an emergency or disaster. SWR is a newly introduced course under PEER Stage 4 that aims to provide individuals the knowledge and skills necessary to search for, stabilize and extricate victims in a water-related incident in a swift water/white water scenario using the safest and most appropriate procedures. NSET is set to develop the course with the involvement of experts from different regional organizations. Instructor development courses aim to train individuals to perform the tasks necessary to be effective instructors of PEER training courses. TFI is prerequisite for being a PEER course instructor.

Implementation partners

While implementing the PEER Stage 4, NSET is collaborating with various national governments of PEER implementing countries for strategic guidance and direction, including developing qualified instructors for PEER courses.

SN	Activities	Focal agency and Authorities
1.	Providing guidance and cooperation for implementing PEER activities in the respective countries	• Disaster Management authorities in the PEER countries: • Ministry of Disaster Management and Relief – Department of Disaster Management in Bangladesh, • Ministry of Home Affairs in Nepal, Ministry of Home Affairs in India, and • National Disaster Management Authority in Pakistan
2.	Implementing PEER courses (MFR and CSSR) and enhancing national emergency response capacity	• National security forces and other emergency response organizations: • Nepalese Army, Nepal Police and Armed Police Force in Nepal • Fire Service and Civil Defense in Bangladesh • Punjab Emergency Service/Rescue 1122 in Pakistan • National Disaster Response Force in India
3.	Implementing Hospital Preparedness for Emergencies (HOPE) courses	• Hospitals and national organizations related to health/medical emergencies; • Institute of Medicine-Tribhuvan University in Nepal • Directorate General of Health Services in Bangladesh • National Health Emergency Preparedness and Response Network (NHEPRN) in Pakistan • National Disaster Management Authority in India
4	Implementing the Community Action for Disaster Response (CADRE) courses	• Red Cross/Red Crescent national societies in their respective countries. • American Red Cross providing supplemental funding for the course in Nepal. • SEEDS India in India • Asian Disaster Preparedness Center Implemented CADRE and HOPE in PEER Stage 3.
5.	Developing, piloting and adapting the Swift Water Rescue course	• Initiative Outdoor (Rescue 3 International for providing technical assistance in developing the SWR Course in the context of South Asian region)

Planned meetings/workshops for PEER Stage 4 (and completed as of May 2018)

Meetings/workshops/conference	PEER Countries				Total Events	Completed	Remaining
	Bangladesh	Nepal	India	Pakistan			
Strategic Planning Meeting		1			1	1	
Course Review Workshop		1			1	1	
Regional Planning Meeting		1			1		1
Country Planning Meeting	5	5	5	5	20	4	16
Final Lesson Learned Meeting		1			1		1
General Conference		1			1		1
Periodic Progress/review meeting	5	5	5	5	20	2	18
Swift Water Rescue Course Development Workshop		1			1	1	
Monitoring and Evaluation	2	2	2	2	8		8
Total Events in countries	12	18	12	12	54	*9*	*45*

Planned course events per country for PEER Stage 4 (and completed as of May 2018)

Program Countries	Training Activities for 5 program years													Total program
	MFR	CSSR	MFR EU	CSSR EU	TFI	MFRIW	CSSRIW	HOPE	HOPE-TFI	CADRE	CADRE-TFI	SWR (Pilot)	MIW	
Bangladesh	1	1	3	3	1	1	1	4	1	4	1			21
India	1	1	3	3	1	1	1	4	1	4	1			21
Nepal	1	1	3	3	1	1	1	4	1	4	1	1	1	23
Pakistan	2	2	4	4	2	2	2	5	1	4	1			29
Total	5	5	13	13	5	5	5	17	1	16	4	1	1	94
	3	*3*	*3*	*3*	*2*	*2*	*2*	*4*		*2*				24
Completed	1 each in Bangladesh, Nepal, Pakistan and India	1 each in Bangladesh, Nepal, Pakistan and India	Nepal: 1 each for Nepalese Army, Nepal Police and Armed Police Force)	Nepal: 1 each for Nepalese Army, Nepal Police and Armed Police Force)	1 each in Nepal and India	1 each in Nepal and India	1 each in Nepal and India	2 each in Nepal and Pakistan	2 in Nepal	2 each in Pakistan and Nepal	1 in Nepal			

Program Outputs

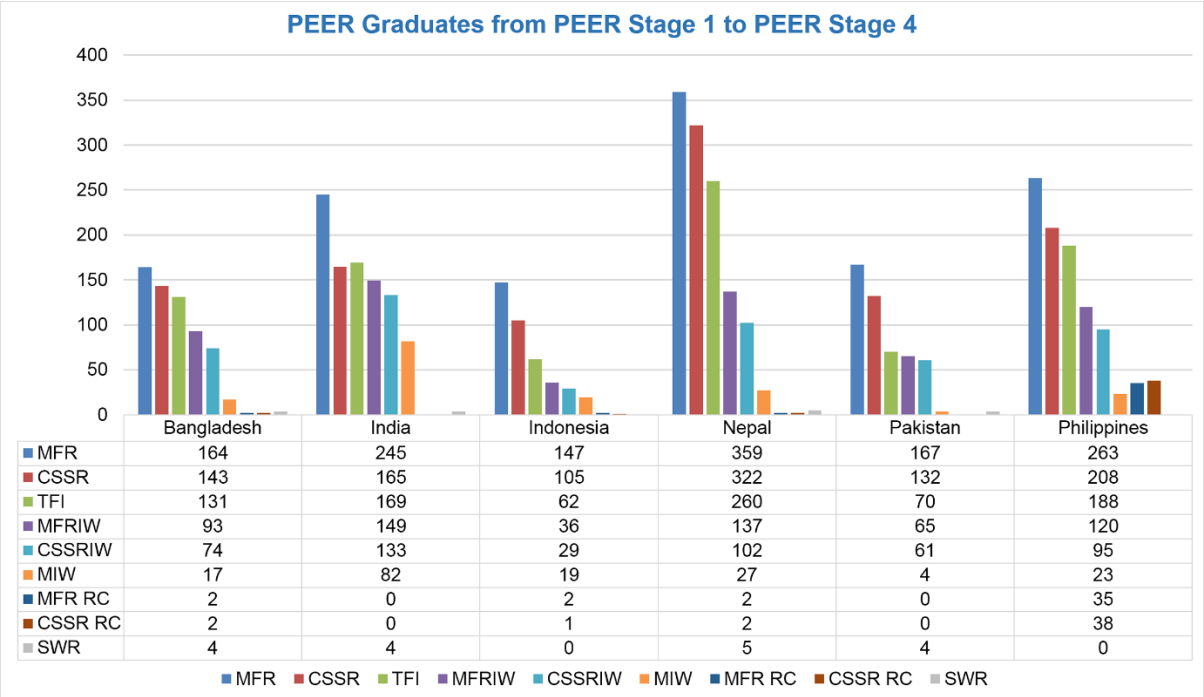
As of May 2018, NSET completed the following program events under PEER Stage 4:

Program Events	Date	PEER Country
MFR End Users Course	June 8-14, 2015	Nepal
CSSR End Users Course	June 18-22, 2015	Nepal
Regional Strategic Planning Workshop	July 21-23, 2015	Nepal
Regional Course Review Workshop	July 24-28, 2015	Nepal
Nepal Country Planning Meeting	September 18, 2015	Nepal
HOPE Course	October 2-5, 2015	Nepal

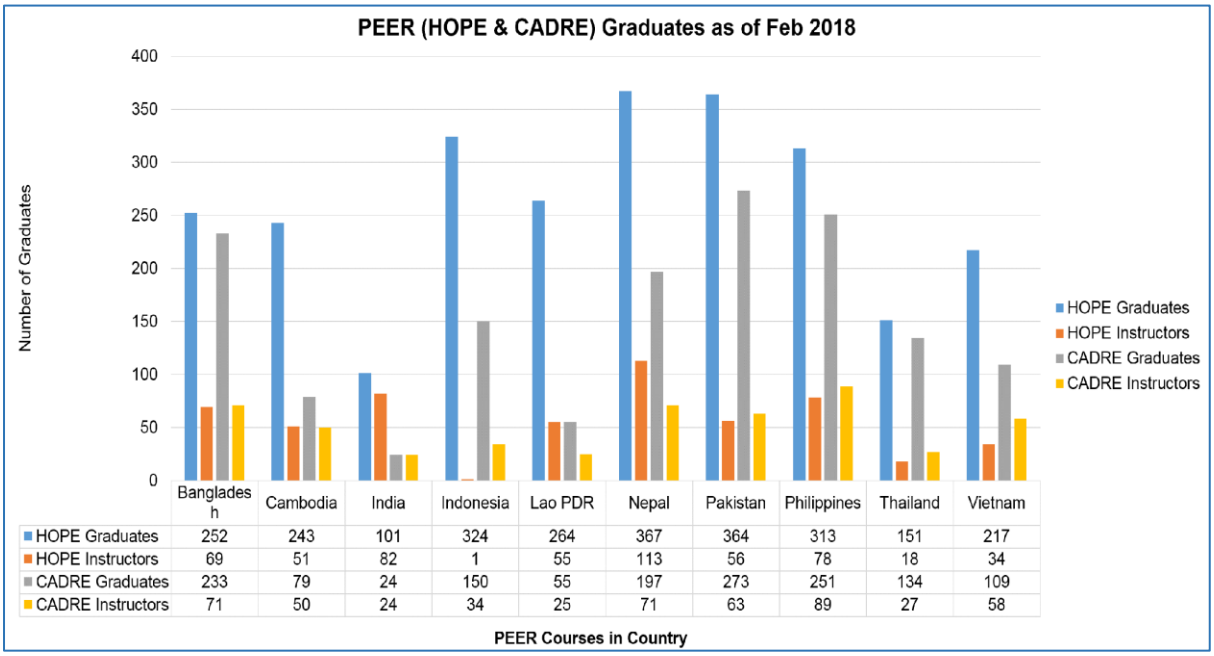
Program Events	Date	PEER Country
Stocktaking and Landscaping Study for Nepal	September 2015	Nepal
MFR Course	December 1-13, 2015	Nepal
CSSR Course	January 7-14, 2016	Nepal
Bangladesh Country Planning Meeting	January 20, 2016	Bangladesh
Stocktaking and Landscaping Study for Bangladesh	January 21-22, 2016	Bangladesh
Pakistan Country Planning Meeting	January 27, 2016	Pakistan
Stocktaking and Landscaping Study for Pakistan	January 28-29, 2016	Pakistan
India Country Planning Meeting	February 8, 2016	India
Stocktaking and Landscaping Study for India	February 9-10, 2017	India
TFI	February 8-12, 2016	Nepal
MFRIW	February 14-18, 2016	Nepal
CSSRIW	February 22-28, 2016	Nepal
MFR End Users Course	March 22-28, 2016	Nepal
CSSR End Users Course	March 31 – April 4, 2016	Nepal
MFR End Users Course	April 8-14, 2016	Nepal
CSSR End Users Course	April 17-21, 2016	Nepal
HOPE Course	April 26-29, 2016	Nepal
SWR Brainstorming Workshop	June 28-30, 2016	Nepal
PEER Mid-Term Review Meeting	July 11-12, 2016	Organized:USAID/OFDA;NSETas participant
HOPE Course	October 17-20, 2016	Pakistan
HOPE Course	October 24-27, 2016	Pakistan
MFR Course	Nov 22-Dec 4, 2016	India
CSSR Course	December 8-15, 2016	India
CADRE Course Review (for Pakistan)	November 7-11, 2016	Pakistan
CADRE Course	November 14-17, 2016	Pakistan
CADRE Course	November 20-23, 2016	Pakistan
MFR Course	December 19-31, 2016	Pakistan
CSSR Course	January 4-12, 2017	Pakistan
Exploratory Visit to Bhutan	March 28-31, 2017	Bhutan
SWR Regional Course Development Workshop	April 10-12, 2017	Nepal
PEER Nepal Progress Review Meeting	April 12, 2017	Nepal
TFI	May 8-12, 2017	India
MFRIW	May 15-19, 2017	India
CSSRIW	May 25-31, 2017	India
PEER India Progress Review Meeting	May 31, 2017	India
HOPE-TFI	July 31-August 4, 2017	Nepal
CADRE	August 12-15, 2017	Nepal
CADRE	September 15-18, 2017	Nepal
HOPE-TFI	February 14-18, 2018	Nepal
CADRE TFI/IW	February 14-21, 2018	Nepal
MFR	February 28-March, 10, 2018	Bangladesh
CSSR	March 15-23, 2018	Bangladesh

Achievements

Since the start of PEER Stage 4 in October 2014 until May 2018, NSET has completed 48 various program events in the four PEER beneficiary countries. There are a total of 1345 MFR graduates, 1075 CSSR graduates, 855 TFI graduates, 580 MFRIW graduates (MFR Instructors), 494 CSSRIW graduates (CSSR instructors), 172 Master Instructors (MFR-CSSR Course Coordinators and Monitors/ MIW), 40 MFR Refresher Course graduates; 40 CSSR Refresher Course graduates; 2590 HOPE graduates, 551 H-TFI graduates (HOPE instructors), 1530 CADRE graduates, and 488 CADRE-TFI graduates (CADRE instructors), in the PEER region as of May 2018.



	Bangladesh	India	Indonesia	Nepal	Pakistan	Philippines
MFR	164	245	147	359	167	263
CSSR	143	165	105	322	132	208
TFI	131	169	62	260	70	188
MFRIW	93	149	36	137	65	120
CSSRIW	74	133	29	102	61	95
MIW	17	82	19	27	4	23
MFR RC	2	0	2	2	0	35
CSSR RC	2	0	1	2	0	38
SWR	4	4	0	5	4	0



	Bangladesh	Cambodia	India	Indonesia	Lao PDR	Nepal	Pakistan	Philippines	Thailand	Vietnam
HOPE Graduates	252	243	101	324	264	367	364	313	151	217
HOPE Instructors	69	51	82	1	55	113	56	78	18	34
CADRE Graduates	233	79	24	150	55	197	273	251	134	109
CADRE Instructors	71	50	24	34	25	71	63	89	27	58

PEER MFR and CSSR Graduates in Nepal (as of May 2018)

SN	Organization	MFR Graduates	CSSR Graduates	MFR-EU Graduates	CSSR-EU Graduates	TFI Graduates	MFRIW Graduates	CSSRIW Graduates	MIW Graduates
1	Nepal Police	96	84	30	30	59	62	51	10
2	Armed Police Force	60	58	24	24	36	36	30	5
3	Nepalese Army	32	27	48	48	18	12	8	5
4	Nepal Red Cross Society	26	16	8	4	16	17	5	4
5	NSET	12	11	6	5	57	12	9	3
6	Other Organizations (eg. World Bank, Nepal Scouts, MHA, TIA, some hospitals, municipalities)	13	6	4	9	74	3	2	0
Total		**239**	**2020**	**128**	**120**	**260**	**142**	**105**	**27**

PEER's innovative Ideas, Technologies, Studies/Research works, Documents

Google Form

NSET through PEER has developed Google form to obtain an individual opinion on PEER and its activities for conducting PEER monitoring and evaluation activity. NSET has disseminated the information to all PEER instructors/graduates and all stakeholders.

PEER Online Self-Test

NSET through PEER has developed an online self-test for PEER graduates, including instructors to test/refresh their knowledge on the course/s they have completed under PEER.

NSET is continuously exploring ways to improve the platform and have the graduates/instructors actively engaged in the program through information and communications (ICT)

CSSR: Participants practicing cutting of lumber using a chainsaw

CSSR: Cutting concrete using Rotary Rescue Saw

CADRE: Practicing using of fire Exitinguiser

MFR: Stabilizing victims using splint and bandages

H-TFI: Preparation for individual presentation

HOPE: Group work during HOPE course

Challenges/Lessons Learned

An organized, functional emergency response system with trained responders is important to save lives during emergencies. Due to the rapid attrition rate of responders, more instructors and country support are needed in program countries to ensure enough responders are available during emergencies.

There is a need to train emergency responders in proper triage and dispatch. Untrained responders and volunteers are likely to move all casualties to hospitals, overwhelming hospital operations.

More modern rescue equipment is needed. Because of the high cost and competing priorities, most PEER countries are dependent on external sources to acquire modern search and rescue equipment.

Capacity development for responders is required at different levels: Community, regional and national; and each level should be provided with emergency supplies.

There is a need to further localize the curricula, facilities and training equipment (if possible) to reduce course costs while maintaining quality and standardization across each country. Medical First Responder and Collapsed Structure Search and Rescue courses have already been adapted to suit national contexts. With the goal of reaching all parts of program countries at the local level, PEER courses may also need to be further adapted to address local emergencies and explore local alternatives for sophisticated equipment

Section 4 Ongoing Major Programs of NSET

Nepal Safer Schools Projects (NSSP)

Introduction

Nepalese schools are vulnerable to numerous natural hazards, the most prominent being earthquakes, landslides, flood and erosion. This vulnerability is due to a chronic weakness in school building construction as well as a lack of any disaster preparedness plan or system of drills. A low level of disaster awareness among teachers, students, parents and other stakeholders is the root cause of these vulnerable conditions.

Over 4 million children are taught in schools which use unsafe buildings that are not compliant with Nepal's building code standards. These schools are at risk of collapse in earthquakes, with many also vulnerable to other hazards (e.g. landslides and floods). A school vulnerability assessment carried out in 2011 estimated that more than 61,000 schools – over half of all schools in Nepal – required retrofitting or reconstruction.

The lesson of the 2015 earthquake was that schools constructed/retrofitted in compliance with National Building Code performed much better than not strengthened. Where school buildings were undamaged, they performed vital functions in the immediate aftermath of the earthquake, acting as centres for disaster coordination, and safe shelters for the community. There are also some evidence that safer schools programmes beyond physical infrastructure have also supported wider awareness raising on earthquake risk, community and family preparedness.

Realizing this; UK Department for International Development (DFID) has launched Nepal Safer Schools Projects (NSSP). A consortium of Crown Agents, Save the Children and Arup international and NSET is implementing the programme.

The NSSP is aligned with the Government of Nepal's **School Sector Development Plan (2016-2023)** which includes a focus on School Safety and Disaster Risk Reduction, by upgrading physical infrastructure to be more resilient and ensuring the curriculum and teacher training integrates disaster resilience.

Objective

The objective of the NSSP is to support the implementation of the Government of Nepal's Vision for Increasing Resilience in Schools in Nepal. It will achieve this in two broad ways.

- Support the implementation of the Comprehensive School Safety framework (Safer Learning Facilities, Disaster Management and Resilient Education) in four districts in the Far- and Mid-West; and
- Support national-level capacity in the Department of Education to further develop policy and guidance to deliver safer schools.

Program Implementation area

The NSSP has just been started and is in the early stage of implementation in province no. 5, 6 (Karnali) and 7 to help retrofit and reconstruct the schools vulnerable to earthquakes. It is to address 250-300 schools in the Far and Mid-West of Nepal as the region is considered to be the most at risk of future seismic disturbance. This project will focus on up to four districts in the region. The process for selection of districts and schools is currently underway.

Expected outputs of the program

1 Safer learning facilities, particularly through seismically-resilient retrofitting and rebuilding:

- Capacity built at the local level for managing and conducting resilience construction,
- Improved understanding of schools and hazards in Mid and Far West Nepal,
- Improved Resilience of school buildings

2 School-level disaster management and resilient education

- Improved disaster preparedness procedures established in schools,
- Increased DRR awareness in schools and communities

3 National-level technical assistance on safer learning facilities in which NSET is leading on outputs 1 & 3.

- Increased staff capacity in government for improving school safety,
- Improved access to real time data on schools through technology,
- Improved government regulations and processes for safer schools,
- Relevant stakeholders including government collaborating in improving school safety.

