Disaster Risk Reduction in Nepal

Status Report 2019

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About this report

The Disaster Risk Reduction (DRR) report provides a snapshot of the latest DRR progress Nepal has achieved under the four priorities of the Sendai Framework. It also highlights some of the key challenges surrounding the issue of creating coherence among the key global frameworks at the country level; and makes recommendations for strengthening the overall Disaster Risk Management (DRM) governance by government institutions and other stakeholders at national, sub-national, and local levels.

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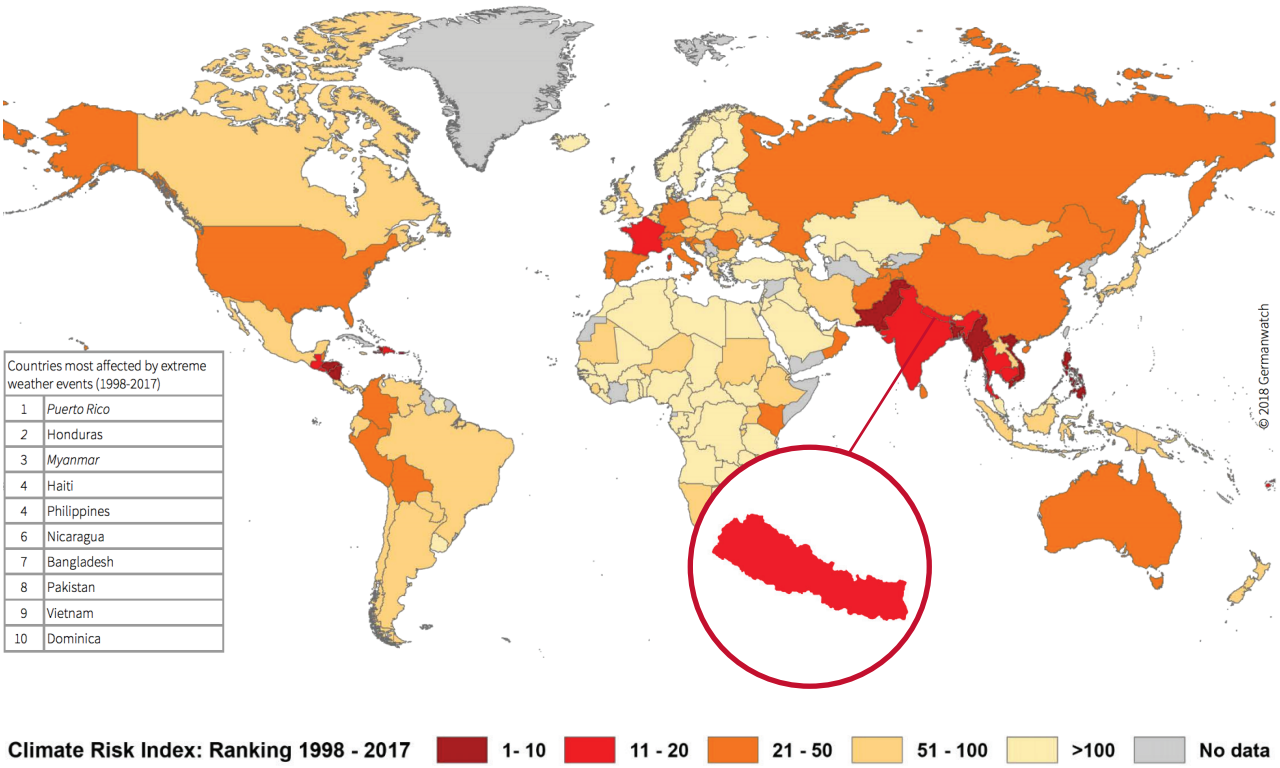
The findings, interpretations, and conclusions expressed in this document do not necessarily reflect the views of UNDRR or of the United Nations Secretariat, partners, and governments, and are based on the inputs received during consultative meetings, individual interviews, and the literature reviews conducted by the research team. While every effort has been made to ensure the accuracy of the information, the document remains open for any corrections in facts, figures and visuals.

UNDRR (2019). Disaster Risk Reduction in Nepal: Status Report 2019. Bangkok, Thailand, United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific



(GermanWatch,2019)

POPULATION 2018	
Total Population	29.3 million
Urban Population	5,666,414 (19.5%)
Population Density Per Km^2	204.2
ECONOMIC INDICATORS	
Gross Domestic Product in Current $US	24.472 billion
GDP Per Capita ($US)	744.7
GDP Growth (Annual %)	7.5
HUMAN DEVELOPMENT	
Human Development Index	0.588
HDI Rank	144

(Central Bureau of Statistics, 2018)

Climate Risk Index

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Rank 11 / High Risk*

INFORM Risk Index

–

Rank 46 / High Risk**

* Climate Risk Index of 2019 analyses the extent to which countries have been affected by weather-related losses between 1998-2017 (GermanWatch, 2019).

** INFORM risk index is a global tool which measures the risk of humanitarian crises and disasters based on 50 indicators assessing hazards, vulnerability and capacity (resources available to mitigate the impact) (INFORM, 2019)

1. Introduction

As a country with diverse typography, complex geology and highly varying climate, Nepal is exposed to many natural and human-induced hazards. In a global comparison, Nepal ranks 4th in terms of climate risk according to the Global Climate Risk Index which assesses the impacts of meteorological events in relation to economic losses and human fatalities (Eckstein, et al., 2019). Also, the country ranks 11th in terms of global risk for earthquake occurrence and impact (Maplecroft 2011, BCPR 2004 cited in MoHA 2015). The country is in top 20 of all the multi-hazard countries in the world.

Nepal's population has surpassed 29 million people (Central Bureau of Statistics, 2018), of which almost 80% depend on agriculture-based livelihoods. Limited domestic economy, geographically dispersed, unconnected population, as well as diverse groups belonging to various castes contribute to the compounding social vulnerability to disasters. More than 80% of the population is exposed to the risk of natural hazards (MoHA, 2017), which include earthquakes, droughts, floods, landslides, extreme temperature, and glacier lake outburst floods (GLOFs).

1.1 Demographic Characteristics

According to 2011 census (Central Bureau of Statistics, 2012), Nepal's population is comprised of 125 caste/ethnic groups, categorized into 8 broad major divisions: Chhetri, Bahun, Hill Janajati, Terai Janajati, Terai other castes, Hill Dalit, Terai Dalit and Muslim. Complex interaction between social dynamics may increase the vulnerability of people of different castes and ethnic groups. This is partly due to the categorization of castes, which are ranked by status; high caste (including Brahmin, high-caste Newari, Chettri), unslavable or enslavable middle castes (including indigenous non-caste Janajati), low castes (Muslim populations and foreigners) as well as the "untouchables" (Dalits). While caste-based discrimination is outlawed, it is still heavily dictating social behavior (Jones & Boyd, 2011), and over 200 forms of caste-based discrimination have been identified (The World Bank, 2006).

