DISASTER RISK MANAGEMENT

A. Disaster Risk Overview of Nepal

1. The unique geo-physical settings and the tropical location makes Nepal vulnerable to a wide range of natural hazards, such as earthquakes, floods, landslides, droughts and Glacial Lake Outburst Floods (GLOF). While certain hazards are more common in specific ecological zones of the country, for instance, the plains in the Terai are prone to flooding and the hilly areas with rough topography are prone to landslides, in terms of earthquake risk the entire country lies in a high earthquake intensity belt. The seismic zoning map divides the country into three zones elongated in northwest-southeast direction, with the middle part of the country being at slightly higher risk than the northern and the southern part; the plains in the Terai and valleys being highly susceptible to liquefaction; and the middle hills and higher mountains being highly susceptible to earthquake-induced landslides.[1] Starting 1900, Nepal has experienced four major earthquakes – in 1934, 1980, 1988 and the most recent ones of April and May 2015.

2. The disaster data of Nepal between 1990 and 2014, shows that landslides have claimed the maximum number of death (32.5%) followed by floods (29.1%). Over the same period of time, floods have affected the maximum number of families and caused the maximum economic impact (53.2%) followed by fire (24.4%) and landslides (12.9%).[2] For instance, the floods and landslides of 1993 resulting in 1,300 deaths, had caused direct physical damage of $55million in the 5 most affected districts out of the 43 affected districts, equivalent to around 3% of GDP.[3] So too, the Koshi and far-western floods of 2008 displaced 47,000 people and affected 43,500 families; damaged 5,000 hectares of farmland and 14 kilometers of road; and slowed progress in poverty reduction, with the poor suffering most in terms of losses to livelihoods and property.[4]

3. Thus disasters impact the socio-economic development of Nepal and this is largely due to increase in vulnerability and exposure of people and assets to natural hazards as development in the country has taken place with insufficient regard to disaster risk. For instance, the increase in rural-to-urban migration has resulted in high urban land prices, thus leading to unregulated land subdivision and encouraging shoddy construction of high-rises on small plots of urban land. Illegal squatters along river flood plains and high risk zones have emerged. So too, the degradation of forest area has increased landslides, soil erosion and flooding; and the disturbance of natural drainage by the construction of roads has increased the incidence of flooding.

4. Further the results of global climate scenario modeling suggest that the impacts of climate change may be intense at high elevations and in regions with complex topography, as in the case of Nepal. Current climate variability and extreme events are already causing major impacts and economic costs in Nepal, estimated to be equivalent to an annual cost of 1.5 to 2% of GDP. An analysis of the future impacts of climate change on water-induced disasters found

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[1] Government of Nepal, Ministry of Home Affairs. 2009. *National Strategy for Disaster Risk Management.* Kathmandu.
[2] United Nations. 2015. Global Assessment Report 2015 Data. http://www.preventionweb.net/english/hyogo/gar/2015/en/profiles/GAR_Profile_NPL.pdf
[3] United Nations Development Programme, 2004.
[4] ADB. 2009. Proposed Asian Development Fund Grant Nepal: Emergency Flood Damage Rehabilitation Project, Manila.

an increased risk of flood damage costs with climate change, including a higher risk of larger events.[5]

5. Recent analysis also estimates that Nepal experiences an annual average loss (AAL) of $172.84 million (equivalent to 0.89% of 2014 GDP) as a consequence of natural hazards and of $143.34 million for floods alone.[6] The 50-year probable maximum loss is estimated at $263 million for earthquake.[7,8] This grim context of increasing disaster and climate risk calls for actions to systematically embed disaster risk considerations into development processes, and to strengthen the policy and institutional set up for disaster risk management (DRM).

B. 2015 Gorkha Earthquake Overview

6. The earthquake of 25 April 2015 measuring 7.8 Magnitude and major aftershock of 12 May 2015 measuring 7.3 Magnitude and hundreds of other aftershocks and ensuing landslides have resulted in over 8,600 casualties and affected 8 million people. The damage and losses is expected to be in the order of $5 billion, equivalent to a quarter of Nepal's gross domestic product (GDP) for 2014. In particular, the damages to school are estimated to be around $250million and damages to rural road is estimated to be $185million.

7. The structural damage of buildings in rural and urban areas has highlighted the underlying factors 1) unplanned and unregulated expansion of urban settlements; 2) inadequate compliance of buildings with the standards specified in the Nepal National Building Code; 3) unregulated conversion of building use from residential to other uses such as schools, hotels and hospitals; 4) limited technical capacity within most municipalities to develop, amend and enforce building by-laws; 5) use of sub-standard building material; and 6) lack of capacity among masons on earthquake resilient construction. Apart from the collapsed or damaged structures, there exist thousands of buildings which though erect are structurally not safe for habitation. There is widespread destruction of rural infrastructure, including roads, bridges, irrigation schemes and loss of food stocks and livestock. The landslides triggered by the earthquake have swept away farmland in some of the severely affected villages in hilly regions.