Implementation process

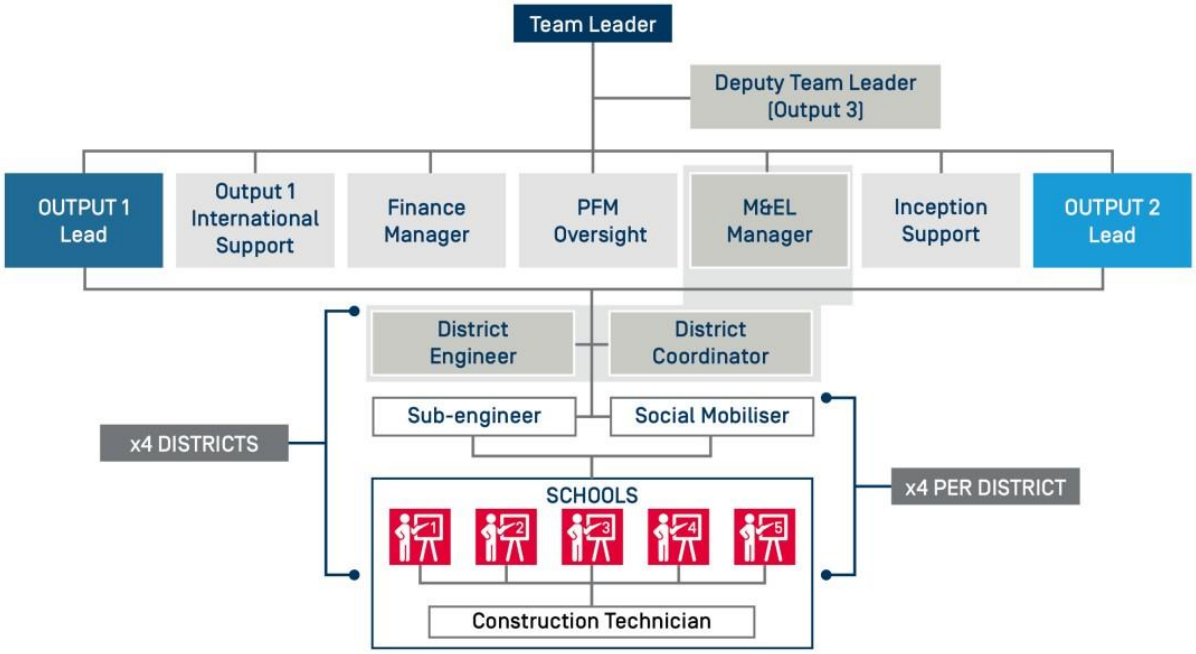
The implementation approach of the NSSP is locally led and internationally managed. Crown Agents is leading a consortium containing the NSET, Arup International, and Save the Children. NSET is to lead for Output 1, with backstopping and guidance on international best practices from Arup International. Save the Children (SC) is to lead for Output 2.

Figure 2: Our consortium

Both organizations will incorporate the requirements of output 3 into their inputs to ensure cohesion between the project and the institutionalization process. However, the NSET will have the overarching responsibility of overseeing and managing output 3. Running across these three outputs, Crown Agents will be supplying overall project management, as well as leading on Public Financial Management (PFM) and Fiduciary Risk Management (FRM).

Team formation and implementation site selection process

NSSP which was formally launched on May 28, 2018, will run for 5 years till 2023. It comprises a small core team led by a team leader, based in Kathmandu. This core team serves on a central Project Implementation Unit (PIU) which is to be responsible for the delivery of NSSP. As required, the PIU is to draw on a wider pool of experts within the organization/consortium or sub-contract to other organizations.



The NSSP has set up and mobilized a central team based in Kathmandu. With consultations and using census information as well as data from the Department of Education's Education Management Information System, the selection process of four focus districts is being carried out by NSET together with Save the Children and Arup International. While finalizing the districts, it will be considered which provinces to focus on, as the individual province structure and authority will have an impact on the educational infrastructure of the districts within. As the districts in the Mid- and Far-West include high mountain, low mountain and Tarai (Plane land) terrains, there will be included at least one district from each terrain which will increase the relevance of the NSSP for further roll out across Nepal. While

selecting Gaunpalika, the number of Gaunpalikas addressed within each district, the balance between urban (municipality) and rural settings and the Demographic balance will be considered.

Once the NSSP focus districts and Gaunpalika are identified, the school selection process will start. As with the district and Gaunpalika selection process, the school selection will start with the collection and analysis of secondary data to determine the school selection criteria. The school selection process will then extend into a thorough, schools based investigation involving quantitative and qualitative primary data collection.

Beneficiaries

The ultimate beneficiaries of this support will be school children, teachers and their wider communities, who will benefit directly from safer learning facilities, disaster preparedness in their schools, as well as disaster resilience in their education. The NSSP should also pay particular attention to socially excluded and highly vulnerable groups, ensuring through the project "no one is left behind".

Mr. Deepak Sharma, Director at Department of Education (DoE) addressing the NSSP Program Launch

Section 4 Ongoing Major Programs of NSET

Disaster Education from Hyogo in Nepal

Introduction

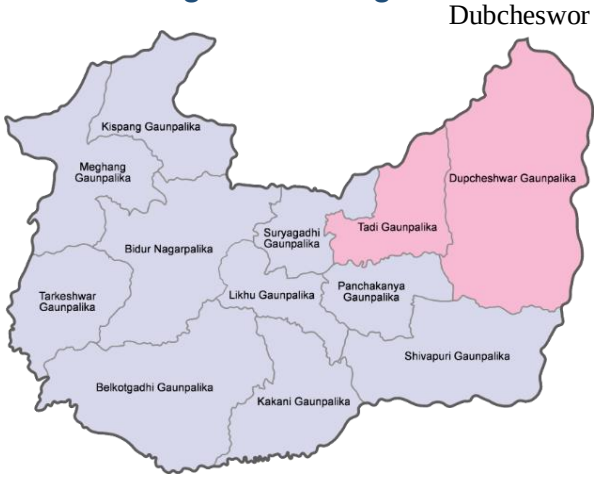
Realizing an urgent need of disaster planning, preparedness and response in vulnerable schools in Nepal, a joint consortium between NSET and Team Hyogo led by Sakura-Net, Japan was formed on June 2016 for the implementation of a project titled "Disaster Education from Hyogo in Nepal." The interventions are expected to make sustainable disaster risk reduction education system in Nepali schools. The program is being implemented in Nuwakot District in close coordination with District Education Office (DEO).

Program objectives

- Support schools of Nuwakot to enhance capacity on disaster preparedness and response planning through promoting sustainable disaster risk reduction/ management education.
- Develop and disseminate disaster safety education resource materials (awareness and education materials, guide books, text books)
- Provide educational logistic support to children and teachers schools of Nuwakot that were affected by 25 April 2015 earthquake.

Program coverage

The program covers 8 schools of two Rural Municipalities: Dubcheswor Rural Municipality and Tadi Rural Municipality of Nuwakot district.



Program areas of Disaster Education from Hyogo in Nuwakot district

Implementation Schools of Disaster Education from Hyogo in Nepal

S.N	Name of School
1.	Bachhala Secondary School, Shikarbesi, Dupcheswor
2.	Dupcheshwor Higher Secondary School, Ramati, Dupcheswor
3.	Rukmani Higher Secondary School, Samundratar, Dupcheswor
4.	Saraswoti Secondary School, Gaukharka, Dupcheswor
5.	Kaukeshwori Secondary School, Raautbesi, Dupcheswor
6.	Shree Birendra Secondary School, Gaukharka, Dupcheswor
7.	Sundaradevi Secondary School, Sundradevi, Tadi
8.	Ghyangphedi Lower Secondary School, Ghyangfedi, Dupcheswor

Major Activities implemented

1 Development of teaching methods and techniques

Seminars for Teachers

Teachers from the 8 schools have participated in a series of seminars on disaster education. The seminars have been focused on knowledge about the hazard, about aspects of disaster preparedness and response planning. A total of six teacher's seminars have been conducted so far.

Model class to Students

Model classes for children have been conducted in all the 8 schools for the students of class 8, 9 and 10. Through the classes, the teachers have been encouraged to facilitate the model classes for children using the knowledge and experiences from the teacher's seminar and action plan.

2 Development of teaching materials

Teacher's Manual

Teacher's manual was drafted through the series of teacher's seminar. The manual includes various aspects of DRM including hazard risk knowledge, preparedness and response to the natural disasters. The manual shall work as the reference for the trained teachers and also the implementation partners to conduct various training and orientation events.

Children's Guidebook

A guidebook for children has been drafted to impart the knowledge on disaster risk reduction education.

3 Development of Safe Learning circumstances.

Establishing disaster learning corner

The project supports the schools to establish disaster learning corners. It will also provide teaching materials and help to promote e-learning facility.

Strengthening of existing Temporary Learning Centre

Chandra Nayan Basic School located at Dansing has been selected for a semi-permanent construction. The school running in a two room structure constructed of bamboo. The school has a total of 35 students with four teachers. The school runs classes from pre-school to grade three. This project supported the construction of two rooms in the

school. The community around the school consists of 75 Households including a population of 500 people. Currently, the construction of the two room block at the school is at its final stage of construction.

Chandra Nayan Basic School before construction

Under construction school block of Chandra Nayan Basic School

Teachers' Training being held at Rukmani Secondary School, Dupcheswor

What next?

- Development of teachers manual and students textbook
- Completion of school block of Chandra Nayan Basic School

Case Study

24 year old Usha Tamang is the principal of Birendra Secondary School, Gaukharka, Nuwakot. A place with no access to electricity, it is located about 4 hours' drive away from the district's headquarters, Bidur. The school has a total of 185 students all of whom belong to Tamang Community. As the younger students do not converse in Nepali, the medium of teaching until grade 3 is Tamang language.

It has been eleven months since Usha Tamang has stepped into the role of principal. On asked how she feels about being the leader of a secondary School, Ms. Tamang replies, "I feel immensely proud, but having said that, there are also a lot of problems and challenges, there is a lot to be done to maintain quality education at our school and the physical condition of the school is also not satisfactory.' Ms. Tamang had participated in NSET and Team Hyogo's Disaster Education Seminar, she is quite clear on the importance of Disaster Education in schools, she states that there needs to be more of such seminars' to build more understanding of disaster education among teachers and students.

Ms. Tamang orientating her students regarding various hazards that are likely to occur in their community

After the earthquake, there was an inadequacy of classrooms but this new building has helped us to run classes smoothly. This school for students with impaired hearing have now become disable friendly. There is the use of a light indicator for deaf students in each class room and toilet as well. During the course of construction, I have observed that many students are attracted to different kinds of construction work such as some students are keenly watching brick work, some students are keenly watching woodwork and some are watching paintwork. This project has also helped to identify the interest of the students so that I can arrange training which may help them to become independent in future.

Mr. Bijay Lama, Principal of Navajyoti Deaf School

Building Back Safer Schools for Nepal Earthquake Response 2015

Building Back Safer Schools for Nepal Earthquake Response 2015 began as a consortium of Plan Nepal and NSET with the financial support from Department of Foreign Affairs and Trade (DFAT), Australia beginning October 2015 till March 2017. Due to the April 2015 Gorkha Earthquake, there was an abrupt change in the living conditions of the 14 most affected districts. Not only households, almost all school buildings were also subjected to damage ranging from minor to major. The project planned to construct 12 School buildings in 6 districts- Kathmandu, Lalitpur, Sindhuli, Sindhupalchwok, Dolakha and Makwanpur.

Implementation Approach

A total of 12 schools site selected based on school selection criteria developed by Plan Nepal and NSET and in close coordination with District Education Offices of program districts. Out of the 12 schools, 5 schools were People with Disability (PWD) friendly (accessible to all) and were considered as model schools for Comprehensive School Safety. Within the consortium, NSET's role was on providing technical assistance, monitoring, training, and support, whilst Plan Nepal played the lead role in implementation, community and school outreach.

Major outcomes of program

- Construction of 7 “model” safe schools in 7 erstwhile VDCs that can serve as an example for the DoE and local masons/contractors.
- A total of 5 Integrated/resource schools (1 Dolakha, 1 Sindhupalchowk, 1 Sindhuli, 1 Makawanpur, 1 Lalitpur) re-constructed/ rehabilitated and supported to meet high standards (including WASH, furniture, aids to inclusion).
- Strengthened capacity of SMCs, child clubs, local masons/engineers, communities to plan, construct and monitor school construction.

- Training to 20 DEO engineers, sub-engineers and building supervisors, partner staff and other local construction supervisors, masons and other construction workers
- District level policy dialogues held on how to implement government policies at the district level

List of reconstructed schools

S.N	Name of School	No. of rooms constructed
1.	Gokarna Secondary School, Gokarneshwor, Kathmandu	6
2.	Magargaun Higher Secondary School (Integrated resource school), Shankhu, Lalitpur	6
3.	Shree Bhimeshwor Bahira Primary School (Integrated resource school), Vimeshwor, Dolakha	6
4.	Shree Sitka Secondary School, Sunkhani, Dolakha	12
5.	Shree Nabin Secondari School, Bhushapheda, Dolakha	12
6.	Indreshwori Higher Secondary School (Integrated School), Melamchi, Sindhupalchwok	8
7.	Shree Shipa-Tindhara Secondary School, Bhotshipa, Sindhupalchok	8
8.	Shree Hira-Devi Lower Secondary School, Sikharpur, Sindhupalchok	6
9.	Shanti Bahira and Shustha Srawan School (Integrated resource school), Hetauda	8
10.	Gitawora Lower Secondary School, Chhatiwan, Makwanpur	8
11.	Navajyoti Lower Secondary Deaf School, Kamalmai Municipality, Sindhuli	8
12.	Gaurishankar Higher Secondary School, Mahadevsthan, Sindhuli	8

Group Photo after the completion of DRR training at Gaurishankar School

Newly constructed building of Navajyoti Lower Secondary Deaf School after construction, Sindhuli

Conclusion

The project has created many benefits not only to the School, students, teachers, and SMC but also in the national level. As the local level benefits, the school has gained enough number of rooms so that school can be run smoothly. Schools are provided with all the facilities that a modern school should possess. Each and every component of the building have complied with the only goal that is Earthquake resistant PWDs friendly, child-friendly and inclusive model school construction. The earthquake resistant building and the Disaster Risk Reduction training conducted in schools have helped teachers, students and parents to get rid of that fear that was created by Gorkha Earthquake 2015.

Section 4 Ongoing Major Programs of NSET

Community Based Disaster Risk Management (CBDRM)

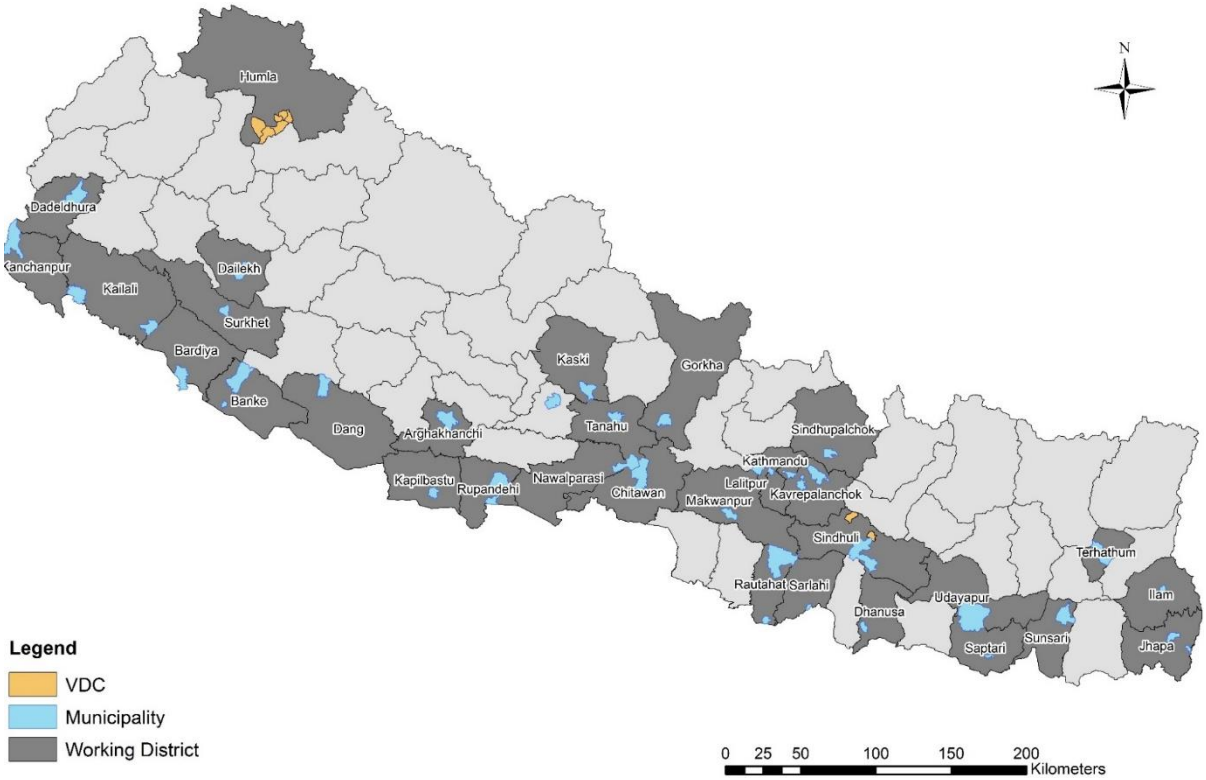
Community members are the first ones to respond during any emergency situation including major disasters. Proper planning and implementation of Community Based Disaster Risk Management (CBDRM) programs is essential to make the communities disaster resilient. NSET works in the field of multi hazard risk reduction with special focus to earthquakes. NSET has been so far able to reach more than fifty urban and rural communities to support them in formulating plans and implementation of Community Based Disaster Risk Management Programs.

NSET experience indicates that Institutional Development within the local government, Capacity Building, Pilot Programs and Networking are the major pillars of CBDRM that significantly contribute to risk reduction and helps enhancing the capacity of a community to respond to any emergency. Another important fact derived from NSET endeavors is direct participation of the community members and transparency well blended with all the above four pillars of CBDRM are very much required in making the community focused disaster risk management activities sustainable even after the project period.

NSET has been implementing various community focused DRR activities. The major activities are **s**upporting to implement Local Disaster Risk Management Planning Guideline – 2068 (LDRMP), creating Baseline on DRR and Governance in Municipalities and VDCs. NSET activities on CBDRM comprise:

- Awareness and Education
- Institutional Development
- Capacity Building for Disaster Risk Reduction and Preparedness
- Demonstration / Pilot Project on DRR
- Networking
- Coupled with Gender Equality and Social Inclusion (GESI) and Sustainability

NSET's CBDRM Outreach has covered 32 districts of the country including 40 Municipalities and nine erstwhile Village Development Committees.



Enhancement of urban disaster resilience through activities of local participatory platform (GGS)

"Enhancement of urban disaster resilience through activities of local participatory platform" project was implemented by Graduate School of Global Environmental Studies (GSGES), Kyoto University under the Grant for Global Sustainability (GGS) in Kathmandu, Nepal and Yangon, Myanmar from 2016 to 2018.

Graduate School of Global Environmental Studies (GSGES), Kyoto University signed a Memorandum of Understanding (MoU) with Lalitpur Metropolitan City (LMC), Centre for Disaster Studies (CDS), Tribhuvan University (TU) and National Society for Earthquake Technology-Nepal (NSET) to implement GGS project in Nepal. The main objective of GGS Project is to enhance resilience of cities against natural disasters through capacity buildings of the stakeholders in cities.

The activities in Nepal were initially planned to cover ward number 16 of Lalitpur Sub-Metropolitan City and Karyabinayak Municipality, now ward number 16 and 21 of Lalitpur Metropolitan City (LMC).

Accomplished GGS Activities

There has been accomplished various activities so far in both the wards as listed below.

LMC Ward No. 16	LMC Ward No. 21
Development of ward level earthquake scenario	Development of ward level earthquake scenario
Earthquake Risk Reduction Action Plan based on ward level scenario	Action Plan based on ward level earthquake scenario
First Aid Training for Community Volunteers	First Aid Training
	Debris Removal

Both the local platforms felt need of improving earthquake risk reduction capacity of the wards after the 2015 Gorakha Earthquake. This is why the

GGS objective of preparing an earthquake scenario was readily accepted by both the (Disaster Risk Management Committees (DRMCs). One Earthquake Scenario Workshop was organized in each DRMC (local platform) to facilitate them to draft earthquake scenario.

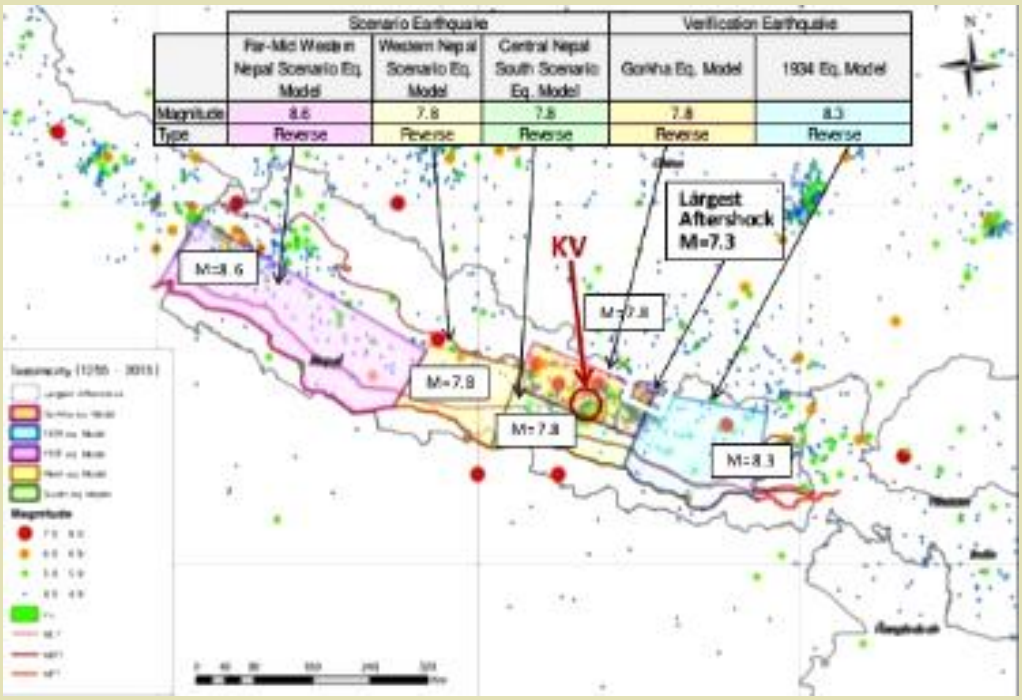
The participants were asked to write impact of previous earthquake on different aspects like search and rescue, infrastructures, school, hospitals, debris management and reconstruction. Also, participants had to write about their experience on different time frame within the year. Not only experience but possible solution for problems were also discussed.