There also exists a persisting inequality between genders in Nepal. Despite the country's legal framework and constitution which strives to advance gender equality (Malagodi, 2018), and has addressed gender-based violence as a serious issue (Colombini, et al., 2016), women in Nepal still continue to suffer from physical violence and structural discrimination (Gurung & Thapa, 2016). Their role in a household is traditionally rooted into a conservative, patriarchal system, where women's voice and agency – financial and otherwise – may be reduced to be dependent from men, especially in the rural regions. Inequality manifests itself plethora of ways, often as in limited access to education, employment and opportunities, and can result in increased gender-based violence, especially in the aftermath of disasters.

It should be noted that the population of Nepal is currently undergoing a transition towards a stage where the numbers of working age populations are higher than the dependent populations in need of support (UNFPA , 2017). This means that the country is approaching a "window of opportunity", sometimes referred to as demographic dividend, which may result to achieve rapid economic growth, but only if appropriate investments to youth and industry will be made (UNFPA , 2017).

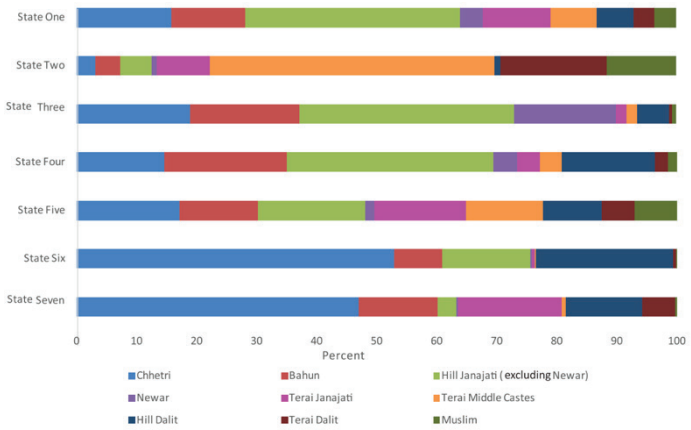

Figure 1. Distribution of major caste/ethnic groups by province (UNFPA , 2017)

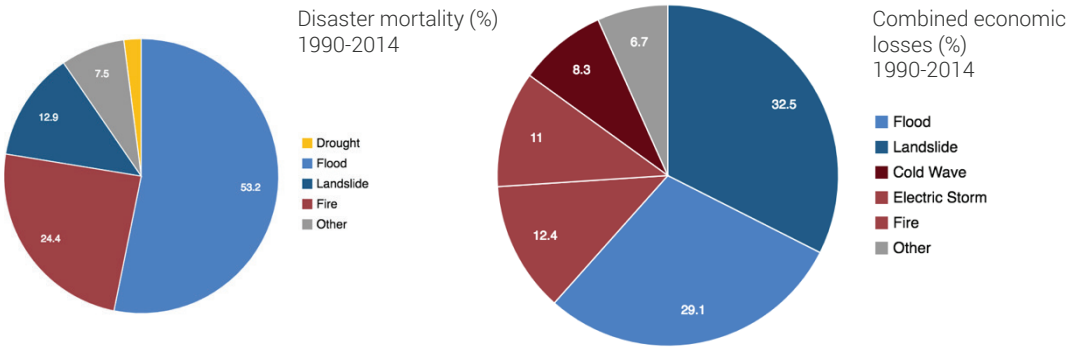

Figure 2. Disaster mortality and combined economic losses in Nepal 1990-2014 (UNISDR, 2015)

DISASTER TYPE	DEATHS	INJURED	AFFECTED	TOTAL DAMAGE (USD)
Flood	4796	1417	4 839 811	909 929 000
Landslide	1317	160	375 470	15 000 000
Earthquake	8969	20 504	5 789 880	5 174 000 000
Epidemic	3551	-	168 298	-
Extreme Temperature	267	200	25 000	120 000
Storm	109	194	165	-

Figure 3. Socio-economic impact of disasters in Nepal (1990-2019) (EmDat, 2019)

Figure 4. Annual growth rate of GDP by economic activities (Ministry of Agricultural Development, 2017).

1.2 Economic Impact of Disasters

Nepal has experienced frequent catastrophic earthquakes, such as the recent Gorkha earthquake in 2015. Kathmandu Valley is the world's most at-risk urban area to seismic activity, (Global Facility for Disaster Reduction and Recovery, 2017) and between 1990-2019 seismic events have caused over USD 5 billion in damages and affected nearly 6 million people (figure 3). These recurrent, large-scale disasters have further increased the country's reliance on agriculture by obstructing critical infrastructure, such as transport and electricity production, thus delaying the development of other industries (International Labour Organization, 2017). High-risk environment also deters foreign investment, which contributes to the slow growth.

The effects of the Gorkha Earthquake on industry and manufacturing can be seen in figure 4; during the years 2015/16, growth of the share of manufacturing in GDP decreased drastically, and the overall GDP growth dropped 1.5% from the estimated number (National Planning Commission, 2015). Tourism is another sector to experience severe impact of disasters; it was estimated that the Gorkha earthquake caused $US 8.2 million in losses and damages to tourism by impairing hotels, travel agencies, other travel-related infrastructure and several cultural heritage sites (ICIMOD, 2015).

Earthquakes alone are not the only source of damage, as the country also suffers from other hazards of varying scales of impact. Most of the monsoonal precipitation during June and September triggers regular flooding in the low-lying Terai Plains. In 2017, 80% of the Terai region and some surrounding districts suffered inundation triggered by monsoonal rains, causing US$ 584.7 million in damages (National Planning Commission, 2017). Historically, flooding has caused the most significant economic damages in the country (figure 2). Droughts have had similar effects, as unusual patterns of rain and droughts have caused yearly crop production losses ranging between 5 and 35 percent in 2001-2010 (apart from the years 2003 and 2007). The total value of crops lost due to extreme weather amounts to around US$ 1.5 Billion.