C. Disaster Risk Management Policy and Institutional Landscape

8. The Natural Calamity Relief Act of 1982 is the main legal instrument for disaster management in Nepal. The Act mandates the Ministry of Home Affairs (MOHA) as a lead agency for rescue and relief work as well as for disaster preparedness related activities. Recognizing the disaster response focused approach of the Act a new comprehensive Disaster Management Act has been drafted and is awaiting cabinet endorsement. Meanwhile, the Government of Nepal has developed the National Strategy for Disaster Risk Management (NSDRM) in 2009. With an overall vision of disaster resilient Nepal, the NSDRM adopts a comprehensive approach and proposes sector specific[9] and cross-cutting strategic actions for

[5] Economic impact assessment of climate change for key sectors in Nepal 2014, Climate and Development Knowledge Network, IDS-Nepal, Global Climate Adaptation Partnership and Practical Action.

[6] Average annual loss is the expected loss per year based on both historic and modeled potential future hazards averaged over many years.

[7] The average maximum loss that could be expected within a given number of years.

[8] UN. 2015. Global Assessment Report 2015 Data. http://www.preventionweb.net/english/hyogo/gar/2015/en/profiles/GAR_Profile_LKA.pdf

[9] Actions are identified for agriculture and food security; health; education; shelter, infrastructure and physical planning; livelihood; water and sanitation, information, communication, coordination and logistics; and search and rescue, and damage and needs assessment

implementation. The NSDRM proposes the new institutional set up for DRM, realization of which is subject to the enactment of the new Disaster Management Act.

9. Importance of DRM is emphasized in various sector legislation and policies. For instance, the Local Self Governance Act of 1999 encourages local governments to undertake disaster risk reduction related actions. So too, the Nepal National Building Code provides standards for all types of buildings, including guidelines for earthquake resistant building construction for non-engineered building in remote areas.

10. In terms of institutional set-up the MOHA is the focal ministry for DRM and responsible for formulating policies, plans and programs; coordinating with other agencies; and providing rescue and relief materials to disaster victims. The Department of Hydrology and Meteorology, Ministry of Science, Technology and Environment; the Department of Mines and Geology, Ministry of Industry; and the Department of Water Induced Disaster Preventions, Ministry of Irrigation are key national agencies responsible for providing hazard related information. The Department of Urban Development and Building Construction, Ministry of Urban Development is responsible for administering the implementation of the National Building Act and the National Building Code in the context of public buildings and for proving technical support to the municipalities. The Department of Education, Ministry of Education (MOE) has been leading the school earthquake safety program, which includes retrofitting of vulnerable schools. Individual local governments – municipalities and village development committees are responsible for implementing disaster risk reduction measures in the context of local development, including implementation of the National Building Code.

D. Stakeholder Involvement in DRM

11. Recognizing the importance of multi-stakeholder involvement in DRM, the National Platform on Disaster Risk Reduction was established in 2008 under the National Directives Act of Nepal. It is headed by the MOHA and comprises of relevant government agencies, United Nations (UN) organizations and civil society organizations. The objective of the platform is to raise political commitments for DRM; provide directions on DRM activities; and develop actions for mainstreaming DRM into policy, plans, and programs.

12. Various development partners are actively engaged in DRM in Nepal, including UN Agencies, the International Federation of Red Cross and Red Crescent Societies (IFRC), international and national NGOs, bilateral donors, such as JICA, USAID, DFID, ECHO, and the World Bank. Apart from implementing their individual programs, the development partners have come together under the leadership of the Government of Nepal to establish the Nepal Risk Reduction Consortium (NRCC). The NRRC is a unique arrangement that brings together humanitarian, financial and development partners to support the government's priorities, as stipulated in the NSDRM. The NRRC has identified short-to-medium-term priorities that are both urgent and viable within the current institutional and policy arrangements in the country. These priorities are termed as Flagship Programs and includes (i) School and Hospital Safety (led by the Ministry of Education and Ministry of Health and Population and coordinated by ADB and the World Health Organization); (ii) Emergency Preparedness and Response Capacity (led by MOHA and coordinated by IFRC; (iii) Flood Management in the Koshi River Basin (led by Ministry of Irrigation and coordinated by the World Bank); (iv) Integrated Community Disaster Risk Management Programme (led by Ministry of Federal Affairs and Local Development and coordinated by the IFRC); and (v) Policy/Institutional Support for Disaster Risk Management (led by MOHA and coordinated by the United Nations Development Programme).

E. ADB Assistance in DRM

13. ADB's Country Partnership Strategy 2013-2017 identifies the high disaster risk the country faces and aims to strengthen DRM. It identifies the need to prepare hazard maps for hydro-meteorological hazards, undertake vulnerability assessment, strengthen early warning systems, and support the strengthening of policies and programs on integrated disaster risk management.