Lastly, they made earthquake scenario for quake greater than they experienced in 2015 for different time frames within the year, with possible mitigation measures.

The Central Nepal South Earthquake 7.6 Magnitude was taken as the scenario earthquake based on the "The Project for Assessment of Earthquake Disaster Risk for the Kathmandu Valley in Nepal". The draft scenario was technically reviewed by the experts from Centre for Disaster Studies (CDS), Tribhuvan University (TU). CDS also translated the scenario into English after its technical revision. The wards DRMCs are now planning to add on figures and maps before it is published.

Probable Damage Details of LMC Ward-16 and 21 (Based on Gorkha Earthquake + JICA Report)

Damage Details	LMC 16	LMC 21
Residential Buildings		
Damaged (Inhabitable) mm Buildings	902	900
Cement mortar Buildings with cracks	119	
RCC Buildings with hairline cracks	288	
Heritage Buildings	Maximum Damaged	Partial Damage
Death	80	65
Minor casualty	150	300
Major casualty	80	
Homeless	5,390	



Workshop on Earthquake Risk Reduction Action Plan based on the Scenario

A workshop in each ward was organized to endorse earthquake scenario and prepare action plan based on scenario. These workshops were chaired by respective ward Chair who were also the Chair of Disaster Risk Management Committee (DRMC) and facilitated by NSET team. The program discussed and briefed on earthquake scenario to DRMC members. After discussion, necessary editing was made and scenario was endorsed.

GGS Final Conference

Final Workshop was organized on 22-23 February 2018 to conclude the GGS project in Nepal. All the 29 ward chairpersons of LMC, the members of City Council, Municipality officials including Mayor and Deputy Mayor actively participated in the Final Conference. There were four presentations from CDS, NSET and Kyoto University. The local level action from ward DRMC 16 and 21 were presented by the respective ward chairs. The mayor committed to support the two DRMCs in implementing the action plans prepared during the GGS project.

Recommendations

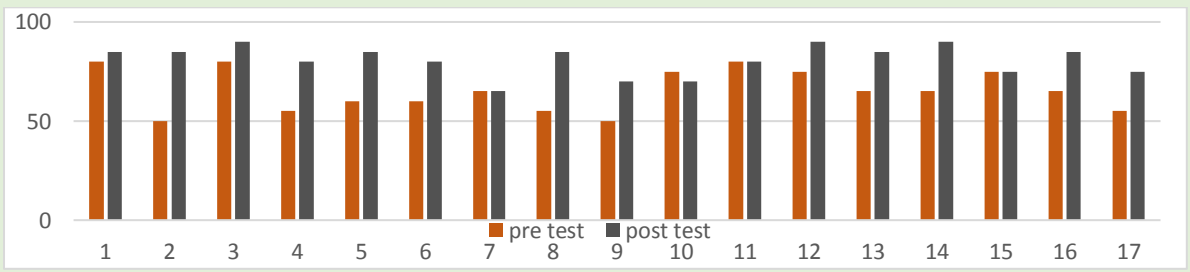
The following recommendations are drawn out based on the experiences of implementing GGS activities along with conducting similar projects in the past.

- It would be more effective if the universities and or research institutes conduct research on the identified problems of the community. This will highly motivate the community members to be involved in the project.
- Research projects should have some flexibility to support community level hardware components in disaster risk reduction to motivate the community members.

7-day ToT on Community Based Disaster Risk Reduction conducted

A seven-day Training for Trainers on Community Based Disaster Risk Reduction was organized for the Potential Trainers of Small Farmers Development Bank (SFDB) in Hotel Pacific at Jamal in Kathmandu from June 10 to 16, 2017. The training program was organized by Earthquake Safety Solutions (ESS) with technical input from CBDRM/NSET.

The objective of the training was to produce skilled trainers who would be able to design and incorporate DRR issues in the other training programs so that the communities being served by SFDB would be disaster resilient. The training curricula had five modules spread over 22 sessions and thematic exercise and games for better understanding on Disaster Risk Reduction at the community level. Eighteen professional trainers engaged in other aspects of training participated the program from various offices of SFDB.



Participants' score before and after training

Emergency Preparedness Training Program in Nepal for SOS CV Officials

Five-day training on Emergency Preparedness was organized by SOS Children Village in its Kabhre Training Center. The main objective of the training was to develop effective processes for preparedness planning in order to improve disaster response and recovery programs. CBDRM was involved in planning the training course finalizing the curricula and conduct training for two days and other three days was conducted by ECHO Nepal. Professionals from CBDRM delivered sessions related to basic disaster risk reduction and earthquake preparedness, response and mitigation.

Orientation program to elected political leaders from LMC

An orientation program on Disaster Risk Reduction was organized at Lalitpur Metropolitan City (LMC) for all the newly elected members from June 23-25, 2017 where all ward chairpersons and ward members along with the social mobilizers of all the wards participated. The orientation program included presentations from National Reconstruction Authority (NRA), Ministry of Federal Affairs and Local Development (MOFALD) United Nations Development Program (UNDP) and NSET.

Orientation program on earthquake resistant building construction and Non Structural Mitigation (NSM) knowledge for house owners

NSET in collaboration with Society for Urban Poor (SOUP) and Shapla Neer Nepal conducted an Orientation on earthquake resistant building construction and NSM for house owners program in January 2018 at Nepal Bhasa Manka Chhen at Tyagal, Lalitpur. 84 participants (52 female and 32 male) from ward 7, 8 and 17 of LMC actively participated in the program. The objective of the program was to provide the basic knowledge on earthquake resistant building construction and Non-Structural Mitigation (NSM) to the potential house owners including members of the women groups of the area.

Distribution of Earthquake Go Bag for Wheel Chair users conducted

NSET in coordination with Center for Independent Living Kathmandu (CIL-Kathmandu) distributed customized version of 'Earthquake GO BAG' for wheel chair users at a program organized in Kathmandu in January, 2018.

The 'Go Bag' is especially designed with most essential items like medicine, torch lights, fast food items and clothes packed on which will be useful during the emergencies that can be kept easily under a wheel chair. 40 persons (14 female, 11 male) using wheel chairs received the Go Bags.

Mr. Ganesh Kumar Jimee, Director, DPER division of NSET, handing over the 'Go Bag' to a wheel chair users

Interaction Program on existing knowledge and Capacities in DRR among local communities held

An interaction program on the existing local knowledge and capacities/resources in Disaster Risk Reduction was held in March 2018 at NSET office. There were 14 participants including female community members from Thankot Mahila Jaagaran Saving and Credit Cooperative, Kirtipur Women's Network and Lalitpur Ward no. 12's members of Community Disaster Management Committee (CDMC).

The discussion was held on DRR activities carried out by the community. Components such as the level of awareness of disasters, coordination of community members with the local government officials and preparation of work plan were discussed.

An action plan which comprised of required resources through external support was developed. The program, therefore, led to the development of a plan by the community members for future activities concerning disaster management.

Orientation Program on Earthquake Safety for Deaf and People Hard of Hearing Held

An orientation Program on Earthquake Safety for Deaf and People Hard of Hearing was organized at NSET office in January, 2018. The program was jointly organized by NSET and National Association of Deaf & Hard of Hearing, Nepal (NADH).

There were 25 participants (14 female, 11 male). All of whom were members of NADH and some of them are also working professionally in various sectors.

Participants of earthquake safety drill conducted in Old-age home at Pashupatinath, Kathmandu

Section 4 Ongoing Major Programs of NSET

Research and Development

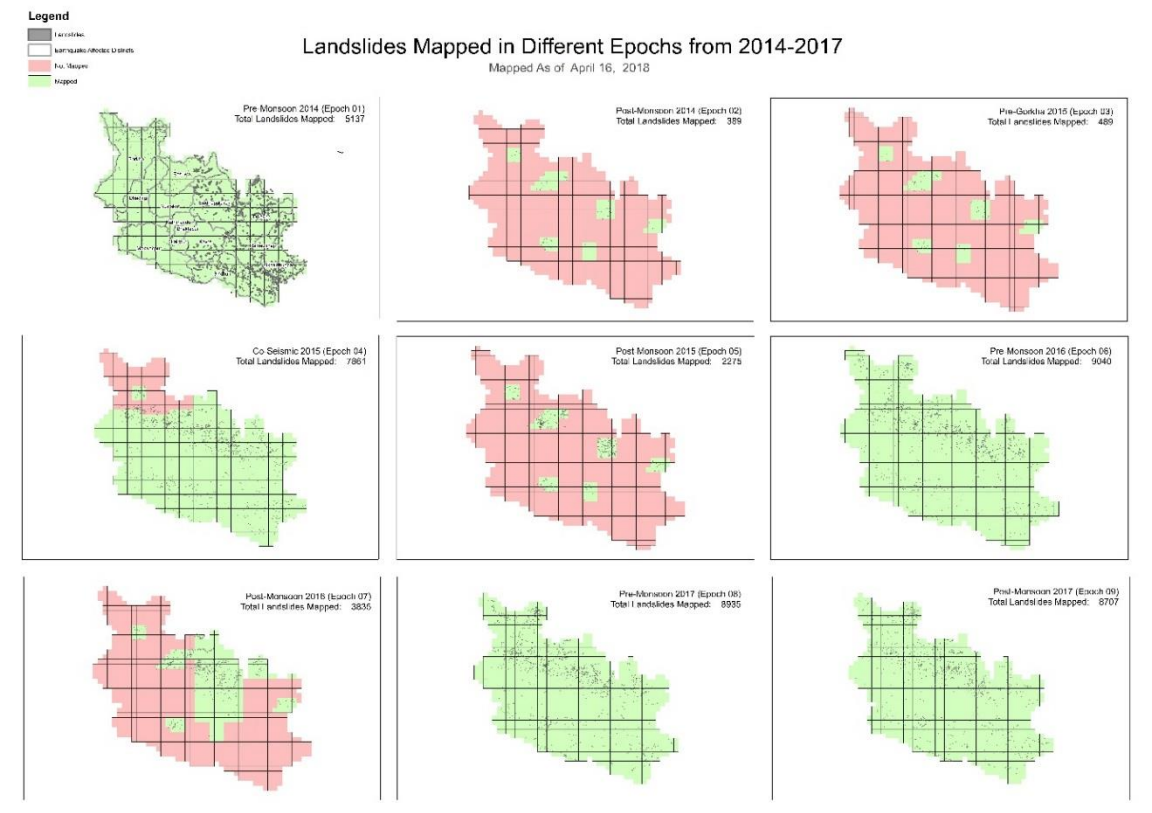
Disaster Risk Reduction (DRR) is the process of preparing for, responding to and recovering from disasters, and taking action to mitigate their consequences or reduce risks. The Sendai Framework for Disaster Risk Reduction has recognized and highlighted the role of research, academia, science and technology in disaster risk mitigation. For better understanding of risk in all its dimensions of hazards, exposure and vulnerability, role of research is vitally important aspect as it provides the evidence and knowledge on risk.

Scientific study of any problem provides a universe of knowledge and expertise that can be readily mobilized when needed. Identifying the risks and vulnerabilities of the local communities is the first step in management of disasters. In this context, NSET, which has been working in the DRR in Nepal and region, and established as an important stakeholder in the DRR sector, is intensively engaged in research, science and technology in the DRR.

Earthquake triggered Landslides in Nepal during and Post Monsoon, 2015-2018

Landslide assessment was an area where many scientists felt that they could contribute. Several groups began mapping landslides using science-based protocols, assuming that such information might be useful to those managing the relief effort after 2015 Gorkha Earthquake. While some groups were interested in mapping individual landslides, others were focused on rapid identification of their broad-scale impacts. Groups of international scientists reported that they had passed landslide assessments on to various interlocutors – from the Prime Minister of Nepal to the UN RCO to ICIMOD. To take one example, Durham University and BGS produced and shared four maps over a six-week period between 4 May and 19 June 2015.

Numerous efforts were undertaken to map coseismic landslides after 2015 Gorkha Earthquake. These maps drew primarily upon very high-resolution imagery, yielding an upper estimate of > 25,000 coseismic landslides. An increasing body of research centers upon identifying rates of landsliding in the years after an earthquake. This of considerable importance for understanding subsequent patterns of sediment mobilization, the role of coseismic damage accumulation in driving post-seismic slope failure, and the evolving nature, extent, and severity of landslide risk.



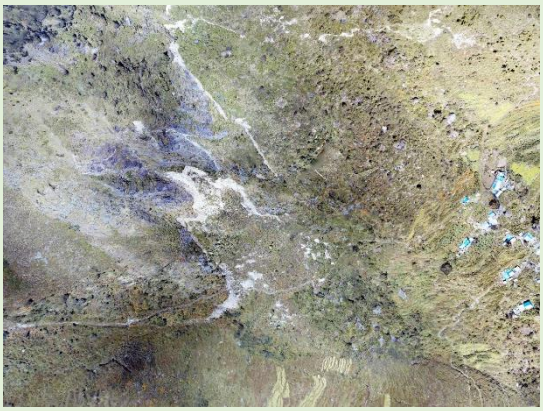
The continued monitoring that is required becomes increasingly important in regions where landsliding is also driven by intense seasonal meteorological events. Following the Gorkha earthquake, extensive and pervasive cracking was observed on many hillslopes that had not undergone full failure. In the monsoons of 2015-2017, new failures and reactivations were observed in addition to many cracked slopes that remained stable. The case of the Gorkha earthquake therefore presents an important opportunity to increase our understanding of the decay in landslide rates in the years after an earthquake event., Thus, NSET and Durham University continuously undertaking this mapping work for 14 major affected district to identifying patterns of land sliding in the years after an earthquake.

Completed Digitizing work for Landslide

	Pre-monsoon 2014	**Co-seismic 2015 Gorkha earthquake**	**Pre-monsoon 2017**
Digitization %	100	100	100
Landslides outlined	5,137	7,861	8,934

Use of Unmanned Vehicles System (UAV) for Landslide monitoring work

NSET is using UAV for Landslide monitoring work in Rasuwa and Sindhupalchwok district. In this case, a low-cost remote sensing approach based on unmanned aerial vehicles (UAVs) and digital compact cameras are used which enabled high-resolution acquisitions of landslides. Digital surface models (DSMs) were generated using a new feature-based surface reconstruction approach that does not require any ground control point information.One major advantage of UAV-based remote sensing applications for hazardous environments like landslides, mudslides or rockfalls is the possibility to gain information in very dangerous areas of interest.



Cracks of Tarsha Landslide in Syphrubesi, Rasuwa

Slides cracks of Pahiro Besi Landslide in Rasuwa

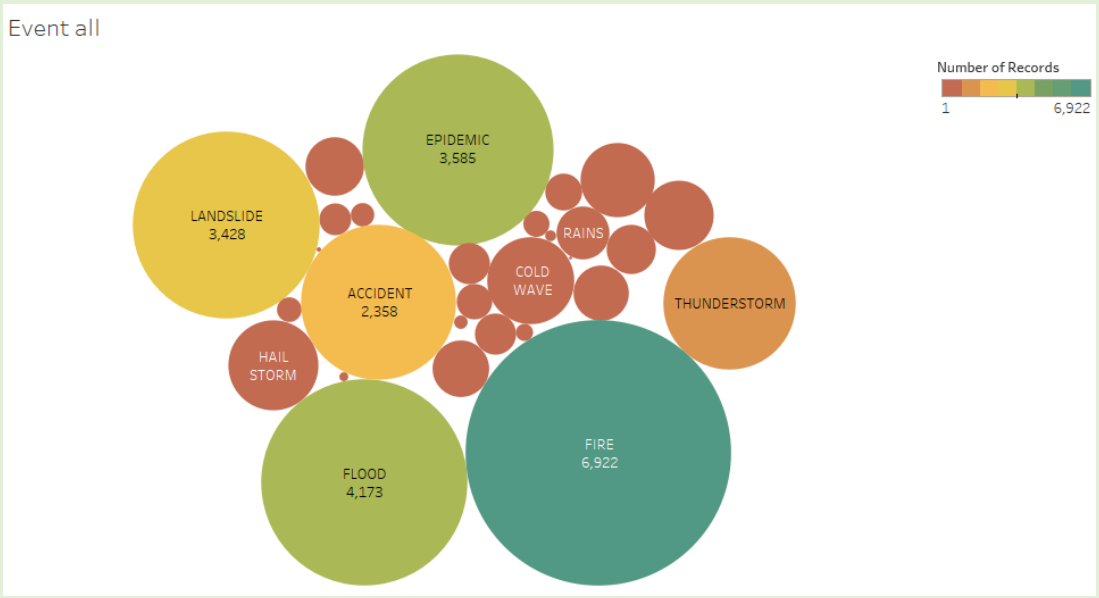
Disasters in Nepal: Inventory of Events and Analysis of Impact 1971 to 2017

NSET worked with financial support of UNDP-Nepal to establish a systematic data inventory of natural disaster events in Nepal. The effort has been focused mainly on collection, computer-entry, and analysis of natural disaster data for 33 years (1971-2003) initially and has been continued for subsequent years. A standard data collection format was developed and used to capture the data from different sources and entered into the *DesInventar* System, a methodological tool developed by Latin American Network of Social Studies on Disaster Prevention (LARED).