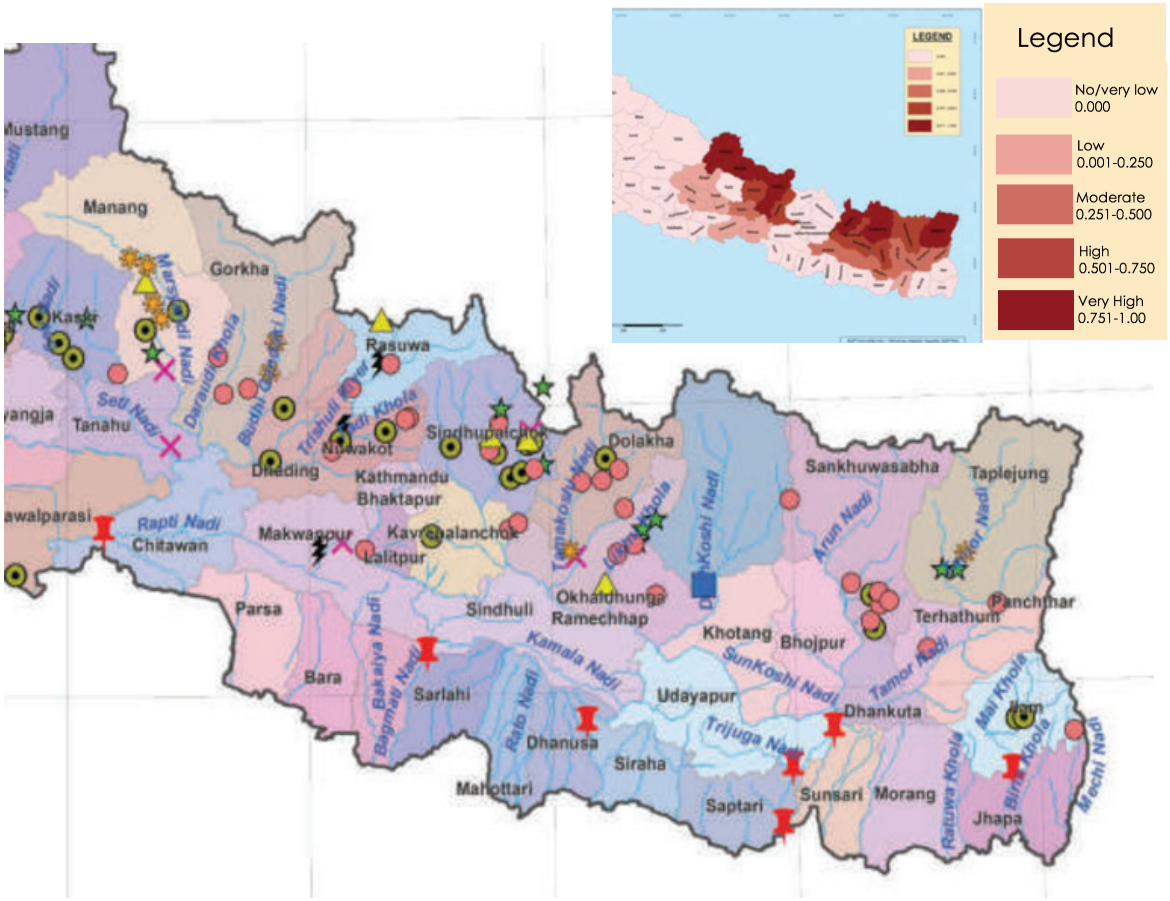

Figure 5. GLOF vulnerability map VS. on-going dam project locations ((Asian Development Bank, 2018; Ministry of Environment, 2010).

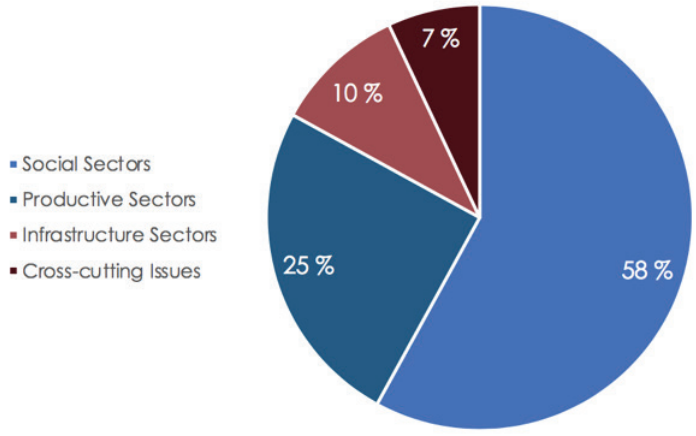

Figure 6. Share of the 2015 earthquake's effects across sectors (National Planning Commission, 2015).

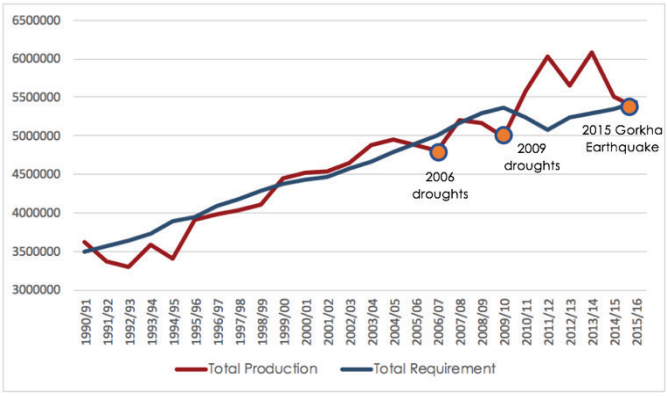

Figure 7. Total production and production requirement (Mt) of edible cereal grains in Nepal in 1990-2016 (Ministry of Agricultural Development, 2017)

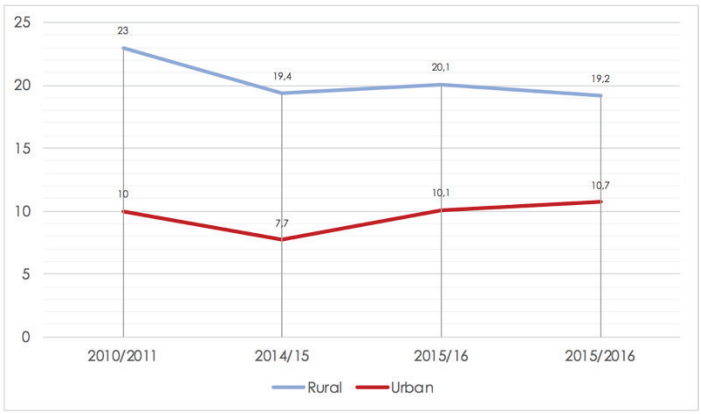

Figure 8. Percentage of households with inadequate food consumption in Nepal 2017 (Government of Nepal , 2017)

1.3 Social Impact of Disasters

The social implications of hazards affecting the main employment sectors are severe: loss of livelihoods results in increased poverty (The World Bank, 2014); and the loss of agricultural crops rapidly turns into food insecurity. For example, the losses of crops to droughts in 2006 and 2009 led to food deficits of 400,000 tons, which increased the food prices by 117-300 percent in various locations (figure 7) (UNDP, 2012). In 2015 the Gorkha earthquake, its aftershocks and accompanying landslides drove an estimated 2.5% - 3.5% of Nepalese population into poverty (International Labour Organization, 2017) by destroying crops, livestock, agricultural tools and buildings. The overall impact of the 2015 disaster was indeed greatest to the social sector (figure 6), and the effects are often felt most by the poorest and the low-caste populations due to their marginalized status, limited resources and livelihood options.

Also, to effectively utilize the “window of opportunity” to increase economic growth of industry as a method of reducing poverty and food instability, investments to youth and infrastructure need to be made. However, currently the sector remains stagnant due to recurrent disasters which impair critical infrastructure and drive increasing numbers of people into poverty. Achieving the Sustainable Development Goals such as poverty

reduction, and zero hunger remain uncertain in Nepal due to increasing environmental threats, and as long as recurrent disasters gnaw the gains of achieved national development.

2. Disaster Risk Profile

2.1 Hazards and Climate Change

The topography of Nepal, varying from the Himalayan mountain range and hills to low-lying plains, creates an equally diverse setting for disasters to occur. For example, the Terai plains are more exposed to seasonal flooding due to the monsoonal rains and the present complex river systems (Dewan, 2015). The mountainous and hilly regions on the other hand are more at risk of landslides (Gautam, 2017) and GLOF events due to the vicinity of glacier lakes. Also, despite the earthquakes having the potential to affect the whole country, vulnerability to seismic activity is the greatest in the urban regions following unplanned urban growth, and in the mountainous regions where earthquake-induced landslides are more likely.