14. ADB has joined the NRRC since its inception in 2009 and has been supporting the School Earthquake Safety Program of the Ministry of Education. The program aims to undertake seismic retrofitting of 700 priority school buildings in Kathmandu Valley and build capacity of masons, teachers, students and professional staff of Department of Education. Till date 250 schools have been retrofitted, out of which ADB supported retrofitting of 160 schools and trained masons and engineers. The support has also included the development of the Strategy and Overall Plan for Increasing Disaster Resilient Schools in Nepal, which provides strategic direction for scaling up the school earthquake safety program.

15. After the devastating floods of 2008, ADB provided grant support to the Government to rehabilitate and restore damaged infrastructure in order to restore economic activities and improve the livelihoods of about 300,000 affected people.[10] The project components included recovery of the agriculture sector; and rehabilitation of irrigation infrastructure, water supply and sanitation, and roads, to higher standards of resilience. In 2012, ADB approved a technical assistance supporting hazard mapping of water-induced disasters for 20 priority river systems.[11] The Mainstreaming Climate Change Risk Management in Development Project financed by the Strategic Climate Fund through the Pilot Program for Climate Resilience (PPCR) supports the preparation of climate risk screening tools and methods to be applied for projects in irrigation, flood protection, roads, water supply and sanitation and urban development sectors.[12]

F. Key Priorities to address during Earthquake Recovery and Reconstruction

16. Based on the understanding of the underlying factors contributing to disaster risk; impact of the recent earthquakes; and ADB's involvement in DRM-related work in Nepal till date, following are identified as key immediate priorities for strengthening disaster resilience.

17. Strengthening school resilience: Nearly 30,000 public and private classrooms in 49 districts have been completely destroyed or significantly damaged in the recent earthquakes. While it is important to resume schools in transitional centers in order to minimize the long term impact of the disaster on the education sector, it will be equally critical to ensure that the schools being reconstructed follow higher standards of resilience. This would include ensuring the site selection is done based on understanding of multi-hazard risks; revising the type designs for classrooms to follow international safety standards to withstand shaking intensity of magnitude MMI IX; masons and engineers involved in reconstruction and supervision have the necessary skills to build back better; and the school management committees and students are trained on school emergency preparedness, including installing early warning systems, where needed. It will be also important to reconstruct all schools made with stone and mud mortar and retrofit the structurally unsafe schools. Such an approach will provide an opportunity to the MOE

[10] ADB. 2009. Proposed Asian Development Fund Grant to Nepal for the Emergency Flood Damage Rehabilitation Project. Manila.
[11] ADB. 2012. Proposed Grant to Nepal for the Water Resources Project Preparatory Facility. Manila
[12] ADB. 2011. *Nepal: Mainstreaming Climate Change Risk Management in Development*. Manila.

to scale up implementation of the Strategy and Overall Plan for Increasing Disaster Resilient Schools in Nepal.

18. **Resilient transport infrastructure:** The earthquake and landslides have affected 4,400 km of rural roads in 31 districts. Rehabilitation and reconstruction of the rural roads, bridges and strategic roads will be critical to reestablish physical connectivity and for economic recovery of the affected population. It will be important that the road and bridge planning process factors in multi-hazard risk information; are designed to withstand shaking intensity of magnitude MMI IX; and have appropriate early warning systems in place.

19. **Capacity building for safe reconstruction:** The earthquakes and aftershocks have destroyed or damaged nearly 785,000 houses along with thousands of schools, health posts and public buildings, thereby, highlighting the underlying factors contributing to the vulnerability of the building construction sector in Nepal. With such a massive scale of destruction, the reconstruction process will provide an opportunity to strengthen resilience of the building construction sector to future disasters. This will require a comprehensive approach for capacity building for reconstruction process, in order to ensure the reconstruction is not creating new risks. Such an approach should build capacity of all actors including affected municipalities to develop/amend building by-laws; municipal engineers and architects to carry out on-site building inspection for reconstruction and repair and ensure compliance with the national building code; private property owners and community facilitators in rural areas on inspecting earthquake resilient construction following the Mandatory Rules of Thumb; private contractors, engineers and architects on earthquake resilient housing design and construction; and masons to undertake earthquake resilient construction, using appropriate local material and skills.

20. **Strengthening DRM related legislation and institutional set-up:** The earthquake reconstruction process can provide an impetus to strengthen the overall legislative and institutional arrangements for DRM. Recognizing disaster risk presents one of the most serious threats to sustainable socio-economic development of Nepal, the country requires a comprehensive legislative framework. Thus the enactment of the new Disaster Management Act would be a key priority. It will also be important to strengthen the institutional set up for DRM as per the recommendations of the NSDRM. Capacities of individual sector ministries need to be strengthened to encourage the use of disaster risk information for decision making, improved planning and investment designs; implementing disaster risk reduction measures; and putting in place systems to manage the residual disaster risk through improved disaster preparedness, early warning systems, and disaster risk financing solutions.