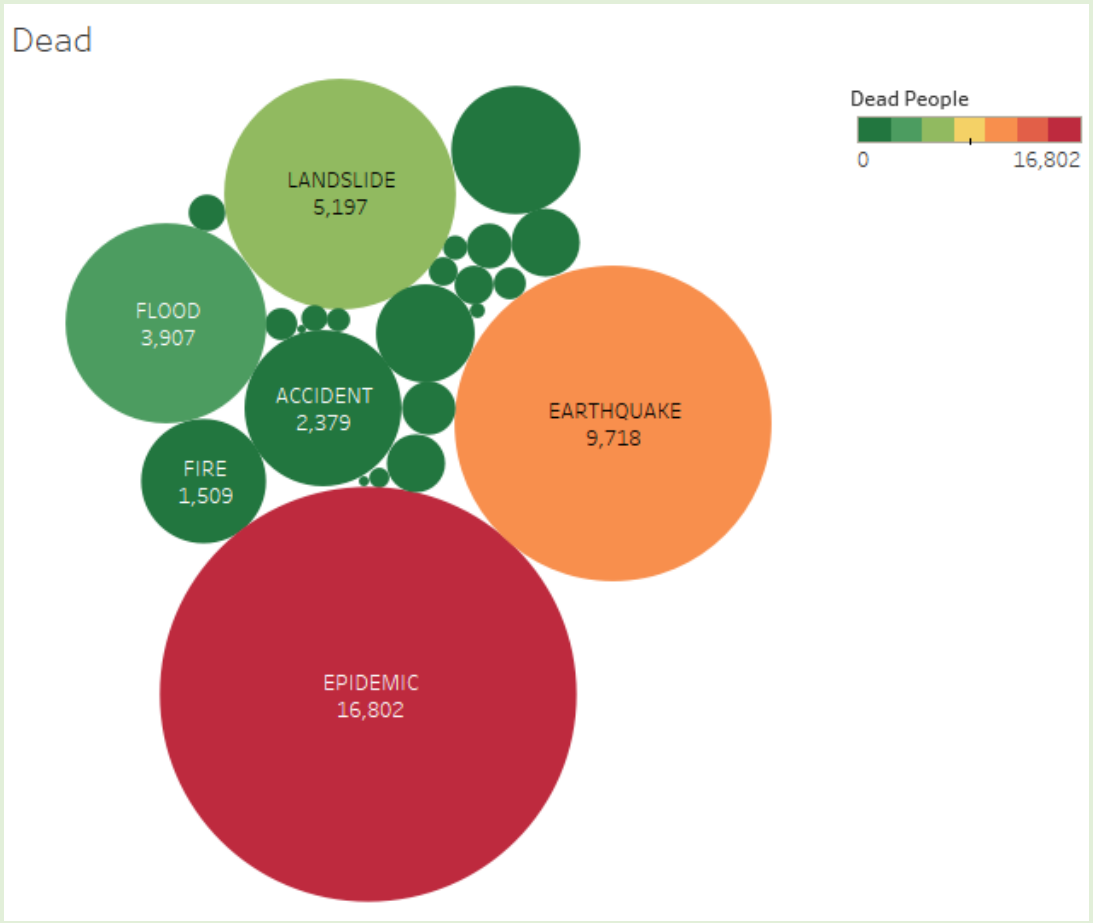
Disasters events in Nepal from 1971 to May 2017

Total events recorded: 27,163, Total deaths: 44,119

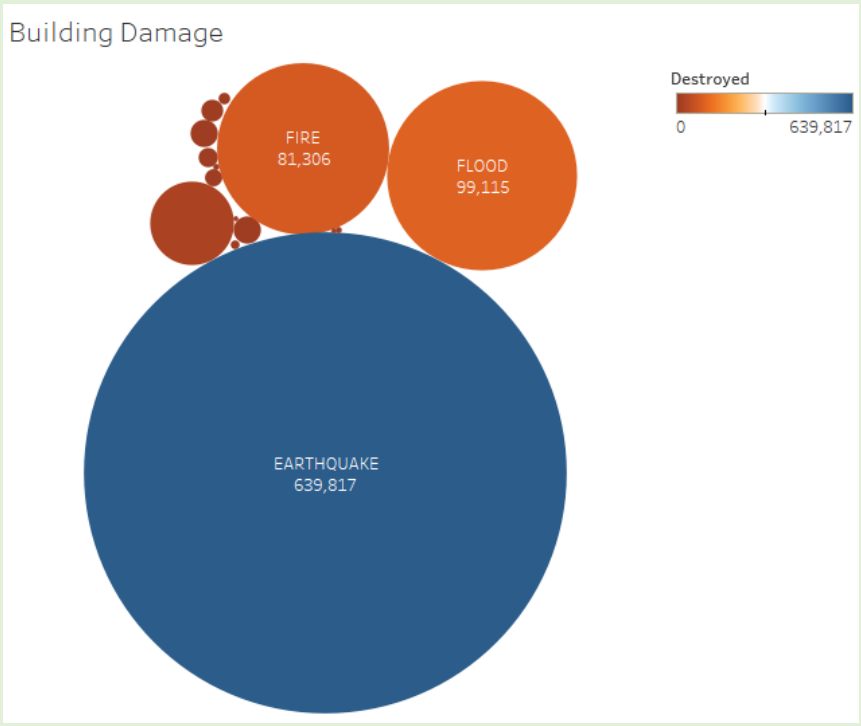
Highest Mortality	Highest Housing Damages
• Epidemic : 116,802 Deaths; 3585 Data Cards • Earthquake: 9,718 Deaths; 310 Data Cards • Landslide: 5,197 Deaths; 3428 Data Cards • Flood: 3,907 Deaths; 4173 Data Cards	• Earthquake: 639,817 Houses; 310 Data Cards • Flood: 99,115 Houses; 4173 Data Cards • Fire: 81,306 Houses; 6922 Data Cards



Fire, Flood and Epidemics are the three most prevalent disaster risk hazards in Nepal



Epidemics is the number one killer. Earthquakes and Landslides are the second and third in terms of lethality in Nepal



Earthquake, altogether only 3 episodes in past 70 years, destroyed the highest number of buildings in Nepal

Seismic Retrofitting of two heritage buildings in Rongthunng Trashigang Bhutan

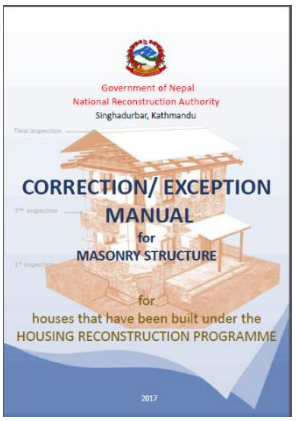
NSET is assisting in retrofitting of two Bhutanese traditional buildings to be retrofitted in the Hotel Natshang premises.

Earthquake Safety Solutions (ESS) signed an agreement with Hotel Ngatshang for the Seismic Retrofit Design and Implementation of two heritage structures in Rongthung, Trashigang in the Hotel Natshang premises. One of them is a two storied building and the other is four storied. Both the buildings have thick stone masonry walls with timber floor and corrugated iron sheets roofing over timber structure. The retrofitting scheme includes RCC Jacketing, RCC slabs for diaphragm at each floor and steel roof structure for better strength and anchorage. The retrofitting of buildings was started in July 2017 and is planned to complete in June 2018. NSET is involved in preparing working details as per the structural design along with social considerations on the retrofitting works as requested by ESS. The project is running smoothly and is progressing as per the planned time line. It is expected that the works will be completed by June 2018. It is expected to open a wider horizon for ESS and NSET in retrofitting old buildings traditional buildings with native architectural and archeological importance.

Housing Reconstruction Program related manuals publication

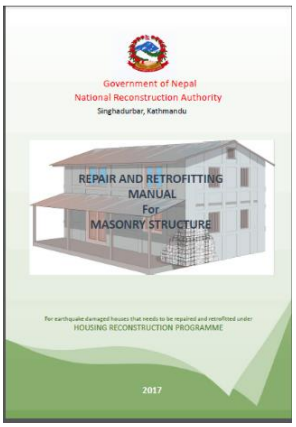
NSET worked together with NRA and JICA, and had provided the technical support in development of following manuals under the Housing Reconstruction Program across the 31 districts devastated by 2015 Gorkha Earthquake.

Correction/ Exception Manual for Masonry Buildings



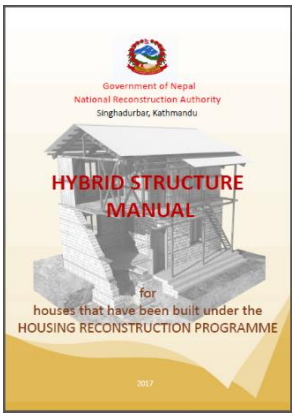
Under the housing reconstruction program, houses that have been constructed or are in the process of construction need to comply with the Minimum Requirements (MRs) for compliant construction. In order to receive the housing reconstruction grant, the buildings need to comply with all the descriptions mentioned in the inspection check sheet which were formulated on the basis of MRs. Most of the houses that have been reconstructed till date do not fulfill all the MRs, as a result many houses have not been approved to receive the government reconstruction grant. Hence, this manual was developed to help the technical staff introduce the exceptional cases, other than mentioned in MRs and several correction measures along with their step by step procedures for mitigation measures.

Repair and Retrofitting Manual for Masonry Structure



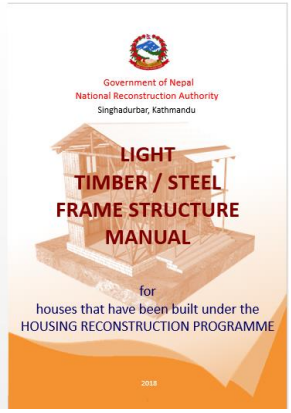
Under the housing reconstruction program, houses that are partially damaged, and fall under damage grade 2 (major) and 3 (minor) are eligible to receive a 100,000 NPRs grant to retrofit their home. For the household to receive the housing retrofit grant, their home must comply with all the specifications detailed in the inspection check sheet, which were formulated based on the Minimum Requirements. This manual has been prepared to help the technical staff introduce the inspection standards for the housing retrofit grant, and their associated step by step procedures for construction.

Hybrid Structure Manual



As per Minimum Requirements under Housing Reconstruction Program, for the buildings with stone/brick masonry in mud mortar, the number of story is restricted to only one if wooden band is used whereas permissible number of story is one story plus attic if RC band is used. Nevertheless, the people tends to construct two story building to meet their living functional requirement. And other reason is that people have felt risk of multi-storey building constructed with low strength masonry structure. Hence, they have built the upper story mostly with timber frame structure using the available material such as CGI sheet on the masonry structure at ground floor and the safety of such building is unknown. Therefore, a manual "Hybrid Structure Manual" was developed for technical staff to check the safety of these building against earthquake load and wind load.

Light Timber/ Steel Frame Structure Manual



In some parts of Siwalik range, use of wood in building construction is found quite high. These wooden frame building are found to be constructed using traditional method in Sindhuli, Makawanpur and Okhaldhunga district. Such traditional construction shall have an appropriate technical guideline (Including MR, Inspection sheet) to ensure seismic requirements to support the housing reconstruction program. Hence, this "Light Timber/ Steel Frame Structure manual" has been developed to help the technical staff to check the safety of existing timber buildings and to help in the construction of new timber buildings.

Training on "Advanced Design Course on Seismic Safety of Buildings" for Engineers

There has been a lot of advancement in the field of earthquake engineering in the past decade and before. We now have a great understanding in this field from past earthquake experiences and there has been a lot of researches and studies going on.

A 3-day Training Program on "Advanced Design Course on Seismic Safety of Buildings" held in 2017 in Kathmandu. The main objectives of the course are i) to acquire knowledge on state-of-the art practice of analysis and design and ii) to develop the professional network as the program was able to bring in the experts from various leading organizations from abroad and home country.

The programme was jointly implemented by NORSAR Kjeller Norway, British Colombia Institute of Technology Canada, Indian Institute of Technology Roorkee India, Institute of Engineering Pulchowk, National Society for Earthquake Technology-Nepal and Earthquake Safety Solutions.

There were 32 participants, 21 design professional with master's degree in structural / earthquake /geotechnical engineering and 11 post graduate students with building design experience. A team of 10 instructors facilitated the course. The program was fee based and charged from the participants though nominal in amount.

Instructors and participants at Engineers training on "Advanced Design Course on Seismic Safety of Buildings" in Kathmandu

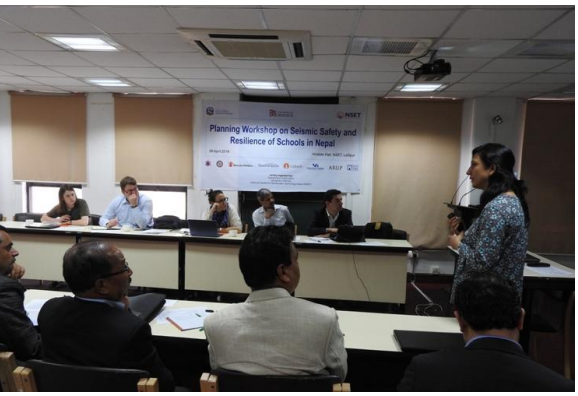
Planning Workshop on Safer School Research Project held in Lalitpur

Planning Workshop of the Seismic Safety and Resilience of Educational Communities in Nepal (SAFER) on 'Safer School Research Project' held in Lalitpur in April 26, 2018. The workshop was jointly organized by Department of Education (DoE), Bristol University and NSET together with consortium partners.

SAFER is a holistic and multi-disciplinary program for improving the earthquake-related safety of school buildings and the resilience of

educational communities in Nepal. The Safer School Research Project has been divided into five work packages and various tasks which are scheduled to be accomplished in three years.

The main objective of SAFER is to take global development challenges in Nepal through engineering research for sustainable infrastructure and Disaster Resilience through a multi-disciplinary consortium of geographical and structural engineers, engineering seismologists, ICT experts, earth scientists from academia, social scientists, policy makers, financial experts, and humanitarian and stakeholders.



Altogether six presentations were made during the one-day workshop. Prof. A. Sextos from Bristol University presented Overview of the SAFER project including the experimental campaign in Bristol and Southampton. NSET Director Ms. Hima Shrestha presented on experiences of NSET in School Infrastructure Strengthening and Research on Nepali Building typologies. On the occasion, representatives from Bristol University, University of Buffalo and Arup ID also did the presentations on different theme of the Safer School Research Projects.

After the presentations, the participants had engaged in intense discussion to formulate a joint action for the way ahead. The program was concluded with the remarks of NSET Executive Director Mr. Surya Narayan Shrestha.

SAFER is the consortium program of various partners; Bristol University, University of Southampton, California Institute of Technology (CALTECH), University at Buffalo, University of Roma Tre, NSET, Tribhuvan University, Institute of Engineering, Kathmandu University (KU), Arup International Development (ARUP-ID) and Save the Children.

Section 4 Ongoing Major Programs of NSET

20th Earthquake Safety Day

Chief Guest Prime Minister Sher Bahadur Deuba, special guests and other participants present at theESD National Meeting held at Bashantapur Durbar Square Jan 2018.

Nepal marked the 20th edition of **Earthquake Safety Day (ESD**) with the theme " Empowering Local Communities and Governments: Strong Foundation of Earthquake Safety" focusing on role of local government in earthquake risk reduction efforts in the context of new structure governance in the country. The National Organizing Committee led by Ministry of Home Affairs (MoHA) organized the 20th ESD National Program with objective to help raise public awareness and public engagements on various facets of Earthquake Risk Management and consequently contribute in building Nepali communities resilient to earthquakes. Kathmandu Metropolitan City (KMC) hosted 20th ESD National Programs this year. The ESD events, as in the previous years, were conducted nationwide through collaborative efforts of various stakeholders.

Nepal marks the 2nd Day of Magh, the 10th Month of Bikram Sambat Calendar (that falls on January 15 or 16) as **ESD** every year to commemorate the devastating 1934 Nepal Bihar Earthquake. Government of Nepal had declared ESD in 1999, and has been observing regularly since then. Nepal Government has issued **ESD Guidelines, 2014** that guides plan and execute ESD program activities more in organized and purposive ways. **ESD National Committee** that is led by **Ministry of Home Affairs (MOHA)** and accompanied with representatives from various government and non-government agencies related to Disaster Risk Reduction, Emergency Response and Critical Facility Management. Two sub-committees are formed separately, one chaired by **Department of Urban Development and Building Construction (DUDBC)** for Publicity Campaigns and another chaired by the host municipality for event management. The **NSET** serves as the Member Secretary in the committees.

ESD National Meeting

Prime Minister Sher Bahadur Deuba inaugurated the National Meeting of 20th ESD held at Basantapur Durbar Square area in Kathmandu on January 16, 2018. Addressing the program, Prime Minister Deuba appealed political parties with diverse ideologies to make a collective commitment for reducing earthquake risk in the country as the task is not possible by the efforts of single body or entity therefore requires collaboration among the multiple stakeholders. "Majority of deaths during the earthquakes were caused by weak structures rather than the earthquake itself. Thus, I urge the concerned government departments, stakeholders as well as local organizations to adhere to the building code". He also emphasized on building the communities safer to resist future earthquakes. "As disasters are equally severe to everyone, it is our responsibility and we all need to make a firm commitment towards Disaster Risk Reduction," he said.

Prime Minister Sher Bahadur Deuba addressing the Nationl Meeting of 20th ESD.

Chief Guests and other Guests at the program.

Minister for Physical Planning and Transport and Chairman of the National meeting, Mr. Bir Bahadur Balayar stressed on the need of making newly constructed buildings and development infrastructures earthquake resistant as the country's geography lie on most active seismic regions. Mr. Balayar also harped on collaboration among the various stakeholders to counter the future disaster incidents.

Addressing the Meeting, Mr. Yuba Raj Bhusal, Chief Executive Officer (CEO) of National Reconstruction Authority (NRA) remarked that the 1990 and 2015 earthquakes resulted in massive losses and sufferings, thus in order to alleviate the effects of the earthquakes, activities such as preparedness, response, relief and rescue and other Disaster Risk Reduction activities need to be accelerated on extensively. During the event, Mr. Bhusal also briefed about NRA's progress of reconstruction and future plans.

On the occasion, Mayor of KMC, Mr. Bidya Sundar Shakya announced to implementat the earthquake risk reduction measures in the stringent manner in the municipality. Arguing that building permit process will not just be limited to residential houses, he vowed to make building permit system mandatory to public and government buildings too to be constructed within municipality areas. He further added that KMC has not been charging building permit fees to those who lost their houses in the earthquake.

Mr. Shiva Hari Sharma, Coordinator, ESD Publicity Sub-Committee and Director General of Department of Urban Development and Building Construction also expressed his views in the program

At the program, Dr. Amod Mani Dixit, Member Secretary of ESD National Committee and NSET General Secretary presented the welcome remarks in the program.

Rank and file government officials, professionals from various organizations and dignitaries from diplomatic missions were also present at the program.

Minister Bir Bahadur Balayar addressing the National Meeting at Basantapur

Mr. Bidya Sundar Shakya, Mayor of KMC, addressing the National Meeting of 20th ESD

Earthquake Memorial Meeting

As part of ESD, the Earthquake Memorial Meeting was held at historical Earthquake Monument at Bhugol Park, New Road in Kathmandu. The program was organized in memory and pay homage to those who lost their lives in past earthquakes of 1934, 1988, 2015 and many others. A group of participants from Government of Nepal, professionals from various organizations, Civil Society and Community people paid tributes to the earthquake victims with one minute silence in the beginning and also offered flowers to the departed ones at the later part of the program.

Mr. Bir Bahadur Balayar, Minister for Physical Planning and Transport paying homage to earthquake victims at Earthquake Memorial Monument, New road.

Addressing the Meeting, Minister for Physical Planning and Transport, Mr. Bir Bahadur Balayar stressed on focus on earthquake preparedness and risk reduction considering the high risks of earthquake in the country. "As the country has already entered into the federal governance system, provincial and local government should to pay adequate attention on the construction of such infrastructures which must be resilient to future earthquakes," Minister Balayar added.

Mayor of KMC, Mr. Biddhya Sundar Shakya clarified the significance of organizing the memorial meeting. "This meeting inspires everybody to learn from the past tragedies like devastating earthquakes of 1934 and 2015 and preparing for the events may occur in the future," he said. He further added that KMC has unveiled house pooling concept with view to discouraging the tendency of rebuilding new houses in small land plots in the nucleated settlements within KMC.

Participants attending the Earthquake Memorial Meeting

Addresing the program, Mr. Mohan Krishna Sapkota, Secretary at Ministry of Home Affairs (MoHA), said that his Ministry has accelerated efforts on earthquake risk reduction after the 2015 earthquake. Secretary Sapkota added that a new Act named as Disaster Risk Reduction and Management (DRRM) has been promulgated as Participants attending the Earthquake Memorial meeting part of policy change and also gearing up on forming Disaster Management Authority to manage the future disasters events.

Dr. Amod Mani Dixit, Executive Director of NSET highlighted the objectives of organizing the memorial meeting and stressed on joint work and cooperation among various stakeholders to minimize the earthquake risks in the country.

On the occasion, chiefs of security forces and representatives from various agencies and organizations and community people paid tributes to all those who lost their lives in past earthquakes, namely, 1934, 2015 and many others! The meeting was chaired by Mayor of KMC. KMC hosted this year's Memorial Meeting.

Earthquake Safety Rally

Earthquake Safety Rally is one of the major program events of ESD being held every year. The rally is organized before the National Meeting with the view to elevate level of public awareness, perception and attitude towards earthquake risks as well as preparedness and to promote and encourage safer reconstruction practices.

Mayor of Kathmandu Metropolitan City, Mr. Bidya Sundar Shakya cutting ribbon to inaugurate Earthquake Safety Rally.

Mr. Bir Bahadur Balayar, Miniser for Physical Infrastructure and Transport, Mr. Biddhya Sundar Shakya, Mayor of KMC, Mr. Krishna Bahadur Raut, Joint Secretary and Head of Disaster Management Division of Ministry of Home Affairs and Mr. Sanjeev Thapa Chairperson of Nepal Red Cross Society (NRCS) jointly inaugurated the rally. The Earthquake Safety Rally walked along inner city core areas of Kathmandu with the messages of earthquake safety and safer reconstruction. The rally commenced from Juddha Salik (Statue) of New Road, walking across Om Bahal, Lagan, Bramha Tole, Huymat, Jasidewal, Kohiti, Bhimsensthan, Kasthhmandap, Yatkha, Naradevi, Kilagal, Bhedasingh, Indrachowk and finally gathered at Juddha Salik for the National Earthquake Safety Day Meeting. The Rally was joined by walkers from various Government Offices, Community Groups, Police Forces, Army, NGOs, INGOs, Scouts, Students, Volunteers, Participants, Businesses, Local Community people, CBOs and many more. Various organizations participated the rally joining hands and coming together to exhibit their institutional, personal as well as community level commitments to earthquake safety, awareness raising and preparedness initiatives.

National Earthquake Safety Demonstration

A nationwide Earthquake Safety Demonstration was also conducted at 2:24 PM coinciding with the strike of 1934 Nepal Bihar Earthquake. A special siren was aired from Radio Nepal and other FM stations across the country as a notification of an artificial earthquake. The safe behavior (Drop, Cover and Hold on) demonstration was conducted by a team of NSET. Then, each one of the participants joined into a human chain by holding hands as a symbolic gesture of working together in reducing the earthquake risk in days to come.