Hydro-metrological hazards, including droughts and floods have already caused widespread damage, loss of livelihoods, lives and property, but the intensity of such hazards is expected to increase in the future. By the mid-century, it is suspected that the amount of precipitation will be increased by 15-20% (Ministry of Environment, 2010), which will be amplifying the impact of water-induced disasters. Climatic variations have a direct effect on the livelihoods of the people, because large proportion of Nepal's economy and employment are dependent on climate-sensitive activities. Agriculture and forestry account for 35% of the GDP (Ministry of Science, Technology and Environment, 2014), and any deviations in weather or production cycles may obstruct livelihoods of millions (figure 6, see droughts).

2.2 Exposure

The hunt for employment opportunities is one of the main drivers of domestic migration in Nepal. The attraction of urban regions and agricultural employment opportunities have made the Terai plains, Lalitpur, Bhaktapur and Kathmandu districts the fastest growing in the country (figure 9), while mountainous districts are experiencing negative population growth (UNFPA , 2017). Poverty, lack of economic opportunities and the absence of basic amenities in the rural regions are some of the numerous push factors (Ishtiaque, et al., 2017) which encourage domestic and international migration.

Migration has also contributed to unregulated urbanization processes in Kathmandu. During the period between 1992 and 2012 Kathmandu Valley saw 211% growth in around its built-up areas, but at the expense of equal loss of cultivated land (National Planning Commission, 2015). These largely unregulated processes coupled with significantly increasing density, have increased the urban risks in Kathmandu Valley (National Planning Commission, 2015). Additionally, the districts in the Terai plains are also experiencing unusually high unemployment of young people due to excessive domestic migration towards possible employment in agriculture (Ministry of Home Affairs, 2015) (figure 11). Growing population and high numbers of unemployed people may thus suggest growing vulnerabilities following poverty in the Terai plains as the region is highly exposed to seasonal flooding.

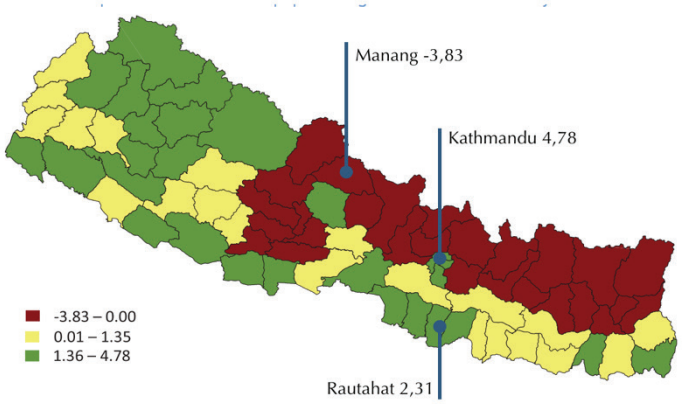

Figure 9. Intercensal annual population growth of Nepal by district (UNFPA , 2017)

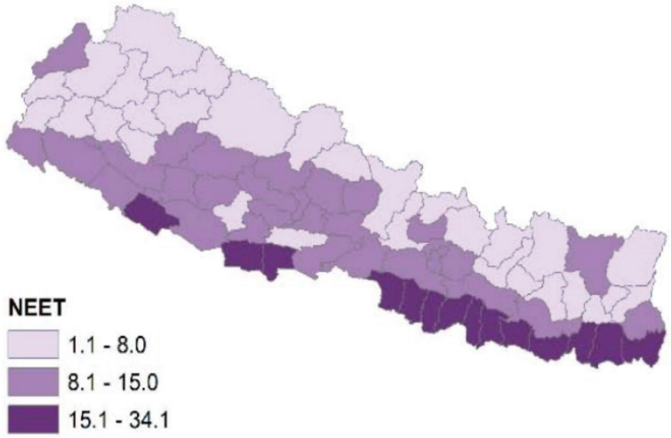

Figure 10. Employment NEET (Youth aged 15-24 Not in Education, Employment or Training) (UNFPA , 2017) and the Terai flood vulnerability map (Ministry of Science, Technology and Environment, 2014).

Environmental degradation is another source of concern, resulting from poor land use and land cover (LULC) planning and uncontrolled urbanization. Unplanned settlement is accompanied by increasing numbers of squatters, river pollution from direct discharge of untreated wastewater and industrial waste, inadequate sanitation facilities, and poor management of solid waste (Chhetri & Shakya, 2010). This poses a significant health risk, as people living in unsanitary conditions are more likely to come in contact with contaminants spreading diarrheal diseases. Also, populations living near stagnant bodies of water are more likely to become exposed to cholera, typhoid and mosquito borne diseases especially during the monsoon season (Dewan, 2015).

Poor waste management also has an impact on ground water; more than 50% of Kathmandu valley has been found to be susceptible to groundwater pollution (Shrestha, et al., 2016). Air pollution in the same urban areas is also increasing the occurrence of lung diseases, including bronchitis and asthma (Chhetri & Shakya, 2010).

2.3 Social Vulnerability

Multi-dimensional vulnerability plays a significant role in the formation of disaster risk. Incorporating assessments of the socio-economic aspects – including caste, ethnicity, employment and gender – which contribute to social vulnerability, evidenced by the understanding of spatial attributes and intersectionality specific to certain demographic features, is crucial to understanding the formation of disaster risk.

For example, roughly 13% of the population is malnourished (ICIMOD, 2015), as a result of hazards that affect agricultural production in the country. However, the effects of food shortages are not evenly distributed. Moderate stunting resulting from malnourishment is more likely to be an issue for children living in the mountainous areas and children of working women (Gaire, et al., 2016). Severe stunting is more likely to be seen in children from Dalit groups, in rural settings and in children from the poorest households (Gaire, et al., 2016). Furthermore, the migration of male populations leaves women, elderly and children inhabiting the rural areas, and they are highly dependent on subsistent farming, or remittances paid by men. Hence, women in the rural regions are increasingly vulnerable to hazards and climate change due to their dependency on small-scale agriculture and limited access to other livelihood options due to their societal status.

2.4 Physical Vulnerability

To improve the stagnant industry and manufacturing sectors, hydroelectric power has been identified as the key resource for future economic growth (Chinnasamy, et al., 2015). This is because the future of industrial development in Nepal relies heavily on consistent and sustainable electricity production. 90% of the electricity in Nepal is already generated through hydropower (Bhatt, 2017), however, the currently installed facilities provide only 786 megawatts as opposed to the theoretical maximum production capacity of 43,000 megawatts (IHA, 2016). To further the effective utilization of water resources, the country has invested in 223 new dam projects that are now in various stages of development around the country (Asian Development Bank, 2018).

The trend of developing large-scale hydropower facilities in highly volatile regions does not come without concerns. Earthquake as well as landslide dams blocking rivers may impair the operations or damage the facilities. Periods of droughts also have a critical impact on hydropower electricity production, because they rely on constant river flow. Furthermore, dams affect river ecosystems, thus endangering natural fish populations and the livelihoods of fishermen (Asian Development Bank, 2018), and the growing reliance of agriculture on seismically vulnerable reservoirs adds to the concerns over the safety of hydropower facilities. Many of the development locations are also situated in regions which are highly vulnerable to GLOF events (figure 5).

Also, due to the lack of seismic technologies, trained masons or engineers (Dixit, et al., 2013), and because the perceived cost of seismic-resilient construction is high, many of the newly constructed buildings are seismically unsafe. The consequences of unsafe building practices materialized during the 2015 earthquake, as most of the damaged buildings were non-engineered stone or masonry structures (Goda, et al., 2015). Many structures are still being supported by bamboo, wooden or iron bastions to prevent

further disintegration which originated from the earthquake. Various schools and hospitals are also in varying states of disrepair, and their operations are still being supported by semi-permanent structures nationwide (UNICEF, 2018). To enhance seismic resilience, effective risk management – including risk assessments, building codes, zoning regulations, resilient building techniques and building back better – must be rapidly implemented (and enhanced) by the Nepalese government (Bhagawat, et al., 2017).

2.5 Future of Disaster Risk in Nepal

When it comes to climate change, the future projections are dire; it is expected that the currently most productive Terai regions suffer the most severe consequences of climate change. The future direct costs resulting from climate change to vulnerable sectors (including agriculture and electricity production) has been expected to be as high as 3% of the total GDP by 2050 (Ministry of Science, Technology and Environment, 2014). In the future it is expected that flooding will cause 82.93% of the Average Annual Loss (AAL) (UNISDR, 2015). These are significant concerns due to the impact that climate change has on increased precipitation in Nepal, which enhances the effects of water-induced disasters. By mid-century, monsoonal precipitation has been estimated to increase by 15-20% (Ministry of Environment, 2010). Another arising concern are agricultural losses resulting from periods of extreme precipitation or drought which affect food security and livelihoods. Given the future projections for population growth, mitigating the impacts of climate-induced hazards on production and are crucial; by 2050, the population is expected to reach 46 million people (United Nations, 2013), all of whom require increased resources and safe land-use planning.

Nepal's Development Vision for 2030 aspires average annual GDP growth of 9-10% to join Nepal into the ranks of middle-income countries (Sharma, et al., 2012). However, this progress relies heavily on the new hydropower facilities, which are being developed in a highly vulnerable setting due to the increasing risk of earthquakes, landslides and GLOFs. Hazards enhanced by climate change may compromise the aspirations of utilizing water resources, and thus threatens the future expectations for industrial development. Even if the industry experiences a growth boom, it is likely to cause environmental concerns. In 2014, 56% of manufacturing establishments reported that environmental laws and regulations had no impact on industrial activities (Central Bureau of Statistics, 2014) – in other words, most operators did not adjust their activities to meet the legislation. Thus, pollution and environmental degradation are likely companions of development if sustainable approaches are not favored. Increased infrastructural development is also likely to create new hot spots for landslides. Informal road construction and explosions for developing transport infrastructure have a tendency to destabilize slopes due to loss of vegetation, soil erosion and loss of slope toes (McAdoo, et al., 2018).

3. Disaster Risk Reduction and Climate Action Interventions

Against such background, it becomes clear that future disaster risk reduction and enhancing climate resilience in Nepal are a daunting task. The following chapters shed light on the country's process in DRR and CR, under the global policy frameworks: Sendai Framework for Disaster Risk Reduction, Sustainab;e Development Goals and the Paris Climate Agreement.

3.1 Sendai Framework for Disaster Risk Reduction

Priority 1. Understanding Disaster Risk. Gathering and developing comprehensive risk information, based on technically-sound risk assessments remain a challenge. Despite different available products for hazard assessments and risk mapping, the approaches rely on project-based exercises, or small-scale projects in specific localities. The technical tools adopted for conducting risk assessment are varied, and there is still a lack of commonly referenced tool and standards.

During the formulation process of National DRR Policy and Strategic Action Plan: 2017-2030, critical issues reflected in multi-stakeholder consultations revealed that existing practices for conducting hazard, vulnerability and capacity assessments are inadequate to support prioritizing investments. There was also a consensus about the need of collecting local level risk information based on levels of risk for all urban and rural municipalities. The vulnerable sectors of which more data is required to determine risks included private homes, schools and health facilities, as well as government- and public buildings.

Reviews of a few Local Disaster Risk Management Planning (LDRMPs) and Local Adaptation Plan of Actions have shown that they are not based on a comprehensive understanding of risks. Despite the challenges, the Ministry of Home Affairs (MoHa) has still engaged with various agencies to develop methods for conducting risk assessments. Some of the past assessments include are discussed in table 1.

Disaster information management systems and online databases are under development with features for increasing accessibility for public use. These include SAHANA, DesInventar, Nepal Disaster Risk Reduction Portal, Nepal Government Geo-Portal and primary data of real-time water and flood monitoring system of Department of Hydrology and Meteorology (DMH)

ASSESSMENT MECHANISM	METHOD
Nepal Hazard Risk Assessment (2010)	Multi-hazard risk map for Nepal, based on description of the available data, hazard assessment and mapping for earthquakes, floods, droughts, landslides and epidemics at the national level.
Urban Risk Atlas (2013)	The URA was developed based on RADIUS tool for risk analysis. The data input includes base maps, major infrastructure, buildings, critical infrastructure, building typologies and number of people at home when the earthquake occurs as basic for casualty estimations (based on day/night cycle).
Vulnerability and Risk Assessment Framework (VRA)	VRAF describes a conceptual framework for vulnerability and risk assessment, methodological process for conducting VRA and provides a set of venerable and risk indicators to be accounted for in different sectors, i.e. urban settlement & infrastructure, water resources & energy. This supports the measurement of climate risk to determine climate adaptation priorities and devising climate adaptation strategies.

Table 1. Different mechanisms for conducting risk assessments in Nepal

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk. Addressing disaster risk has been by and large receptive, event-based and response-focused, with Natural Calamity (Relief) Act, 1982 as the principal legal instrument for DRM, prioritizing disaster response. However, progress has been made by building the foundations of DRM through robust, complementary legislative framework, illustrated in table 2.

The newly endorsed Disaster Risk Reduction and Management Act (2017) has been formulated to address disaster risk management with a comprehensive approach, focusing on different stages of disaster management cycle from preparedness, mitigation response to rehabilitation. Furthermore, it provides a well-structured institutional set-up from the national to local levels for steering risk reduction activities.

Yet, gaps remain even within the new legislative framework. Conflicting provisions of Acts have created overlapping roles and responsibilities. The policy formulation and institutional set-up need to be complemented with enhanced ability and competence in implementation to operationalize the intent of the relevant acts and policies at all levels of government (Nepal, et al., 2018).