An Earthquake Safety Demonstration held during National Meeting at Bashantapur.

Participants joining into a human chain by holding hands during National Meeting.

National Symposium on Earthquake Risk Management and Risk Reduction, 2018

National Symposium on "Earthquake Risk Management and Risk Reduction" held in Kathmandu during January 7-8, 2018 with the view to provide a forum for the corresponding development sectors and stakeholders to discuss on the past experiences, progress and pertinent issues and way forward towards reconstruction and preparedness to minimize the future impacts of large-scale earthquakes in the communities. The symposium discoursed intensively on the various issues of earthquake risk reduction and safer reconstruction and reviewed the efforts on reconstruction, risk reduction and preparedness.

Chair and Speakers in the Opening Ceremony of National Symposium, 2018.

Mr. Bidya Sundar Shakya, Mayor of KMC inaugurated the opening Ceromoney of the Symposium. National Reconstruction Authority (NRA), DUDBC, KMC and NSET in association with various government and non-governmental organizations organize symposium every year.

Mr. Bidya Sundar Shakya, Mayor of KMC, adressing the Openning Ceromoney of National Symposium

Addressing the inauguration session, Mayor Shakya urged everyone to take lessons from the 2015 Gorkha Earthquake and stressed on earthquake preparedness and follow risk reduction measures to minimize the loss of lives and assests in the similar disaster to come. "Our experience in the KMC clearly showed that post-disaster reconstruction is very tough task and it could not be carried out effectively despite providing the reconstruction grant to affected people by the government. Thus, we must be prepared before such disaster," Mr. Shakya said. On the occasion, he highlighted some of the plans that his municipality is introducing to implement the National Building Code in stringent manner in all kind of building construction.

Speaking on the occasion, Dr. Hari Ram Parajuli, Executive Committee member of NRA stressed on the need of giving priority on the safety of public infrastructures like hospital and school buildings rather than private houses. "Although the recurrence interval of the earthquake is long comparing that of floods and other types of disaster events, the potential impact of earthquake risk is far more severe on human lives and assests. Thus, we need to put special attention to this fact and need to be prepared," Dr.Parajuli remarked.

Joint Secretary at Ministry of Urban development Mr. Shambhu KC urged local governments to put its focus on earthquake risk reduction activities in the changed context of federalization of the country. Highlighting the various events of the two-day symposium, Mr. Krishna Bahadur Raut, Joint Secretary at Ministry of Home Affairs, urged government and donors to step up the activities and efforts in minimizing the earthquake risk reduction as the cost of post disaster recovery is far higher than the actual cost requires for the preparedness activities. He also stressed on implementing the development activities keeping the risk sensitivity in the mind.

Mr. Mani Ram Gelal, Deputy Director General of DUDBC, emphasized on building multi hazard disaster resilient infrastructures as the country is at risk of all kinds of disasters except tsunami.

Dr. Amod Mani Dixit, Executive Director of NSET, highlighted the objectives of the symposium. Dr. Dixit emphasized on cooperation and joint work and coordination among the stakeholders to achieve the overall goal of sustainable earthquake safety in the country.

Mr. Parishit Kadariya, Project Deputy Director of MoUD-CLPIU, put forth his welcome remarks at the beginning of the session.

Altogether 12 thematic sessions were held at the national symposium. The followings are the 12 themes discussed during the symposium:

Dr. Amod Mani Dixit addressing during Opening Ceromoney of National Symposium.

- Status, Issues and Challenges Gorkha Earthquake Housing Reconstruction in Changed Context of Federalism,
- Policy Strategy and Action plan on Disaster Risk Reduction in the Context of Federal Transition in Nepal,
- Reconstruction for Vulnerable Population: Urban and Rural Housing,
- Findings of Study on Cause of Deaths and Injuries (CDI) in the 2015 Gorkha (Nepal) Earthquake,
- Building Code Implementation in Nepal: Building Permit Process,
- Current Status & Way Forward on Earthquake Preparedness based on Lessons Learnt from Gorkha Earthquake in Context of Transition to Federal System,
- Reconstruction in Flood affected area,
- Experience Sharing on Building Code Implementation and launching of Technical Support on Building Code Implementation in Nepal (TSBCIN),
- Research and Development on Rural Housing,
- Post-Earthquake Re-strengthening and Reconstruction of Cultural Heritage: Status, Issues, Challenges, and way forward for Safeguarding,
- Urban Planning and Resilience and
- Building Resilient Schools.

There was the active participation of above 200 professionals from different organizations namely; NRA, MoHA, MoUD, DUDBC, Nepal Army, APF, Nepal Police, NSET, Nepal Redcross Society, DRR Experts, Academia, Consultancies, Freelancers, Media and representatives of different NGOs and INGOs.

Also series of ESD activities reported held in District Headquarters , Municipalities, Schools, Communities, and vaarious social forums.

Section 4 Ongoing Major Programs of NSET

KDC Integrated Settlement Redevelopment (KDCISR): NSET support through Housing Plots Consolidation

In order to conserve the originality of the Kilakwo Dumbo Chowk (KDC) of Kathmandu and its heritages, NSET is assisting on Kilakwo Dumbo Chowk Integrated Settlement Redevelopment (KDCISR) project being implemented by National Reconstruction Authority (NRA), Kathmandu Metropolitan City (KMC) and the residents of KDC.

Kilagal is a densely populated urban core of Kathmandu. It is a mixed zone composed of residential and commercial use. Kilakwo Dumbo Chowk (KDC), a part of Kilagal which is the historic core city well decorated by temples, chibas, and courtyards (chowks). It also represents vernacular architecture. Hence, the originality of the area and its heritages must be conserved. The need of KDCISR was realized by the residents of KDC immediately after the 2015 Gorkha Earthquake. Forty-four residential buildings out of fifty-four, suffered major damage in the earthquake and are waiting for reconstruction.

The process of urban regeneration was carried out in cooperation of KMC, NSET, and the residents of KDC in its initial stage. House owners of fifty-four houses participated in the process of urban regeneration. Recently, NRA has coordinated with KMC and Lalitpur Metropolitan City (LMC) to speed up the process of urban reconstruction through integrated settlement redevelopment. The KDCISR project started with the Detail Damage Assessment (DDA) of the buildings damaged by the Gorkha Earthquake. Cadastral map of ward number 18 was used to conduct the DDA and prepare digitized base map. Thus obtained base map and data from DDA also act as a base for further planning process of KDCISR.

KDC cover an area of 1959 square meters (3 Ropani 13 Ana 2 Paisa and 2 Dam) of land. It is accessed by Chandra Man Singh Marga on

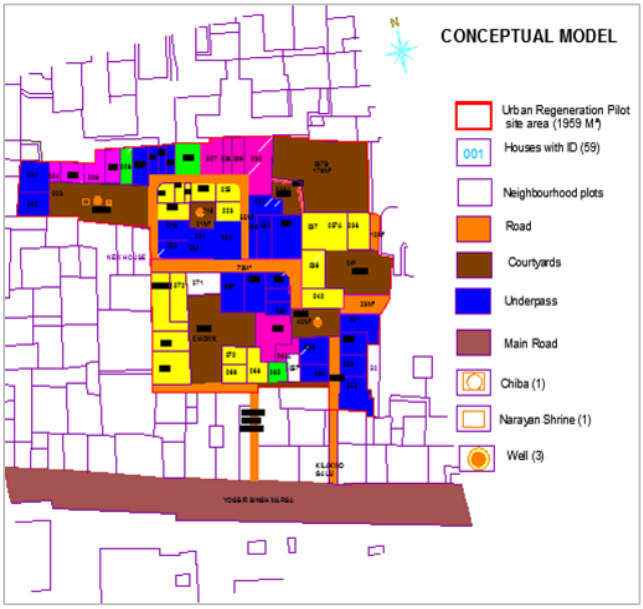
Photo 1: Buildings of Kilakwo Dumbo Chowk

its East, Gangalal Marga on its West, Chittadhar Marga on its North and Yogbir Singh Marga on its South. KDC lies between two famous Hindu temples, the Nardevi on its West and the Aakash Bhairav temple on its East side in a distance of around 150 meters. KDC consists of five private chowks, seven public chowks, one Guthi chowk and one private Vegetable garden (Bari). Altogether the chowks consist of 30% of total area. Most of the chowks are assessed by the underpasses. The street consists of around 9% while the total built up area consists of around 61% of the total area. According to the survey, among fifty-four buildings, thirty-four buildings have traditional form, four buildings are modern whereas sixteen buildings are mixture of traditional and modern forms.

Within KDC, a Narayan Shrine and a small Chiba are located. The site also consists of one festive (Jatra) route which is annually used by local community to celebrate the Kankeshwori and Ganesh Jatra. This Jatra is celebrated one day before Ghode Jatra. Three wells within the area are being used for catering community's household needs. These wells serve as primary sources of water. The drainage system is connected to the city drainage system.

After the analysis of data obtained from the survey, three different models of house pooling were proposed. Among them, one was selected in a common understanding to move ahead which is presented below together with the existing land use plan of KDC.

Existing Land Use Plan of KDC



Conceptual Housing Plot Consolidation plan of KDC

In this conceptual model, different plots were combined to create a large chunk of plot to construct a house through the process of Integrated Housing Plot Consolidation. An example is presented below:

Legally permissible with consolidated housing | Existing Condition | Legally permissible construction built separately

In this model, the first picture from the left is a picture of three houses built individually in three different plots as per bylaws. Middle picture depicts the existing context of three houses built individually in three different plots. While, the first picture from the right depicts a house constructed after consolidating three different plots. Thus house in consolidated housing plot will be multi- functional, spacious and planned than the individual constructions. It follows bylaws and building code and hence is safer, earthquake resistant and legally sound.

Integrated Settlement Redevelopment through Housing Plot Consolidation (House Pooling)

Housing Plot Consolidation is a tool of urban land development used to consolidate the buildings constructed in smaller plots to provide functional, spacious, well planned and multiple use living space at the same time preserving the urban fabric and vernacular architectural form. Land pooling, Guided Land Development, land subdivision has become the common tools of urban land development in Nepal but the tool "Housing Plot Consolidation" has not been introduced yet. Hence, KDC integrated settlement redevelopment project is the pioneer project of Nepal, and will act as an example for the entire settlement redevelopment within historic city core and traditional old settlements.

Planning and Implementation Process of KDC Integrated Settlement Redevelopment

- The process of KDCISR includes six different phases. They are:
- Planning and design
- Planning approval process
- Preparatory works for equitable benefit distribution
- Reconstruction works according to the integrated house pooling
- Compensation and adjustment
- Financial clearance and report on achievements

Conclusions

As KDCISR is the pioneer project of Nepal, this project will act as an example for the entire urban regeneration of the country.

Section 4 Ongoing Major Programs of NSET

Housing Recovery and Reconstruction Platform Nepal (HRRP): Technical Coordination by NSET

HRRP is a platform for coordination, strategic planning and technical guidance to agencies involved in recovery and reconstruction and to support the Government of Nepal in coordinating the national reconstruction program.

HRRP supports government authorities (NRA, MOUD/DUDBC, MOFALD) in coordination, strategic planning, facilitating cooperation with the national and international organizations, the private sector, overseas labor migrants, and public associations involved in recovery and reconstruction under the guidance of GON and co-led by IOM and UNHABITAT, as of the beginning of January 2016. In order to facilitate the ongoing reconstruction efforts in the earthquake affected districts, Nepal Reconstruction Authority (NRA) approved the HRRP phase-3 on 7th March 2017 and it is set to run until the end of February 2019. CRS Nepal is leading the platform for phase-3; and DFID, SDC, Habitat for Humanity, Plan International, ACTED, Caritas Nepal and NSET have been providing financial and in-kind contributions to the platform.

The Technical coordination provides supports to POs and Government line agencies, NRA, CLPIU/DLPIU for both MOUD and MOFALD. NSET, with the HRRP management, has provided technical staff at central and district level in line with the approved HRRP organogram. The fundamental approach of technical coordination is working at three level (National, Hub and district) in line with the HRRP3 main approach. The National technical coordination team comprising three personnel (One National Technical Coordinator and two national technical coordination officer) is facilitating the standardization of technologies, standards, guidelines, and curricula at center level through developing/ adapting/ reviewing for all technologies, which recommended for approval. The technologies and related guidelines are for both new construction as well as retrofitting, including corrections of non-complaint buildings.

At hub level, technical coordinator embedded in a District Management Team (DMT) and supporting the delivery of coordination services under the HRRP in districts. The DMT, Technical Coordinator is working with district management team to ensure a common understanding of technical assistance for the housing reconstruction. The DMT technical coordinator is working with the district technical coordinator to identify and respond to

gaps or duplications in coverage, and to address quality issues. Currently, 8 District Technical Coordinator (DTC), one in each district (Ramechhap, Kathmandu, Sindhuli, Dhading, Okhaldhunga, Dolakha, Makawanpur and Sindhupalchowk), are working for HRRP. They are supporting to disseminate the technologies developed at center level to district level to ensure clear and common understanding amongst all stakeholders, particularly POs staff involved in technical assistance at VDC level and the MOUD/CLPIU engineers based in the VDCs and responsible for inspection.

This is continuously doing through the district orientations, trainings, district technical coordination meetings and field visits by technical professionals through the District Technical Coordinators with continuous support from National technical team and The District Management Team (DMT). Similarly, Technical coordination is supporting all stakeholders to have a uniform understanding on the comprehensive package of technical assistance at center as well as district level.

Progress measurable at Center Level

- Technical Session on Inspection SOP and Technical Session on Northern Areas of quake-affected districts
- Eight Digital stories prepared by Technical Coordinator and presented during Anniversary meeting
- Design support for MOUD/CLPIU for 11 typical non-compliance cases on RCC structures
- Training support for MOUD/CLPIU MTOT on Retrofitting Techniques and the Correction and Exceptions Manual for 1st lot DLPIU Engineers
- Training support for MOUD/CLPIU MTOT on Retrofitting Techniques and the Correction and Exceptions Manual for 2nd lot DLPIU Engineers
- Technical Session on Correction and Exception Manual
- Technical session on Social Mobilization for Reconstruction; Experience Sharing, 23rd June 2017
- Coordination and support to design, prepare and publish the correction / exception manual and Training support for MoUD/CLPIU MToT on Retrofitting Techniques and the Correction and Exceptions Manual for vendor engineers
- Supported NRA with the development of training curricula on 'Resurvey and Re-Verification of Damage Buildings' for DLPIU engineers and conducted orientations for NRA Engineers on the developed curricula
- 3 days technical training for social mobilizers in Kathmandu, Kavre, Makawanpur and Sindhupalchowk for POs staffs.

Progress measurable at District

- Orientation on Correction/Exception Manual, Confined Masonry, Dry Stone Masonry and Treatment of Wood and Bamboo and Orientation on Repair and Retrofit Manual
- Regular field visit in coordination with NRA/DLPIU district team at Municipality/ Rural Municipality level with technical coordination meeting at Municipality/ Rural Municipality to discuss the progress and typical field issues.
- Orientation for Repair and Retrofit

Section 5 Ongoing Major Programs of NSET

NSET from Various Lenses

National Society for Earthquake Technology- Nepal (NSET) has made Strategic Audit of its organization through Three H Management, a management consulting firm. Strategic Audit of NSET is a very important aspect of the organization's future strategic direction at the verge of its completion of 25 years of existence. As a part of this exercise, the firm had conducted a survey with a set questionnaire to collect the responses of various stakeholders keeping identities of respondents anonymous. A very detail and comprehensive response from each of the respondents expected to be solicited in order to make this exercise a worthy one; which was expected to add immense value towards the existence, strategic intent and operational excellence of NSET in near to farther future.

Compilation of the Responses of Stakeholders was done and submitted to NSET in March 2018. Some sections from Compilation of the Responses of External Stakeholders extracted and presented hereunder to share ideas how NSET looks from various lenses.

Visitors' Notes

"It has been most inspiring and motivating to learn about pioneering work being done by NSET in terms of Earthquake Risk Reduction, in view of the history and vulnerability that we share together, along with cultural ties, it will be great to collaborate and work together to create safer and happier communities."

Anil.K. Sinha, Vice-Chairman, Bihar State Disaster Management Authority, Patna, Bihar. 13/04/2015

Responses of Community Representatives

NSET's Identity and Purpose

- The presence and importance of NSET was most acutely felt after the recent Gorkha Earthquake. Although outside the jurisdiction of their work, NSET provided relief and rescue to the communities in Bhainsepati. NSET later partnered with the local rotary club to sustain and continue their relief
- Even at current standing NSET has provided their expert advice and support to the community with any matters related to making the community earthquake resilient
- NSET is an organization primarily focused in establishing preparatory disaster risk management assistance in Nepal
- It is a progressive organization that understands and support upcoming issues of the society like GESI. NSET is a very supporting organization with sub-par level of enthusiasm and commitment for making Nepal a more earthquake resilient

NSET's Priorities (Strategic Purpose and Objectives)

- Start considering possibilities of becoming a multi-hazard management institution, supporting not only Earthquake risk management but also other frequent natural disasters prevalent in rural and remote Nepal
- NSET as a body for scientific research and knowledge generation should look into the possibility of transferring this knowledge into the community through formal channels as well
- Increase interaction and coordination with the community
- Expand scope of work to remote areas; create programs that penetrate on a deeper level to establish awareness about prevention and recovery from disaster in more rural and remote areas

"Great to be visiting and meeting friends, so many new ideas to work on, I am going back loaded and changed!"

Manu Gupta, SEEDS India, 08/02/2013

NSET's Strengths

- Experience in operation has allowed them to gain efficiency and deliver fast response to disaster
- Their reach/ work scope and their success in mobilization of youth

"Great to be visiting and meeting friends, so many new ideas to work on, I am going back loaded and changed!"

Robert Piper, UN RC/HC, 24/06/2011

NSET's Weaknesses

- Operation in isolation of community to some extent, they have yet to utilize the community as their resource
- They provide trainings yet fail/ neglect to provide networking and connection that can help individuals implement their skills.

"Thank you for all the important work that you are doing in the field of disaster mitigation."

Helen Crowley, GEM Foundation, 04/03/2013

Responses of Representatives of Professional Societies

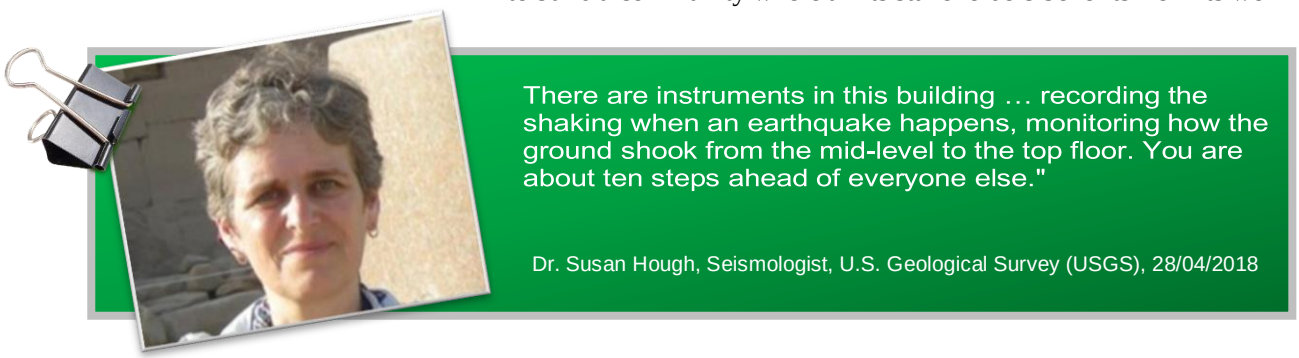
NSET's Identity and Purpose

-

By the name itself it may be inferred that NSET is an organization that works with Earthquake related technologies and science

- NSET is seen as a government agency. The thought of NSET to create earthquake safe community till 2020 is seen impossible
- NSET is involved in earthquake management rather than other disaster sectors management
- NSET is an organization that understood the risks of Nepal being in the seismic zones and took the initiative to move for this cause
- Although it is an NGO, it appears as a national body, with the way it has established authority and responsibility in the field of technology for earthquake. NSET has worked with highest level of collaboration with the government ministries and related institutions.
- It has a principle role of governing body in managing the earthquake related activities in Nepal. Discriminating (distinguishing) its work as specific and different from other disaster management initiative
- NSET, as an NGO has set as example, with its record of outstanding work in the field of Earthquake Disaster Management

The main purpose of NSET is to bring technology innovation and dissemination at community level to professionals for a better technically oriented community. At the same time NSET should work to build a community where all its stakeholders benefits from its work



NSET's Priorities (Strategic Purpose and Objectives)

- Focus on precautionary/preventive activities
- Become the leading organization in disseminating information and knowledge for creating "Preparedness" for earthquake disaster risk management
- NSET should focus more on promoting and advocating for precautionary activities/ Preventive programs- rather than reaction oriented activities and programs like rescue and relief, focus more on Pre-Disaster Management advocacy
- NSET should provide technical support to take on Precaution and Prevention activities in Nepal as an 'Expert Entity' to the government

- Creating public awareness on Earthquake Disaster Risk Management in areas that was were not directly affected by the Gorkha Earthquake
- Advocacy for constructing structurally sound buildings
- It should focus on increasing the implementation of the existing building code (many people neglect the building code when constructing their structures)
- Equally and simultaneously work towards bringing necessary changes and updates – possibly in every 2-5 years
- However this is more the responsibility of the government so NSET can provide its expertise and knowledge as support to bring the change
- Increase advocacy for the development/ review on the building code

Accolades for NSET's efforts over the years

United Nations Sasakawa Award for Disaster Reduction presented to NSET in appreciation for its outstanding contribution to disaster reduction, thereby furthering the goals of the international strategy for disaster reduction in 2001.