The Constitution and Local Government Operation Act, 2017, grants more power and responsibility for the local governments comprising Urban and Rural Municipalities, District Councils/District Coordination Committees, and Provincial Coordination Councils. Under the federal system, local governments are responsible for much larger territories and are mandated to manage the local services, local level development plans and projects, including disaster management (The Asia Foundation, 2017). Indeed, support for the provincial and local governments in fulfilling their legal mandate in disaster risk reduction and for managing local to mid-scale disasters is indicated as one of key priorities for resilient development of Nepal (MoHA, 2017). Under the auspices of the DRM Act (2017), establishment of a National Risks Reduction and Management Authority (NRRMA), to oversee all phases of disaster risk management and coordination with all DRR stakeholders, is under process (Ministry of Home Affairs, 2018). NRRMA, operating under the Ministry of Home Affairs, is envisaged to determine new

architecture of DRR in the country, with solid mandates and functions to rollout the country's DRR plans and strategic into actions.

Independent and autonomous entities established under the constitution have an explicit role to play in the protection of rights of marginalized groups, enhancing equitable, inclusive and rights-based development. They could also be effective in reinforcing good governance for DRR, monitoring authorized agencies and making case for the state's accountability and transparency in various circumstances, including emergency management and disaster response. These agencies include the National Human Right Commission of Nepal, the National Dalits Commission (NDC), the National Inclusion Commission National Women Commission, and the Indigenous Nationalities Commission.

Political participation and gender inclusion in risk governance system has also opened up a pathway towards gender equality in Nepal, as well as increased participation of women in local DRR. The recent elections have strived to ensure close to a half of women's representation in the parliament. However, there is a critical need to move from numbers towards increased agency and impactful participation of women within DRR decision making.

IMPLEMENTATION	LEGISLATION	SCOPE	PURPOSE
MINISTRY OF HOME AFFAIRS	Natural Calamity (Relief) Act, 1982	National, districts and municipalities	Legal instrument focusing on disaster response. The Act gave MoHa the responsibility to oversee overall disaster management activities.
LOCAL GOVERNANCE	Local Self Governance Act, 1999	Municipalities	Delegated administrative power to local authorities on overall local development process including disaster risk reduction.
MINISTRY OF HOME AFFAIRS	the National Action Plan for Disaster Risk Management 1996	National, districts and municipalities	Action plans for pre-disaster and post-disaster phases.
MINISTRY OF HOME AFFAIRS	National Strategy for Disaster Risk Management (NSDRM), 2009	National	Formulated to set up 29 strategies to transform Nepal's response-focused disaster management approach to a more comprehensive and proactive risk reduction approach.
THE GOVERNMENT OF NEPAL	Nepal's New Constitution 2015	National, districts and municipalities	Mentions DRM for the first time under Article 51 and has clearly assigned DRM as a concurrent responsibility for all tiers of government.

IMPLEMENTATION	LEGISLATION	SCOPE	PURPOSE
THE MINISTRY OF HOME AFFAIRS	Disaster Risk Reduction and Management Act (2017)	National	Replaces the Natural Calamity (Relief) Act, 1982. Sees disaster risk management as a process focusing on different stages of the disaster management cycle.
THE MINISTRY OF HOME AFFAIRS	Local Government Operation Act, 2017	Districts and municipalities	Outlines the roles and responsibilities of Urban and Rural Municipalities,
THE MINISTRY OF HOME AFFAIRS	the National Disaster Risk Reduction Policy 2018 (Nation DRR Policy	National	Serves as the national framework for disaster risk reduction, aligned with the SFDRR, with the vision: Sustainable Development through DRR actions and climate change adaptation.
THE MINISTRY OF HOME AFFAIRS	National Disaster Risk Reduction Strategic Action Plan, 2018 - 2030 (NDRRSAP)	National	Guides priorities of actions towards the concluding years of SFDRR.

Table 2. Nepal's legislative frameworks for disaster risk reduction and climate resilience.

Priority 3. Investing in Disaster Risk Reduction for Resilience. Nepal's commitments in investing in DRR were expressed in the language of planning documents. Disaster risk reduction began to receive more attention from the Government since the 10th Five Year Development Plan (2002-2007) and the subsequent periodic plans. (MoHA, 2017). The Twelfth Three Year Plan (2010/11-2012/13) sets up disaster management goal, aligned with the Hyogo Framework for Action, and the Thirteenth Plan (2013/14-2015/16), indicating aspiration to mainstream disaster risk management into development processes.

The current 14th 3-year periodic plan (2016/17-2018/19), developed in consideration of the SDGs, has set its disaster management goals under the section of disaster management, environment and climate change which aim to reduce human, physical, economic, cultural and ecological losses due to disasters (Nepal, et al., 2018).

However, and thus far, concrete mainstreaming actions of policies and plans have been limited to project and donor-driven activities. Sectoral policies and plans such as the Land Use Policy 2015, National Urban Development Strategy (2017), etc. have incorporated DRM/CRM issues. Translating these into implementation is yet to be seen.

Public expenditure for disaster preparedness and mitigation is channeled through government line agencies for DRR projects and programs. About five percent of the total capital expenditure of the government currently spent in DRM is insufficient given the scale of disasters in the country, and sectoral allocation for DRM is still very marginal compared to the actual needs. Budget constraints in prioritizing DRR actions over other development activities is another obstacle in achieving the agenda for DRR and CCA (MoHA, 2017). At local level, funding mechanism include Provincial DM funds and Local DM funds that can be used to finance DM activities at each respective level.

However, it is expected that due to limited budgetary provision, the elected municipal bodies might encounter financial deficit while seeking to fulfill their functions in disaster risk management.

Still, considerable progress is noted in the health, education and agricultural sectors which are among critical areas for mainstreaming DRR interventions. Sectoral agencies have demonstrated continued efforts to increase considerations for DRR by awareness raising, hospital and school DRM planning, and retrofitting of major public hospitals in Kathmandu city and schools. The latterly mentioned is a continuation of the past efforts on multi-donor supported School and Hospital Safety project. Initiatives on Risk-sensitive Land Use Plan (RSLUP) have also been carried out for cities in Kathmandu Valley with the intent to review regulatory frameworks, and to explore options and enabling factors for risk sensitive land use planning. Increased technical capacity, mainstreaming of DRR, comprehensive risk assessments, and increased availability of SADD data are among the requirements for comprehensive RSLUP planning. Due to the lack of aforementioned, the substantial integration of DRR in land use is still in its early stages.

Strong evidence of comparative benefits of DRR mainstreaming based on cost-benefit analysis is still missing. Although efforts have been taken by MoHA and UNDP to conduct a study on Economic and Financial Decision Making in DRR, which seeks to develop an evidence-based strategic approach to mainstreaming DRR into development in Nepal, it has not trickled down to the sub-national level planning (GoN, 2011. Mainstreaming DRR in different sectors is often seen to be limited to the sector-specific standalone DRR development projects, mostly following their own specific framework and agenda (PracticalAction, 2017).

Priority 4. Enhancing Disaster Preparedness for effective Response to "build back better" in recovery, rehabilitation and reconstruction. To support the efforts towards achieving mandates set under priority 4, Nepal has produced multiple guidelines and mechanisms to support a comprehensive approach to recovery, rehabilitation and reconstruction (table 3). The National Disaster Response Framework covers preparedness and emergency response at national, regional, district and local level using tiered structure, with MoHA as decision making body. In the case of a mega-disaster, the Cabinet can declare a state of emergency upon the request of the Central Natural Disaster Relief Committee.

At the district level, Disaster Preparedness and Response Plans (DPRPs) have been completed in 75 districts, and they are revised yearly before the monsoon. These plans outline key actions and responsibilities for district authorities in order to prepare for and respond to disasters (Government of Nepal, 2015). The Local Disaster Risk Management Planning guidelines (LDRMP 2011) were approved by the MoFALD and describe the process for developing disaster management plans at the VDC municipality level in consultation with community members. The LDRMPs have undergone revision to combine local climate change adaptation and DRM into one coherent plan. The draft Local Disaster and Climate Resilience Planning Guidelines (LDCRP Guidelines-2074) will be essential planning tools for the newly formed city governments and municipal bodies under the federal system.

Early Warning Systems for water-related hazards, developed since 2010, are active, utilizing automatic sensing and mobile communication technology for real-time climate

and hydrological data acquisition and warning dissemination. They operated under Department of Hydrology and Meteorology, supported by Nepal Telecom (NTC) and Ncell Company. For more than a decade, community-focused early warning systems have also been developed and tested in pilot areas for floods and landslides, in an attempt to bridge the gaps between technological hazard early detection and local needs and capacity. However, Nepal Flood in August 2017 following incessant rainfall in Terai districts attests the dire need for more comprehensive preparedness and people-centered EWSs which would guarantee that early warning reaches all communities. Equally important is to guarantee that the EWSs would instigate the uptake of safety measures and evacuation in timely manner (Practical Action, 2017).

In terms of Building Back Better, in the aftermath of the 2015 Gorkha earthquake, the Legislature- Parliament passed the Act Relating to Reconstruction of the Earthquake Affected Structures, 2015 (or the Reconstruction Act) that established the National Reconstruction Authority (NRA) as a national body for a five-year period. In accordance with the Reconstruction and Rehabilitation Policy, 2016, the Post-Disaster Recovery Framework (PDRF) was prepared under the leadership of the NRA, in consultation with key stakeholders, to provide a systematic, structured and prioritized framework for implementing recovery and reconstruction. Informed by the PDNA, led by the National Planning Commission (NPC) in 2015, PDRF's recovery vision, broad guidelines and strategic Recovery Objective 1-5 reflected build-back better and resilient-focused recovery, ensuring that interventions integrate risk reduction, so as to withstand the impact of future disasters (NRA, 2016).

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
THE MINISTRY OF HOME AFFAIRS	Guidance Note on Disaster Preparedness and Response Planning, 2011	National, districts and municipalities	The basis for district preparedness and response plans
THE MINISTRY OF HOME AFFAIRS	National Disaster Response Framework, 2013 (NDRF),	National	Launched to guide more effective and coordinated national response in case of large-scale disaster.
THE CABINET OFFICE	NEOC standard operating procedures	National, districts and municipalities	In case of a mega-disaster, NEOC is activated GoN MoHA 2015). EOCs are also established in 5 other provinces.
THE GOVERNMENT OF NEPAL	Multinational Military Operations and Coordination Center (MNMCC)	National	Support military to military and civil-military coordination during and after the 2015 earthquake.
DISTRICT GOVERNANCE	Disaster Preparedness and Response Plans	District	Outlines key actions and responsibilities for district authorities in order to prepare for and respond to disaster. (GoN, 2015)

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
LOCAL GOVERNANCE	Local Disaster Risk Management Planning guidelines LDRMP 2011	Municipality	Describes the process for developing a disaster management plan at the municipality level in consultation with community members. Over 460 plans have completed by the end of 2015 ((NRRC, 2014)

Table 3. Guidelines for response, recovery, rehabilitation and reconstruction activities.

4. Coherence with Sustainable Development Goals & the Paris Climate Agreement

Nepal was one of the signatories of the 2030 Agenda for Sustainable Development. Nepal' s Voluntary Nation Review (VNR), presented at the High-Level Political Forum on Sustainable Development (HLPF) in July 2017, New York, reiterates the country's aspirations to swiftly complete the unfinished agenda of the MDGs, and step up its efforts towards implementing the SDGs. Nepal has halved extreme poverty and is on track to confine it to less than 5 percent by 2030. Among other priorities to bridge the unmet gaps is to create gender parity at all levels of education, to reduce the maternal mortality rate, reduce undernourishment and the prevalence of malnutrition in children.

During the process of adopting the SDGs at country level, Nepal anticipates graduating from Least Developed Country status by 2022, and envisages to be an enterprise-friendly middle-income country by 2030, inhabited by a vibrant and youthful population living in a healthy environment, with absolute poverty in the low single digit and decreasing (NPC, 2017). Different ways to generate economic growth have to be tested and tried considering different challenges including low production technology, lack of skilled labor forces and geographical access to external markets (Rai, 2017).

Nepal's Sustainable Development Goals Status and Roadmap: 2016-2030, launched by NPC, outlines a country monitoring framework that aligns and updates national SDGs indicators with the global ones, will be used to assist in tracking progress for the indicated years: 2015, 2019, 2022, 2025, and upon conclusion of SDGs implementation by 2030. Interconnectedness across multidimensional aspects is well addressed, including poverty reduction, reduction of hunger, gender disparities, outcomes in education and health, and environmental stressors. The country's specific targets for 2030 demonstrate explicit linkages to DRR and CCA, such as those under SDG 2 and SDG 11, exhibiting disaster risk reduction and adaptation considered as essential to sustain country prosperity. Nepal has put climate change adaptation at the centre of its development plans and policies, and has successfully piloted community adaptation programs through implementation of Environment-Friendly Local Governance (EFLG) Framework and Local Adaptation Plan of Action (LAPA) in collaboration with the local government authorities (MoHA, 2017).

When it comes to addressing climate change, the institutional foundation has traditionally been strong in Nepal with the climate change council at the top overseeing all activities. The most important link in the success of integrating climate change adaptations/climate resilience measures at the local level planning has been the involvement of the community and private sectors. Work in the area of climate change is reinvigorated with Nepal having ratified the Paris Agreement on climate change on 4 October 2016 and since then it has been actively engaged in implementation processes led by UNFCCC, including submission of first Nationally Determined Contributions (NDC) in 2015.

Currently, the country is developing National Adaptation Plan (NAP) to help address medium and long-term adaptation needs to reduce climate vulnerabilities through a sectoral approach. (MoHA, Nepal Disaster Report 2017: Road to Sendai, 2017). The NAP process essentially looks into climate resilience building by identifying concrete adaptation options in cross-cutting issues on various sectors, including agriculture, urban settlements and infrastructures, and climate-induced disasters with two related aspects: the impacts of disaster on the systems, and their adaptive capacity to deal with these impacts (Ministry of Population and Environment, 2017).

It is apparent that coherence among DRR and CCA under the pathway towards sustainable development is established and well-articulated in the country's policy planning, backed up with planning tools exhibiting cross linkages of these three domains (see Table 4). However, to what extent such synergies are translated into tangible actions and outcomes remains to be seen.