United Nations and International Strategy for Disaster Reduction

Research

- Focus on conducting research to support and aid the grameen sector. NSET should focus efforts on research and technology development, especially in the area of reconstruction of homes in village/rural areas.
- Research on how to make stronger houses and structures using traditional materials such as stones, mud etc.
- Bring in Donors/funds for activities that prioritize National Development Goals/ agendas-NSET should invest in researching about possible sectors that need development.

NSET received The Tech Museum Award, 2004 under the Microsoft Education Category by the Tech Museum, San Jose, California for developing the "Shake Table" for use in community education and enhancing earthquake awareness. During the event, Tech Museum President and CEO Peter Giles said, "The Tech Awards laureates are pioneering appropriate technology solutions to aid so many people, but it's the ease with which their innovations can be scaled and replicated elsewhere that will continue to truly make this world a better place," The award was set up to honor individuals and organizations that are using technology to address the 15 “most urgent” challenges facing humanity and the environment as identified by the United Nations.

Building cordial relations with the External Stakeholders

- NSET should prioritize on building partnership with the government agents and various agencies since Government's trust and support is vital for continuing the programs of NSET
- Forge good relations by highlighting the good aspects of the government rather than focusing on the weaknesses
- Prioritize and use to advantage the decentralized ministry to build synergy with them
- Build on their international relations; share Nepal's Himalayan/ Hilly region experience in international forums


State of the Azad Jammu & Kashmir, Pakistan and
United Nations Development Programme (UNDP), Pakistan
award this
Certificate of Appreciation
to
National Society for Earthquake Technology - Nepal (NSET)
for their invaluable support in capacity building for earthquake-resistant construction
at the critical time following the earthquake of 8 October 2005.

Appreciation for invaluable support in capacity building for earthquake resistant construction at a critical time following the earthquake of 8 October 2005.

State of the Azad Jammu and Kashmir, Pakistan and United Nations Development Program (UNDP), 9th March 2006

Strategic Restructuring of NSET

- Prioritize the strategic planning for the future of NSET
- Review NSET's strategic role as the implementer to guidance provider
- Focus on building sustenance: future growth and development


शिक्षा दिवस २०६२
कदर-पत्र
फाल्गुण १३, २०६२

NSET awarded by The Balpremi Secondary School on the occasion of Education Day 2006, for the Technical and Financial contribution on earthquake resistant school building construction, 2006, Balpremi Secondary School

NSET's Strengths

- NSET's good network with civil and professional societies like SCAEF
- NSET's Good/ Cordial relation with community and partner organizations
- NSET's activities and programs have a good reach within the Kathmandu valley
- NSET's years of experience has earned it good name as a credible and trust worthy organization
- NSET's experience and expertise in the field of disaster risk management
- NSET's international recognition and amiable relation with international organizations and donor/partners
- NSET's highly commended projects
- NSET's Good leadership
- Top-level management is visionary
- Well-coordinated team
- Good human resource and their optimum use results rapid /efficiency in the tasks

Certificate of Recognition to NSET Nepal for outstanding contribution and delivering of training in Earthquake Resistant Building Technology and assisting ERRA in the implementation of its overall training strategy. (May 2007)

Earthquake Reconstruction and Rehabilitation Authority (ERRA)

NSET's Weaknesses

- Lack of far stretched reach outside of the valley
- Top level management are not thinking in the level of strategic plans
- Centralized authority
- Fear of losing control of the organization- the leaders fear that without their direct involvement, the organization will lose its credibility and quality of work.
- Executives acting as Technical Experts in the field has created misbalance between the technical and managerial performance of the executive leading the project and NSET in general to suffer

- Retention of staff members
  - Unclear career path goals and security of work
  - Not only monetary incentives
  - Performance and grievance reviews
- Top-bottom organizational structure of NSET is traditional and not relevant in present context.
- NSET needs extra human resource. Management of all the HR is one of the serious concerns for NSET
- Negative impression in the professional community- people think NSET doesn't share their work and expertise
- Issues with donor partners- Some donors have trust issues with NSET while some donors have no problem with NSET.
- NSET has not been able to work at grass root level. NSET has been more of project oriented.
- Non- specialization leading to losing competitive advantage: NSET, right now is involved in all types of disaster management activities, which has caused it to lose its competitive advantage against other organization.

THE HON RICHARD MARLES MP

PARLIAMENTARY SECRETARY FOR PACIFIC ISLAND AFFAIRS
PARLIAMENTARY SECRETARY FOR FOREIGN AFFAIRS

Mr Amod Dixit
Executive Director
National Society for Earthquake Technology
Kathmandu

7 August 2012

Dear Mr Dixit,

Thank you for your time this morning during the earthquake walk and visit to Tri-Padma Higher Secondary School.

I am pleased Australia is working in partnership with the Asian Development Bank and NSET to reduce the disruption caused by natural disasters in Nepal through our Schools Sector Reform Program investment in school safety.

Australia maintains its long-standing diplomatic and aid ties with Nepal, and has more than tripled our development assistance in the last five years. In the next financial year, AusAID will invest $35 million towards education, health and governance reforms to improve the quality of life of Nepalese people.

I have very much enjoyed my visit to Nepal. Thank you again for taking the time to meet with me.

Yours sincerely,

RICHARD MARLES

Amod
what you are doing is very inspiring.
Thank you
Richard

Telephone +61 2 6277 4330 Parliament House, Canberra ACT 2600 Email: richard.marles@dfat.gov.au

Thank you letter received from The Hon Richard Marles MP, Parliamentary Secretary for Pacific Island Affairs, Parliamentary Secretary for Foreign Affairs, Parliament House, Canberra, Australia, for the recognition of our work to reduce the disruption caused by natural disasters in Nepal through School Sector Reform Program investment in School Safety of Australian Government (AusAid) and Asian Development Bank (ADB) in Nepal from The Hon Richard Marles MP, Parliamentary Secretary for Pacific Island Affairs, Parliamentary Secretary for Foreign Affairs, Parliament House, Canberra, Australia.

SEEDS

April 14, 2014

To ,

Mr. Amod Dixit,
Executive Director,
National Society for Earthquake Technology - Nepal (NSET),
Sainbu VDC, Ward Number 4,
Bhainsepati Residential Area,
Lalitpur,
Nepal

Dear Mr. Dixit,

We would like to acknowledge and express our gratitude to the National Society for Earthquake Technology - Nepal (NSET) for the excellent training imparted to volunteers and school teachers of East Delhi as Master Trainers on LSAR (Light Search and Rescue) and BEMR (Basic Emergency Medical Response), in the month of December, 2013.

The training was conducted under the project "Community Urban Risk Reduction Action- East Delhi" being implemented by SEEDS with support from UNICEF, and other partners. The training has been welcomed by the Government of Delhi. The participants were local youth volunteers, school teachers, local CBOs and members of Civil Defence. These Master Trainers would further train other volunteers from community.

I hope NSET would continue to support such projects in Delhi and other cities in India, with more such programmes in future, including refresher courses from time to time.

Thanking you,

Kind regards,

Manu Gupta
Executive Director
SEEDS

HAP 2010

NSET awarded by the SEEDS India in recognition for the excellent training imparted to volunteers and school teachers of East Delhi as Master Trainers on Light Search and Rescue (LSAR), and Basic Emergency Medical Response (BEMR).

Dr. Manu Gupta, Executive Director of SEEDS India in his remarks highlighted the importance of this training, especially in achieving the "End Rescuers" from the local communities of India and expressed his intention for conducting these types of training and advance trainings in the days to come for safer communities.

SEEDS India, 2013

Other Suggestions/ Final Thoughts

- Build good relationship with the government by highlighting their importance and the good aspects rather than focusing on their weaknesses and lacking
- Leaders at NSET have good personal relations with important government officials, they now have to focus on how it can be taken beyond individuals at institutional level
- Create a consultation committee or a sort of council (Parishad) and then a Board above it. This would increase the feeling of ownership
- Extend invitations to the board and consultation committee for critical review, which is very important for growth
- Strategic planning- give up NSET to become a part of the Government, like a unit of government
- The local government will be more receptive for including provisions for earthquake related disaster risk management activities in their agendas during the planning phase. NSET must therefore approach the local level government agencies/agents before the bureaucracy sets in
- NSET has the potential to become an internationally renowned organization for Earthquake Disaster Risk Management, if it can correctly and promptly resolve its relation-problems with its stakeholders

- NSET should be able to bring more and more work/job/activity
- There should be policy regarding appointment of top level on a tenure basis. There should be rotation of the top level
- The building made by NSET during mega earthquake should be studied

NSET- Nepal became a new International Centre of Excellence (ICoE) to join the Integrated Research on Disaster Risk (IRDR) family. The IRDR Scientific Committee (SC), on a meeting held on November 30, 2016, convened in Sanya, China unanimously approved NSET as a new ICoE.

Awarded by the Integrated Research on Disaster Risk (IRDR) as the International Centre of Excellence (ICOE) in Nepal, IRDR 2016

Earthquake Vulnerability Walk

At the request of UNDP Nepal, NSET organized an earthquake vulnerability walk in 2011 where the then UNDP Administrator Helen Clark and Crown Prince of Norway, Mr. Haakon Magnus had participated. This walk demonstrated the vulnerabilities of residential and other buildings, including those of heritage and religious significance, to the next large earthquake that would strike the region one day. Over the years, the earthquake vulnerability walk had the participation of various other personalities such as Margareta Wahlstrom, Secretariat of the United Nations Office for Disaster Reduction.

In 2011, UNDP Administrator Helen Clark and Norwegian Prince Hakoon visited Kathmandu for an 'earthquake walk' - a tour on disaster preparedness. Photo: Bikash Rauniyar/UNDP Nepal

Housing Reconstruction completed in villages
of Khalte, Dhading district

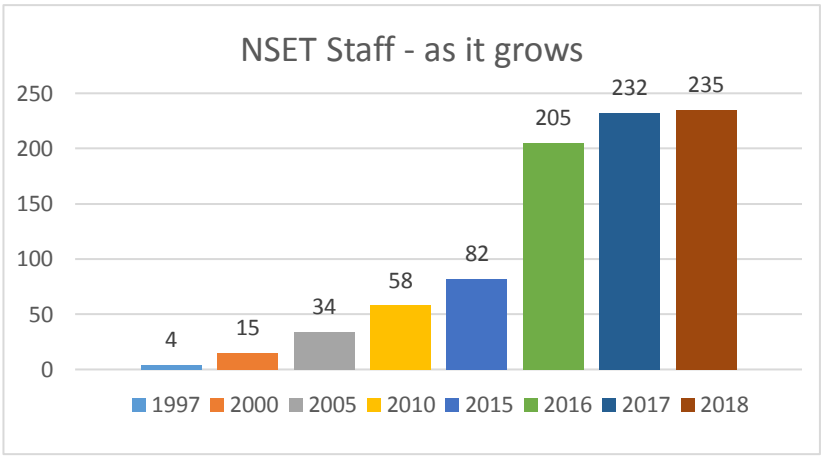
Section 6 Organizational Development

As it began, it progressed and as it progressed, it succeeded!

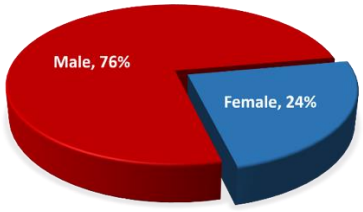
NSET is an organization that started with a few professionals with the mission of earthquake safe communities in Nepal has completed 25 years in action. June 18, 2018 marks NSET's silver jubilee. Over the years, NSET has contributed to Earthquake Risk Management and Disaster Risk Reduction spectrums at not just the national level, but also at the regional and global levels.

NSET Staff – as it grows

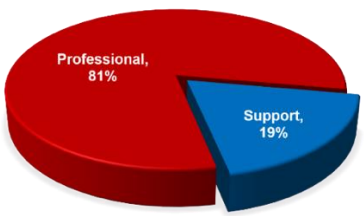
NSET has now grown significantly into one of the leading organizations with a large number of qualified professionals and with adequate physical facilities. With a total of 4 staff back in 1997, we are now 235 professionals and supporting staff who dedicatedly serve as of May 2018; various projects across the country and beyond.



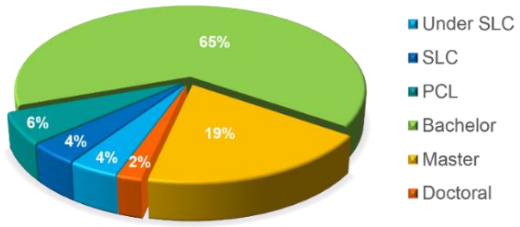
We are Hand in Hand together



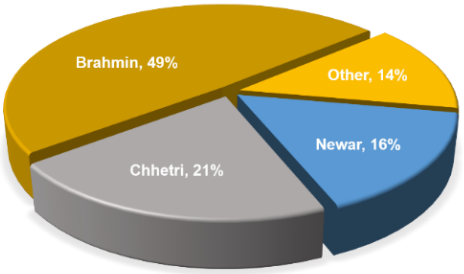
Our Staff



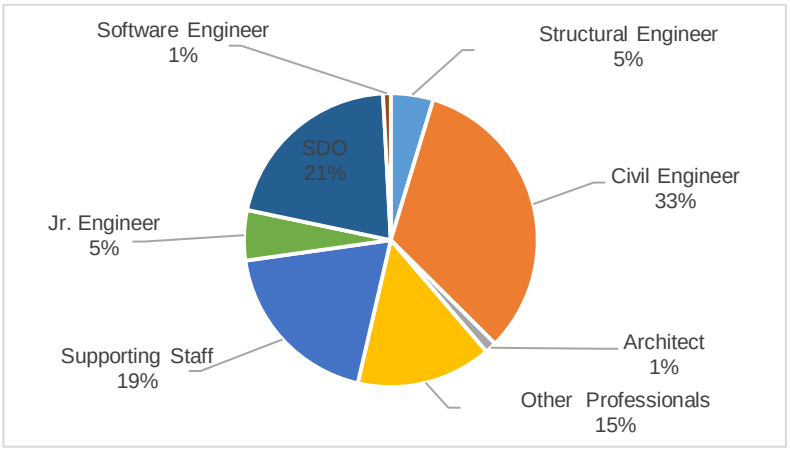
Our Level of Education



We are Nepal

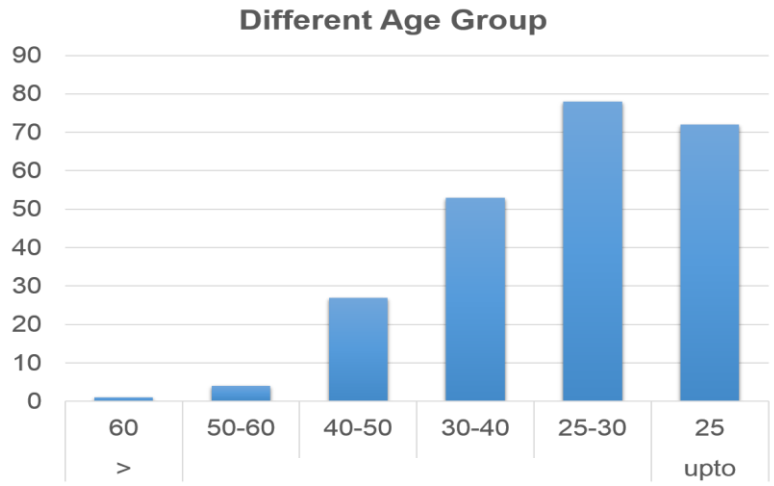


Different Professionals

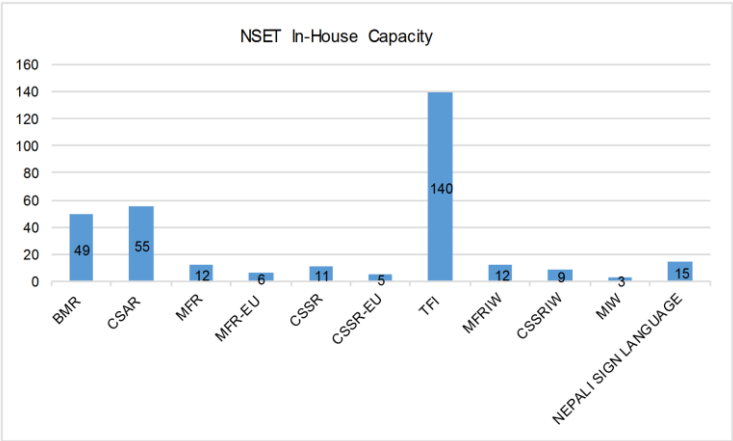


NSET staff consists of professionals from diverse backgrounds ranging from Civil Engineers, Structural Engineers, Architects, Social Development Officers (SDO) to various other professionals such as Geo-mat Engineers, Geographic Information System (GIS) Engineer and Geotechnical Engineers among others.

Different Age Group



NSET Organogram



Certificate distribution program for the staff who completed Nepali Sign Language Course

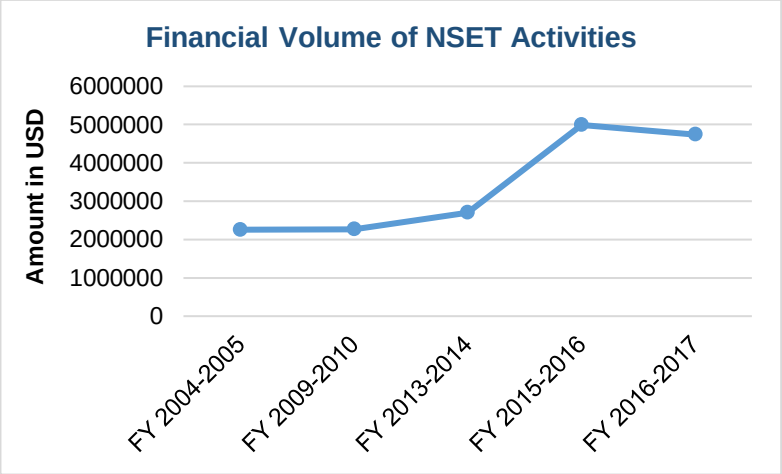
Apart from the academic and professional qualifications, NSET Staff are also trained as Emergency Responders and Qualified Instructors. These include basic lifesaving skills to advanced search and rescue trainings, social mobiliser's trainings, Instructor's trainings among others.

In January 2018, 15 NSET staff successfully completed Nepali Sign Language course. NSET provided Nepali Sign Language classes for the organization's staff with the support of National Association of the Deaf and Hard of Hearing (NADH).

NSET has always strived for being more accessible towards Persons with Disabilities (PWD). The Nepali Sign Language course completion has been an important step in that endeavor. In the future, NSET staff will not only be able to become sign language interpreters, they will also be able to deliver trainings in Nepali sign language itself. Ultimately, this will help in strengthening our mission.

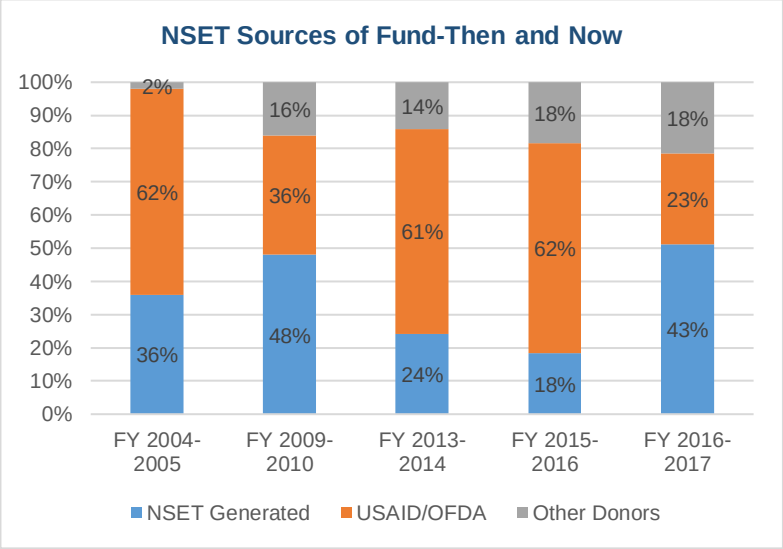
NSET Finances

The financial volume of NSET has also been increasing with the growth in the number of staff and programs. The annual turnover of around 80 thousand USD which was back in 1997 from 2.2 Million USD in 2004/2005 has now reached 4.7 Million USD. This shows tremendous growth in the financial volume of NSET.



Source of Fund then and Now

There is a gradual increase in NSET funds generated through its services in the form of building vulnerability assessment of existing buildings, orientation programs and emergency preparedness planning and drills. NSET has been prioritizing to diversify the sources of fund. It has also expanded its funding sources and now there are several key sources of funds including USAID/OFDA, project funding other bilateral agencies, and funds generated by selling technical services.



Annex 1: Income and Expenditure Statement

National Society for Earthquake Technology - Nepal
Income and Expenditure Statement
for period July 16, 2016 to July 15, 2017

Particulars	Schedule	NSET Nepal	PEER IV/USAID	Buliyo Ghar (IRTAP)	RCIPN/USAID	PLAN	HRRP	Sakura Net	UNICEF	3 PERM/USAID	PEER III/USAID	Shapla Neer	Total	Previous Year (2015/16)
Income		NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs
Grant Income		13,964,144.05	56,212,800.52	263,173,658.93	46,371,704.71	11,659,616.48	3,553,884.00	6,237,937.38	19,504,701.00	2,822,275.27	-	-	423,500,722.34	420,397,073.82
Contribution towards awarness programs and trainings		2,600,525.07	-	-	-	-	-	-	-	-	-	-	2,600,525.07	10,892,113.36
Contribution towards Earthquake Safety Day		954,488.00	-	-	-	-	-	-	-	-	-	-	954,488.00	173,000.00
Contribution towards GO Bag/ HH LSAR Kit		382,101.00	-	-	-	-	-	-	-	-	-	-	382,101.00	872,174.50
Donor's Contribution towards overheads		86,098,953.07	-	93,946.46	-	-	-	-	-	-	-	-	86,192,899.53	72,507,772.66
Total Income		104,000,211.19	56,212,800.52	263,267,605.39	46,371,704.71	11,659,616.48	3,553,884.00	6,237,937.38	19,504,701.00	2,822,275.27	-	-	513,630,735.94	504,842,134.34
Expenses														
Administrative Expenses	V	96,242,172.25	51,887,591.13	175,352,542.45	39,578,066.22	10,276,076.42	3,263,970.33	1,519,782.82	10,221,839.00	-	-	-	388,342,040.62	303,015,196.35
SESP related expenses	VI	253,906.50	-	-	-	-	-	-	-	-	-	-	253,906.50	513,575.16
Event Expenses	VII	2,729,798.40	-	-	-	-	-	-	-	-	-	-	2,729,798.40	379,411.08
Workshop/Training/Seminar and other program costs	VIII	2,858,961.89	21,091,212.95	47,830,335.46	9,893,150.56	4,453,420.74	-	493,413.97	8,842,718.37	-	-	-	95,463,213.94	149,713,330.16
Travel Expenses	IX	6,083,734.08	488,424.81	1,077,715.30	3,650,192.33	1,050,811.99	135,501.32	-	440,143.63	-	-	-	12,926,523.47	18,495,665.40
Public Awareness	X	450,000.00	-	13,373,165.75	-	-	-	-	-	-	-	-	13,823,165.75	29,420,978.65
Exchange (Gain)/Loss		407,043.68	(106,996.52)	-	96,963.58	-	-	-	-	-	-	-	397,010.73	(1,706,857.76)
Total Expenditure		109,025,616.80	73,360,232.37	237,633,758.96	53,218,372.69	15,780,309.15	3,399,471.65	2,013,196.79	19,504,701.00	-	-	-	513,935,659.41	499,831,299.04
Excess of Income Over Expenditure		(5,025,405.61)	(17,147,431.85)	25,633,846.43	(6,846,667.98)	(4,120,692.67)	154,412.35	4,224,740.59	-	2,822,275.27	-	-	(304,923.47)	5,010,835.30
Opening Balance		103,698,900.14	2,871,677.38	10,637,611.72	(2,734,725.71)	7,321,316.33	-			(2,822,275.27)	24,666.37	321,970.61	119,319,141.60	119,292,218.38
Refund to donor		(436,007.46)				(2,847,407.76)				-		(321,970.61)	(3,605,385.83)	(3,889,043.37)
Foreign Exchange Translation Gain/ (Loss)		-	391,657.43	-	286,429.07	-	-			-	(24,666.37)	-	653,420.13	(1,094,868.71)
Balance of funds as on July 15, 2017		98,237,487.06	(13,884,097.04)	36,271,458.15	(9,294,964.63)	353,215.90	154,412.35	4,224,740.59	-	-	-	-	116,062,252.43	119,319,141.60

Significant accounting policies and other explanatory notes — XI

As per our report of even date

Amod Mani Dixit
General Secretary

Varun Prasad Shrestha
President

Yogeshwar K. Parajuli
Treasurer

Tika Sharma
Finance Director

Madan Krishna Sharma
Partner
CSC & Co.
Chartered Accountants

Date: Oct 17, 2017
Place: Kathmandu

Annex 1: Balance Sheet

National Society for Earthquake Technology - Nepal

Balance Sheet
As at July 15, 2017

Particulars	Schedule	As at July 15, 2017 NRs	As at July 15, 2016 NRs
Assets			
Fixed Assets	I	50,723,151.81	51,841,787.79
Receivables	II	70,812,888.56	51,798,262.54
Cash & Cash Equivalents	III	45,196,071.35	51,972,892.32
Total Assets		**166,732,111.72**	**155,612,942.65**
Liabilities			
Current Liabilities	IV	50,669,859.29	36,293,801.05
General Fund			
Opening Balance		119,319,141.60	119,292,218.38
Excess of Income Over Expenditure during the year		(304,923.47)	5,010,835.30
Exchange Fluctuation Gain/ (Loss)		653,420.13	(1,094,868.71)
Refund to Donor		(3,605,385.83)	(3,889,043.37)
Closing Balance		**116,062,252.43**	**119,319,141.60**
Total Liabilities		**166,732,111.72**	**155,612,942.65**

Significant accounting policies and other explanatory notes XI

As per our report of even date

CSC & Co Kathmandu Chartered Accountants

Amod Mani Dixit
General Secretary

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President

Yogeshwar K. Parajuli
Treasurer

Madan Krishna Sharma
Partner
CSC & Co.
Chartered Accountants

Tika Sharma
Finance Director

NATIONAL SOCIETY FOR EARTHQUAKE TECHNOLOGY NEPAL NSET NEPAL 1994 NSET

Date: Oct 17, 2017
Place: Kathmandu

Annex 2: Executive Committee

Mr. Varun Prasad Shrestha
President

Dr. Amod Mani Dixit
General Secretary

Mr. Yogeshwor K. Parajuli
Treasurer

Mr. Shreeram S. Basnet
Executive Member

Mr. Surya Narayan Shrestha
Executive Member

Mr. Manohar Rajbhandari
Executive Member

Mr. Tika Sharma
Executive Member

Dr. Ramesh Guragain
Executive Member

Annex 3: Institutions that helped us grow through collaboration and support

National

- Armed Police Force (APF)
- Bhaktapur Sub-Metropolitan City
- Department of Education (DoE)/(Center for Education and Human Ressource Development)
- Curriculum Development Center (CDC)
- Department of Archeology (DoA)
- Department of Mines and Geology
- Department of Urban Development and Building Construction
- Disaster Management Committee, Alapot
- Disaster Management Committee, Ward No.12, Lalitpur Sub Metropolitan City
- Disaster Management Committee, Ward No. 18, Kathmandu Metropolitan City
- Disaster Preparedness Network (DPNet), Nepal
- Diploma Engineers' Association, Nepal
- Federation of Contactors' Associations of Nepal (FCAN)
- Federation of Nepalese Chamber of Commerce and Industries (FNCCI)
- Heavy Equipment Association Nepal (HEAN)
- Hotel Association of Nepal (HAN)
- Institute of Engineering, Tribhuvan University
- Institute of Medicine, Tribhuvan University
- Initiative Outdoor (IO), Nepal
- Kathmandu Valley Development Authority (KVDA)
- Kathmandu University
- Kirtipur Women's' Network
- Lalitpur Metropolitan City
- Lumanti Support Group for Shelter
- Ministry of Education, Science and Technology
- Ministry of Health
- Ministry of Home Affairs (MoHA)
- Ministry of Federal Affairs and Local Development (MoFALD)
- Ministry of Environment, Science and Technology
- Ministry of Physical Infrastructure & Transport (MoPIT)
- Ministry of Urban Development (MoUD)
- Ministry of Women, Children and Social Welfare
- Municipalities of Kathmandu Valley and other districts
- National Disaster Management Network of Nepal (DiMaNN)
- National Network of Women for Community Resilience
- Nepal Academy of Fine Arts (NAFA)
- Nepal Amateur Radio Operators' Society (NAROS)
- Nepalese Army (NA)
- Nepal Association of Tour and Travel Agent (NATTA)
- Nepal Bankers' Association (NBA)
- Nepal Bureau of Standards and Metrology
- Nepal Engineering Council (NEC)
- Nepal Engineers Association (NEA)
- Nepal Forum for Environmental Journalists (NFEJ)
- Nepal Geological Society (NGS)
- Nepal Red Cross Society (NRCS)
- Nepal Mediciti Hospital
- Nepal Police (NP)
- Nepal Telecommunications Authority (NTA)
- Nepal Tourism Board (NTB)
- Nepal USA Chamber of Commerce and Industry (NUSACCI)
- National Police Academy
- Rotary Club, Bhainsepati
- Sakha & Co. Private Limited
- Shivam Cement Private limited
- Social Welfare Council
- Society of Consulting Architectural and Engineering Firms
- Society of Nepalese Architects

- Disaster Management Committee, Ward No.12, Lalitpur Sub Metropolitan City
- Bhaise, Bagmati Gaupalika- 3, Lalitpur
- Society for Urban Poor (SOUP)
- Shaplaneer
- Forum for Awareness and Youth Activity, Nepal (FAYA) Kailai
- Ratanchura VDC (Golonjor Gaupalika-5) sindhuli
- Jhagajholi Ratmata VDC (Sunkoshi Gaupalika 3,4) Sindhuli
- Katunjebeshi VDC (Roshi Gaupalika 7) Kabhre
- Banepa Municipality, Kabhre
- Dhangadhi Sub-Metropolitan City
- Bhimdutta Municipality
- Nepalgunga Metropolitan City
- Thankot Women's Cooperative Network
- Karnali Integrated Rural Development and Research Center (KIRDARC)
- Nepal Mediciti Hospital
- Nawa Prabhat Nepal
- Suryabinayak Municipality
- Architects Sans Frontiers Nepal
- Institute for Social and Environmental Transition-Nepal (ISET)
- JICA Nepal
- Earthquake Safety Solutions
- Three H Management

Media Partners

- All Three Media Ghar, Ktm
- Bhimeshwor FM, Dolakha
- Bulbule FM, Surkhet
- Dinesh FM, Kailali
- Hamro Radio, Dolakha
- Kalinchowk FM, Dolakha
- Media Helpline, Ktm
- Mero FM, Ktm
- Nuwakot FM, Nuwakot
- Radio Audio, Ktm
- Radio Bihani, Dhading
- Radio Dhading, Dhading
- Radio Jalapa, Nuwakot
- Radio Janasanchar FM, Bhaktapur
- Radio Krishnasar FM, Banke
- Radio Sagarmatha 102.4MHz, Ktm
- Radio Trishuli, Nuwakot
- Sailung FM, Dolakha
- Saptakoshi FM, Sunsari
- Ujyalo 90 Network, Ktm
- Vijaya FM, Nawalparasi
- Watch Dog Media

International

- Action Aid International Nepal
- All India Institute of Hygiene & Public Health (AIIH&PH), India
- Ambulance 118, Indonesia
- American Heart Association
- American Red Cross
- American Society of Nepalese Engineers
- Amity Public Safety Academy of Philippines
- Asian Development Bank (ADB)
- Asian Disaster Preparedness Center (ADPC)
- Asian Disaster Reduction Center (ADRC)
- Asian Disaster Reduction and Response Network (ADRRN)
- Asian Seismological Commission
- Alliance for Adaptation & Disaster Risk Reduction, India
- Badan Koordinasi National of Indonesia
- Badan Search and Rescue National of Indonesia
- Bangladesh Disaster Preparedness Centre
- Global Network of Civil Society Organisations for Disaster Reduction (GNDR)
- Bangladesh Red Cresent Society (BDRC)
- Beijing Normal University, China
- Boarder Security Force of India
- Building Research Institute of Japan
- CAN-USA
- Central Reserve Police Force , India
- Central Industrial Security Force, CISF, India
- Chittagong University of Engineering & Technology (CUET)
- Christian Aid-UK
- Commissioner ate of Health & Medical Services, Gujarat, India

- Center for Participatory Research and Development, Bangladesh
- Crown Agents, UK
- Danish Cultural Institute, Denmark
- Directorate General of Health Services (DGHS), Bangladesh
- Disaster Management Bureau of Bangladesh
- Disaster Prevention Research Institute DPRI/Kyoto University
- Durham University, Institute of Hazard, Risk and Resilience (IHRR)
- Earthquake and Megacities Initiatives (EMI)
- Earthquake Engineering and Research Institute
- Emergency Rescue Unit Foundation of Philippines
- Emergency Medical Relief (EMR)/ Directorate of Health Services, New Delhi, India
- Earthquake Reconstruction and Rehabilitation Authority (ERRA), Pakistan
- European Center of Training and Research in Earthquake Engineering (EUCENTRE), Italy
- EHIME University, Japan
- Fire National Training Institute of Philippines
- Fire Service and Civil Defense Directorate of Bangladesh
- Focus Humanitarian Assistance, Pakistan
- GeoHazards International
- Give2Asia
- Global Earthquake Model (GEM) Foundation, Italy
- Global Network of Civil Society Organizations for disaster Reduction (GNDR)
- Graduate Research Institute for Policy Studies (GRIPS) of Japan
- Handicap International
- Indian Tibetan Boarder Police (ITBP), India
- Indian Medical Association, (IMA), India
- Indonesian Red Cross
- Institute of Mountain Hazards and Environment, Chengdu
- Integrated Research on Disaster Risk (IRDR)
- International Association of Earthquake Engineering
- International Centre Integrated Mountain Development
- International Federation of Red Cross Crescent Societies (IFRC)
- International Resources Group
- Janathaksan, Sri Lanka
- Jakarta Fire Services, Indonesia
- Japanese International Cooperation Agency
- Jawaharlal Institute of Post Graduates Medical Education & Research (JIPMER), India
- Johns Hopkins University - Center for International Emergency, Disaster, and Refugee Studies
- Karlsruhe Institute of Technology (KIT)
- Kunming University, China
- Lutheran World Federation
- MERCY Malaysia
- Mercy Corps, Nepal
- Ministry of Food and Disaster Management, Bangladesh
- Ministry of Health and Family Welfare, Bangladesh
- Ministry of Health, Indonesia
- Ministry of Home Affairs, India
- National Disaster Management Authority of Pakistan
- National Disaster Coordinating Council of the Philippines
- National Disaster Response Force (NDRF), India
- National Health Emergency Preparedness and Response Network (NHEPRN), Pakistan
- National Industrial Security Academy of India
- Nat'l Institute of Preventive and Social Medicine of Bangladesh
- National Research Institute for Earth Science and Disaster Prevention of Japan
- Network of Disaster Management Practitioners (NDMP), Pakistan
- New Zealand Society for Earthquake Engineering
- OGS, Istituto Nazionale di Oceanografia e Geofisica Sperimentale (National Institute of Oceanography and Applied Geophysics)
- Oxfam GB Nepal
- Pakistan Red Crescent
- Plan Nepal
- Practical Action, Nepal
- Philippines General Hospital
- Punjab Emergency Services, Rescue 1122, Pakistan
- Reynolds Geo-Sciences Limited, UK
- SAARC Disaster Management Center, SDMC

- Safety Solutions Incorporated, USA
- Save the Children
- Sustainable Environment and Ecological Development Society (SEEDS/India)
- Shanti Volunteer Association
- The International Institute for Geo-Information Science and Earth Observation (ITC)
- The World Bank
- United Mission to Nepal
- United Nations Center for Regional Development - Disaster Management Planning Hyogo Office
- United Nations Development Programme, Geneva, Pakistan, India, Nepal, China, Thailand offices)
- United Nations International Strategy for Disaster Reduction (UNISDR)
- United Nations Educational, Scientific and Cultural Organization
- United Nations International Children's Emergency Fund (UNICEF)
- United Nations World Food Programme (WFP)
- University of Basilicata, Potenza, Italy
- University of Sapienza, Rome, Italy
- University of Durham
- United Nations Human Settlements Programme (UN-Habitat)
- U.S. Office of Foreign Disaster Assistance (USAID/OFDA)
- World Health Organization
- World Seismic Safety Initiatives (WSSI)

BCIPN & TSBCIN Municipalities & Central Government

- Phidim Municipality, Panchthar
- Dhankuta Municipality, Dhankuta
- Damak Municipality, Jhapa
- Dharan Sub-Metropolitan City, Sunsari
- Itahari Sub-Metropolitan City, Sunsari
- Janakpur Sub-Metropolitan City, Dhanusha
- Mithila Municipality, Dhanusha
- Bardibas Municipality, Mahottari
- Kamal Rural Municipality, Jhapa
- Lalitpur Metropolitan City
- Manthali Municipality, Ramechhap
- Bhimeshwor Municipality, Dolakha
- Bharatpur Metropolitan City, Chitwan
- Vyas Municpiality, Tanahun
- Shuklagandaki Municipality, Tanahun
- Gorkha Municipality, Gorkha
- Baglung Municipality, Baglung
- Gaindakot Municipality, Nawalparasi
- Kawasoti Municipality, Nawalparasi
- Bardaghat Municipality, Nawalparasi
- Sainamaina Municipality, Rupandehi
- Nepalgunj Sub Metropolitan City, Banke
- Kohalpur Municipality, Banke
- Ghorahi Municipality, Dang
- Narayan Municipality, Dailekh
- Birendranagar Municipality, Surkhet
- Bheriganga Municipality, Surkhet
- Dhangadhi Sub Metropolitan City, Kailali
- Godawari Municipality, Kailali
- Bhadrapur Municipality, Jhapa
- Birtamod Municipality, Jhapa
- Inaruwa Municipality, Sunsari
- Triyuga Municipality, Udaypur
- Biratnagar Metropolitan City, Morang
- Khandbari Municipality, Sankhuwasabha
- Karyabinayak Municipality, Lalitpur
- Hetauda Sub Metropolitan City, Makwanpur
- Kamalamai Municipality, Udaypur
- Putalibazar Municipality, Syangja
- Besishahar Municipality, Lamjung
- Tansen Municipality, Palpa
- Siddharthanagar Municipality, Bhairahawa
- Butwal Sub-Metropolitan City, Rupandehi
- Guleriya Municipality, Bardiya
- Tulsipur Municipality, Dang
- Amargadhi Municipality, Dadeldhura
- Shuklaphata Municipality, Kanchanpur

Academia

- Adarsha Aajad HSS, Bhelukhel, Bhaktapur
- Adarsa SS Layaku, Bhaktapur
- Bagehini LSS, Bageshwori, Bhaktapur
- Bairabi LSS,Gundu,Bhaktapur
- Balbhusan LSS,Jhhaukhel,Bhaktapur
- Balmikeshwor LSS,Sudal,Bhaktapur

- Balpremi SS, Bhaktapur
- Balsewa LSS, Kundol, Bhaktapur
- Balsewak LSS,Bhaktapur
- Bharati PS, Bhaktapur
- Bidhayarthiniketan SS, Bhaktapur
- Bode HSS, Madhyapur Thimi Bhaktapur
- Chunadevi LSS Nagarkot, Bhaktapur
- Deujagaun PS,Chitapol,Bhaktapur
- Devi Higher Secondary School, Bhaktapur
- Ganesh LSS, Bhaktapur
- Ganesh SS,Bhaktapur
- Ganesh SS,Bhaktapur
- Janaksiddhikali SS, Bhaktapur
- Jorpati LSS, Sanga, Bhaktpaur
- Kalika SS, Bhaktapur
- Kanya SS, Bhaktapur
- Kulmayabhagawati LSS, Bhaktapur
- Mahendra LSS, Sanothimi,Bhaktapur
- Mahendra PS, Bhaktapur
- Mahendragram SS,Sudal,Bhaktapur
- Manohara LSS Duwakot,Bhaktapur
- Nagarkot PS,Nagarkot,Bhaktapur
- Padma High School, Durbar Square Bhaktapur
- Santiniketan SS, Sipadol,Bhaktapur
- Saraswatividyagrih SS,Bhaktapur
- Shree PS, Bhaktapur
- Tara SS, Bhaktapur
- Yapibhairab LSS, Jhaukhel,Bhaktapur
- Aadinath SS, Chovar Kathmandu
- Adarsha HSS, Bhadrabas,Kathmandu
- Amar Jyoti SS,Syuchatar, Kathmandu
- Arunodaya HSS, Pharping,Kathmandu
- Arunodaya SS,Jorpati, Kathmandu
- Bagh Bhairab SS, Kirtipur
- Bal Bikash Secondary School, Aalapot
- Bal Jyoti Lower Secondary School Kathmandu
- Bal Sudhar SS,Nayapati, Kathmandu
- Bal Uddhar SS,Gagalfedi-1,Kathmandu
- Balambu SS Balambu,Kathmandu
- Balpeeth LSS,Sinamangal,Kathmandu
- Bhagwati SS Sankhu, Kathmandu Kathmandu
- Bhagyodaya SS,Sankhu, Kathmandu
- Bheem SSBaadbhanjyang-3, Kathmandu
- Bidhyamandir SS,Purano Naikap,Kathmandu
- Bijaya Memorial HSS Kalikasthan-32,Kathmandu
- Bishnu Devi Shikshya Sadan SS,Satungal, Kathmandu
- Central School for Deaf Naxal, Kathmandu
- Chalnakhel LSS,Chalnakhel,Kathmandu
- Champadevi SS, Bosan, Kathmandu
- Chandibhairav SS, Badbhanjyang,Kathmandu
- Chandika Devi SS, Baadbhanjyang, Kathmandu
- ChhampashikharLSS,Badbhanjyang, Kathmandu
- Devi Bal Sudhar SS, Baluwa-1,Kathmandu
- Dollu PS, Sheshnarayan,Pharping, Kathmandu
- Ghyampedevi LSS, Chhaimale,Kathmandu
- Gokarna SS, Gokarna-8, Kathmandu
- Gram Sewa HSS,Dharmasthali,Kathmandu
- Gyanodaya SS,Bafal-13, Kathmandu
- Janakalyan SS,Mahadevsthan-2, Kathmandu
- Janaprabhat SS, Kalimati,Kathmandu
- Janbikash SS ,Matatirtha,Kathmandu
- Jitpur HSS, Jitpurphedi,Kathmandu
- Kalidevi HSS, Kavresthali,Kathmandu
- Kalidevi LSS ,Talku,Dudechaur-9,Kathmandu
- Kalika Sharan SS,Jitpurphedi,Kathmandu
- Kalikasaran HSS,Lapsephedi, Kathmandu
- Kamdhenu HSS,Setidevi,Kathmandu
- Kankali SS, Purano Naikap, Kathmandu
- Kantibhairaw SS, Danchi, Kathmandu
- Kanya Mandir SS, Nyoukha,Kathmandu
- Khokanajan SS,Setidevi,Kathmandu
- Mahalaxmi LSS,Matatirtha,Kathmandu
- Mahankal Janajagrit SS,Golfutar,Kathmandu
- Mahendra Sarswoti Sewa LSS Teku, Kathmandu
- Mangal SS Naikap,Kathmandu
- Mangal SS,Kirtipur,Kathmandu
- Mangalodaya SS,Thankot, Kathmandu
- Maniligeshowr SS, Gagalfedi-3, Kathmandu
- Nabingram Shikhya Mandir SS, Nanlebhare, Kathmandu
- Nagarjun SS Goldhunga, Kathmandu
- Nagarjun Thulagaun SS, Jitpurphedi Kathmandu
- Pancha Kanya SS, Budhanilkantha Kathmandu
- Pashupati Mitra SS, Chabahil, Kathmandu

- Phutung SS Phutung, Kathmandu
- Prabhat SS Thankot Kathmandu
- Prithvi Narayan HSS Goldhunga Kathmandu
- Purano Guheshwari SS,Goldhunga Kathmandu
- Rastriya HSS, Indrayani, Kathmandu
- Sarswati HSS,Tokha, Kathmandu
- Seti Devi SS Sokhel, Setidevi Kathmandu
- Setidevi SS Daurechaur, Pharping Kathmandu
- Shanti Nikunja SS Bhagwatibari, Kathmandu
- Shivapuri HSS Maharajgunj, Kathmandu
- Shree Ram LSS, Budhanilkantha, Kathmandu
- Shreekrishna SS,Dahachowk, Kathmandu
- Siddhi Ganesh SS, Sorhakhutte, Kathmandu
- Siddhi Ganesh SS, Gagalfedi-2, Kathmandu
- Sitaram Higher SS, Ramkot-4 Dandapauwa Kathmandu
- Tilingatar HSS, Dhapasi, Kathmandu
- Vidhya Mandir SS,Naikap,Kathmandu
- Adarsha Kanya Niketan HSS, Mangal bazar Lalitpur
- Adarsha Soul yuwak HSS, Bungamati Lalitpur
- Bageswari PS, Chapagaun, Lalitpur
- Bajrabarahi HSS, Chapagaun, Lalitpur
- Bal Binod SS Natol, Lalitpur
- Baleswari SS,Bhardeu, Lalitpur
- Balkel kumari PS,Bungamati, Lalitpur Balkumari HSS, Sunakothi, Lalitpur
- Balodaya PS,Dhapakhel, Lalitpur
- Bhimsen Adarsh SS, Devichaur, Lalitpur
- Bigyanprava LSS, Ikudol, Lalitpur
- Bramhayani PS, Thecho, Lalitpur
- Chhampidevi HSS, Chhampi, Lalitpur
- Choinabina Guruganesh LSS, Lohachok Lalitpur
- Gambhir Samundra setu HSS, Imadol Lalitpur
- Ghusel SS,Ghusel,Lalitpur
- Gothbhanjyan HSS,Dalchoki,Lalitpur
- Kitini HSS,Godawari, Lalitpur
- Lalitkalyan LSS,Bholdhoka, Lalitpur
- Magargaun HSS,Shankhu, Lalitpur
- Mahalaxmi HSS,Lubhu, Lalitpur
- Mahakal HSS, Gotikhel,Lalitpur
- Mahendra Adarsha HSS, Imadol, Lalitpur
- Mahendra Bhrikuti SS, Ekantakuna, Lalitpur
- Namunamachhindra HSS, Lagankhel, Lalitpur
- Navajyoti LSS, Jharuwarasi, Lalitpur
- Phulchoki HSS, Thaiba, Lalitpur
- Prabhat HSS,Tyagal, Lalitpur
- Saraswati HSS, Lele, Lalitpur
- Saraswati HSS, Thecho, Lalitpur
- Shanti Bidhyashram HSS,Lontha, Lalitpur
- Shramajeet Kishor SS, Lukhusi,Lalitpur
- Shramik Shanti HSS,Chyasal,Lalitpur
- Shringeri SS, Lamatar,Lalitpur
- Sisneri HSS, Lamatar,Lalitpur
- Balakharka SS, Chapagaun,Lalitpur
- Yasodhara Bauddha SS,Thaina,Lalitpur
- Yubaprativa SS,Khokana,Lalitpur
- Himalaya SS, New Road, Kathmandu
- Shree Janajagriti SS, Kapan, Kathmandu
- Janasudhar LSS,Swoyambhu, Kathmandu
- Mahendra Bouddha HSS,Bouddha, Kathmandu
- Nepal Yubak SS, Paknajol, Kathmandu
- Panchakanya LSS, Chhauni, Kathmandu
- Tarun HSS, Balaju, Kathmandu
- Ishwori LSS, Sundarijal, Kathamndu
- Manmaiju SS, Tarkeshwor-19, Kathmandu
- Shree Halchowk SS,Halchowk, Kathmandu
- Shree Taudaha Rastriya HSS, Kathmandu
- Gramsewa HSS,Tarkeshwor-13, Kathmandu
- Shree Bhimdev PS, Gokarneshwor, Kathmandu
- Padma Kanya HSS, Dillibazzar, Kathmandu
- Mahalakshmi Lower Secondary School Kathmandu
- Nepal Aadarsha SS Ganabahal, Kathmandu
- Panchakanya SS, Budhanilkantha, Kathmandu
- Tangal SS, Tangal, Kathmandu
- Thapa Danda LSS, Bhadrabas, Kathmandu
- Shree Mahankal Janajagrit HSS, Budhanilkantha, Kathmandu
- Shitala Higher SS, KMC-16, Kathamdnu
- Dhapasi LSS, Tokha-7, Kathmandu
- Shree Gram Shikshya Mandir HSS, Budhanilkantha, Kathamdnu
- Gandhi Aadarsha SS, Manohara, Kathmandu
- Mansingh Dharma HSS, Tarkeshwor-20, Kathamdnu
- Shree Janakalyan HSS,Budhanilkantha-6, Kathmandu

- Prithvi Narayan HSS Tarkeshwor-10, Kathmandu
- Bansbari HSS, Bansbari, Kathmandu
- Nilbarahi SS Tankeshwor, Kathmandu
- Shiva Puri HSS Maharajgunj, Kathmandu
- Nepal Charter PS,Budhanilkantha-12, Kathmandu
- Chamunda SS,Jorpati, Kathmandu
- Balkumari SS,Budhanilkantha-14, Kathmandu
- Vaishnavi SS Kirtipur, Kathmandu
- Shree Sanglabalkumari SS Tarkeshwor-2, Kathmandu
- Shree Jaya Bhadrakali LSS Budhanilkantha-1, Kathmandu
- Shree Ganesh HSS Chapali, Kathmandu
- Rastriya LSS Kirtipur, Kathmandu
- Shree Balkumari SS Kirtipur, Kathmandu
- Baundeswar HSS, Kathamandu
- Yagyamati SS, Budhanilkantha, Kathmandu
- Pokharichaur PS, Nanglebhare, Kathmandu
- Janajagriti Gyan Rashmi SS KMC-16, Kathamandu
- Bhanu SS, Ranipokhari, Kathmandu
- Padmodaya HSS, Putalisadak, Kathmandu
- Shree Nagarjun Thulagaun HS, Jeetpurphedi, Kathmandu
- Shree Adarsha HSS, Bhadrabas, Kathmandu
- Shree Balbyawasayi Kendra SS, Sifal, Kathmandu
- Nagarkot LSS, Kharipati, Bhaktpur
- Panchakanya SS, Sudal, Bhaktpur
- Bagiswori HSS, Bageshwori, Bhaktpur
- Samaj Sudhar SS, Dolachhen, Bhaktapur
- Doleshwor LSS, Suryabinayak, Bhaktpur
- Vidyarthi Niketan SS Durbarsquare, Bhaktpur
- Adarsha SS Madhyapur, Bhaktpur
- Changunarayan HSS Changunarayan, Bhaktpur
- Nabin LSS Golmadhi, Bhaktpur
- Sirutar SS Ananta Lingeshwor, Bhaktapur
- Shree Sharada PS Balakhu, Bhaktpur
- Bode HSS Bode, Bhaktpur
- Ram LSS Nankhel, Bhaktpur
- Shree Padma HSS Durbarchhetra, Bhaktpur
- Devi HSS Devi Chaur, Lalitpur
- Buddha SS Chhampi, Lalitpur
- Aadarsha Saul HSS Sainbu, Lalitpur
- Mahalakshmi LSS, Nakhipot, Lalitpur
- Susta Manasthiti Kalyan Vidyalaya Bungmati, Lalitpur
- Shree Saraswati LSS Lele, Lalitpur
- Shree Basuki SS Lubhu, Lalitpur
- Shree Gothvanjyang HSS Dalchoki, Lalitpur
- Shree Mahakali Devi HSS Bhattedanda, Lalitpur
- Bhatte Danda LSS Bhattedanda, Lalitpur
- Kitini HSS Godawari, Lalitpur
- Shree Buddha Higher Secondary School Badegaun, Lalitpur
- Chapakharka PS Bisankhunarayan, Lalitpur
- Shree Janak Secondary School Gimdi, Lalitpur
- Shree Manakamana SS, Gimdi, Lalitpur
- Shree Bagh Bhairab PS, Kaleshwor, Lalitpur
- Shree Guru LSS, Bukhel-1, Lalitpur
- Shree Kali Seti Devi LSS,Bukhel-7, Lalitpur
- Shree Gumrang LSS, huladhurlung, Lalitpur
- Shree Kalidevi Higher Secondary School Malta, Lalitpur
- Shree Krishna LSS Bishankhunarayan, Lalitpur
- Shree Janajagriti HSS Ikudol, Lalitpur
- Gokarna SS, Gokarneshwor Muncipality, Kathmandu
- Magargaun HSS (Integrated resource school) Shankhu, Lalitpur
- Shree Bhimeshwor Bahira PS (Integrated resource school) Bhimeshwor Municipality, Dolakha
- Shree Sitka SS, Sunkhani, Dolakha
- Shree Nabin SS, Bhushapheda, Dolakha
- Indreshwori HSS (Integrated School), Melamchi, Sindhupalchwok
- Shree Shipa-Tindhara SS, Bhotshipa VDC Ward No4, Sindhupalchwok
- Shree Hira-Devi LSS, Sikharpur, Sindhupalchwok
- Shanti Bahira and Sustha Srawan School (Integrated Resource School) Hetauda Municipality 7, Makwanpur
- Gitawora LSS, Chhatiwan VDC Ward No. 8, Makwanpur
- Navajyoti Lower Secondary Deaf School, Kamalmai Municipality Ward No 6, Sindhuli
- Gaurishankar HSS, Mahadevstahn VDC Ward No 5, Sindhuli

- Kadambari Memorial College of Science and Management, Kathmandu
- Chandra Nayan Basic School, Dangsing, Tarkeshwor Rural Municipality, Nuwakot
- Sundaradevi SS, Tadi Rural Municipality, Nuwakot
- Rukmani HSS, Dupcheswor Rural Municipality, Nuwakot
- Saraswati SS, Dupcheswor Rural Municipality, Nuwakot
- Kaukeshwori SS, Dupcheswor Rural Municipality, Nuwakot
- Birendra SS, Dupcheswor Rural Municipality, Nuwakot
- Bachala SS, Dupcheswor Rural Municipality, Nuwakot
- Dupcheswor SS, Dupcheswor Rural Municipality, Nuwakot
- Ghyangphedi SS, Dupcheswor Rural Municipality, Nuwakot

Abbreviations

AAN	Action Aid Nepal
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Centre
ADRC	Asian Disaster Reduction Centre
ADRRN	Asian Disaster Reduction and Response Network
APIP	Action Plan Implementation Project
AusAID	Australian Agency for International Development
BCPR	Bureau of Crisis Prevention and Discovery
BCIPN	Building Code Implementation Program in Nepal
BDPC	Bangladesh Disaster Preparedness Centre
BEMR	Basic Emergency Medical Response
BPKIHS	B.P. Koirala Institute of Health Sciences
BRI/Japan	Building Research Institute/Japan
BTRTC	Building Technology Research and Training Centre
BTT	Basic Technical Training
CAN-USA	Computer Association of Nepal-USA
CBDMP	Community Based Disaster Management Program
CBKMP	Capacity Building and Knowledge Management Program
CBOS	Community Based Organization
CDMG	Community Disaster Management Groups
CMM	Core Member Meeting
CLPIU	Central Level Project Implementation Unit
CSSR	Collapsed Structure Search and Rescue
DDRC	District Disaster Relief Committee
DEAN	Diploma Engineers Association Nepal
DEMP	Dharan Environmental Mapping project
DHS	Department of Health Services
DHWG	Disaster Health Working Group
DLPIU	District Level Project Implementation Unit
DMC	Disaster Management Committee
DOE	Department of Education
DNET	Development Network (p) Ltd
DPNET	Disaster Preparedness Network Nepal
DPRI	Disaster Prevention Research Institute
DPRP	Disaster Preparedness and Response Plan Framework
DPSS	Disaster Preparedness for Safer Schools
DRH	Disaster Reduction Hyper-Base
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRTC	District Reconstruction Technology Center
DTW	Deep Tube Well
DUDBC	Department of Urban Development and Building Construction
DWSS	Department of Water Supply and Sewerage
EAP	Earthquake Awareness Program
EDCD	Epidemiology and Disease Control Division
EDNeT	Education Network
EMP	Environmental Mapping Project
EPRP	Earthquake Preparedness and Response Plan
ERM	Earthquake Risk Management
ERR	Earthquake Risk Reduction
ESD	Earthquake Safety Day
ESS	Earthquake Safety Solutions
FNCCI	Federation of Nepalese Chamber of Commerce
FSCD	Fire Service and Civil Defense
GEM	Global Earthquake Model
GHI	Geo-Hazards International
GRIPS	Graduate Institute for Policy Studies
HAN	Hotel Association of Nepal
HESI	Housing Earthquake Safety Initiative
HFA	Hyogo Framework for Action
HSS	Higher Secondary School
HOPE	Hospital Preparedness for Emergencies
IAEE	International Association for Earthquake Engineering
ICIMOD	International Centre for Integrated Mountain Development
ICLA	Information Counseling and Legal Assistance
IDCC	Integrated Disaster Communication Consortium
IDNDR	International Decade for Natural Disaster Reduction
IITB	Indian Institute of Technology Bombay
INGo	International Non-Government Organization
IOE	Institute of Engineering
IOM	Institute of Medicine
IRG	International Resources Group
ISDR	International Strategy for Disaster Reduction
ITB	Institute of Technology

ITC	International Institute for Geo-information Science and Earth observation
KMC	Kathmandu Metropolitan City
KVERM-APIP	Kathmandu Valley Earthquake Risk Management Action plan Implementation Project
KVERMP	Kathmandu Valley Earthquake Risk Management Project
LARED	Latin American Network of Social Studies on Disaster Prevention
LRTC	Local Reconstruction Technology Center
LSAR	Light Search and Rescue
LSMC	Lalitpur Sub Metropolitan City
LSS	Lower Secondary School
LWF	Lutheran World Federation
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MFR	Medical First Responder
MIW	Master Instructors' Workshop
ML	Local Magnitude
MOE	Ministry of Education
MOIC	Ministry of Information and Communication
MOFALD	Ministry of Federal Affairs & Local Development
MPPW	Ministry of Physical Planning and Works
MT	Mason Training
NARL	Nepal Amateur Relay League
NATTA	Nepal Association of Tour and Travel Agents
NBC	National Building Code
NCDM	Nepal Centre for Disaster Management
NEC	Nepal Engineering College
NEFEJ	Nepal Forum for Environmental Journalists
NERMP	Nepal Earthquake Risk Management Project
NGO	Non-Government Organization
NIED	National Research Institute for Earth Science and Disaster Prevention
NRCS	Nepal Red Cross Society
NRRC	Nepal Risk Reduction Consortium
NRTC	National Reconstruction Technology Center
NSDRM	National Strategy for Disaster Risk Management
NSET	National Society for Earthquake Technology – Nepal
NUSACCI	Nepal- USA Chamber of Commerce and Industry p
NWFP	North West Frontier Province
NWSC	Nepal Water Supply Corporation
OFDA	Office of Foreign Disaster Assistance
OJT	On the Job Training
PEER	Program for Enhancement of Emergency Response
PO	Partnering Organizations
PPERS	Project for Pre-Positioning of Emergency Rescue Stores
PS	Primary School
3PERM	Promoting Public Private Partnerships for Earthquake Risk Management
RADIUS	Risk Assessment tools for Diagnosis of Urban Areas Against Seismic disaster
RED	Regional Education Directorate
RUDO	Regional Urban Development Office
SEEDS	Sustainable Environment and Ecological Development Society
SESP	School Earthquake Safety Program
SIDE	Support for International Disaster Education
SM	Social Mobilizers
SS	Secondary School
TFI	Training for Instructors
TOT	Training of Trainers
TU	Tribhuvan University
UMN	United Mission to Nepal
UNCRD	United Nations Centre for Regional Development
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	US Dollar
VCA	Vulnerability Capacity Assessment
VDC	Village Development Committee
WCDR	World Conference in Disaster Reduction
WCEE	World Congress on Earthquake Engineering
WDMC	Ward Level Disaster Management Committee
WHO	World Health Organization
WSSI	World Seismic Safety Initiative


Nepal Society for Earthquake Technology- Nepal
Pre-Positioned Emergency Rescue Store (PPERS)


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Community Orientation being held by NSET mobile team at Chilankha, Dolakha

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