Sectoral Aim	Policies with Linkages to Sendai Framework for Disaster Risk Reduction	Sustainable Development Goals (commitments by 2030)	Policies linked to the Paris Climate Agreement
National Development	Nepal's New Constitution Local Disaster Risk Management Planning Guidelines (2011)	Increase Road Density Maintain the Share of Protected Land at 23,3% of Total Land Area	National Three-Year Plan (2010-2013) National (climate) Adaptation Program of Action NAPA (2010)
Agriculture and Irrigation Management	Climate Change Adaptation and Disaster Risk Management in Agriculture: Priority Framework for Action (2011-2020)	Reduce Undernourishment to 3% Increase Food Production by 66%	Climate Change Adaptation: Priority Framework for Action (2011) Irrigation Policy (2003)
Disaster and Climate Risk Reduction	Disaster Risk Reduction and Management Act (2017) Local Government Operation Act 2017 National Disaster Risk Reduction Policy (2018) Natural Disaster Risk Reduction Strategic Action Plan 2018-2030 Local Disaster and Climate Resilience Plans	Fiji Agriculture Sector Policy Agenda (2014-2020) Halve CO2 Emissions Limit Fossil Fuels to 15% of Total Consumption	Climate Change Action Plan (2016-2018) National Strategy for Disaster Risk Reduction in Nepal (2008) Water-Induced Disaster Management Policy Local Disaster and Climate Resilience Plans
Vulnerability Reduction	National Disaster Risk Reduction Policy (2018) Reconstruction and Rehabilitation Policy (2016)	Increase the Portion of Safe Housing to 60% Reduce Extreme Poverty to 5% End Violence Against Women and Children	National (climate) Adaptation Program of Action (2010) Local Adaptation Plan of Action (LAPA under NAPA)
Land Use Planning		National Urban Development Strategy (NUDS)	National Urban Development Strategy ("Climate Proofing UD")

Table 4. Some of the synergies between international agreements and different policies and commitments of Nepal in various sectors.

5. Issues in Implementation of the DRR and Climate Policy

The 2015 Constitution transforms Nepal into a federal democratic republic and aspires to strengthen inclusive governance and proportional representation with three tiers of governments: federal, provincial and local levels. This constitution aiming towards egalitarian and pluralistic society, and to guarantee prosperity for the citizens (United Nations, 2017), serves as solid legal framework to achieve the SFDRR priorities, mandates as set in the Climate Agreement, and the SDG targets. The current objectives to achieve holistic DRR and CR overlap on multiple occasions and share similar characteristics (table 4). However, achieving fully operational local administration (ward and municipal level) with integrated DRR functions requires that the newly formed local administrative bodies are oriented with existing provisions laid out in acts, laws, regulations, directives and plans related to the DRM and local governance. The newly formed local government will require trained human resources, adequate finances and enhanced institutional capacities. (MoHA, 2017)

Providing sectoral ministries and local authorities with guidelines to mainstream DRR and CR priorities into annual development process is a priority of Nepal Planning Commission (NPC), a national focal agency on DRR mainstreaming (MoHA, 2017). Thus, the coherence of initiatives becomes obvious. Despite the synergies and strategic approach, lack of local level capacities may hinder the effective materialization of the intentions. Moreover, the need is felt on incorporating considerations for prevalent social issues such as poverty, migration, livelihoods and internal displacement that exhibits multi-facet linkages with DRR sphere, all of which contribute to achieve Sustainable Development Goals (SDGs), and poverty reduction (Ministry of Home Affairs, 2018).

6. Stakeholder Analysis

Wide spectrum of DRR stakeholders in Nepal have played a crucial role in driving DRR momentum and people-centered development. Nepal Risk Reduction Consortium (NRRC), launched in 2011, has served as a unique multi-stakeholder platform to support the GoN in implementing five Flagship areas of immediate action under the National Strategy for Disaster Risk Management, NSDRM (2009), aligned with the HFA, by bridging the spectrum of development activities and humanitarian expertise, technical support and funding. INGOs, NGOs, CBOs, private sector, academia, and technical institutions have worked in collaboration with GoN, through MoHA, and different line agencies, on capacity development, technical transfer among other projects.

Continued support has also been provided by the World Bank. It has mainly focused on agriculture, irrigation and infrastructure development, as well as telecommunications, highways, power, and water supply and sanitation. ADB also provided loans for road and transportation facilities rehabilitation and promoted gender equality measures in the transport sector. ADB has also been instrumental in supporting and funding school safety, including School Safety Program (SSP) for retrofitting of school in Kathmandu Valley since 2011, and the reconstruction of earthquake-resistant schools in the post 2015

earthquake. Formed in 2014, the Child-Centered Disaster Risk Reduction Consortium, consisting of Plan International Nepal, Save the Children International Nepal and World Vision International Nepal, have supported the program.

The harmonized school safety model that contextualizes the Comprehensive School Safety Framework (CSSF) in Nepal is a significant achievement of the consortium. The safe school interventions have been conducted in collaboration with the Department of Education and National Centre for Education Development.

For emergency response, Nepal engages with a broad-array of stakeholders including UN agencies and international development partners through a cluster-based approach, adopted in 2009. Nepal Red Cross is also a key player in response operations and active in mobilizing local volunteers. The network is extensive, with volunteers ready to mobilize across all 75 districts (Overseas Development Institute, 2017).

For building back better, number of local NGOs and CBOs have deep roots in their communities and have been involved as partners in the 2015 earthquake reconstruction activities. Community-based organizations (CBOs), specifically those targeting the urban poor, who are often unrepresented in national and municipal structures, will be critical partners in the immediate relief efforts and longer-term recovery. The National Federation of Squatter Communities and the National Federation of Women's Savings Collectives are examples of organizations that might help to guide both of these locally contextualized responses. Both are affiliates of the global Slum Dwellers International network. (ALNAP, 2015). The NGO Federation of Nepal (NFN), comprising about 6,233 affiliated members NGOs in 77 district chapters, has coordinated the civil society process on the 2030 Agenda for Sustainable Development (SDGs) to assess situation of SDGs implementation in Nepal, reflecting gaps and needs from perspectives of diverse vulnerable groups on different cross-cutting themes (including disaster risk reduction).

7. Future Challenges and Priority Issues

7.1 Challenges

The political, social and economic development in Nepal is envisaged to undergo a significant transition in the years to come, as stipulated in the 2015 Constitution. However, such aspirations for change will not only set the overarching context for future growth but will also be a driving force to either exacerbate, or to reduce disaster and climate risks.

Growing cities, and the development of critical facilities and infrastructure offers an opportunity for the country to start planning and developing targeted sectoral resilience. Furthermore, because the economic growth is highly reliant on utilizing the "window of opportunity", high investments to young populations with low dependency, industry and manufacturing are required to maximize the growth potential. However, large-scale disasters may effectively hamper this process of turning from agrarian economy to production and industry. Accumulated impacts of extensive risk including monsoonal floods and landslides, drought, regional sedimentation and accelerated melting of snow

and glaciers will compound socio-economic vulnerability of agrarian-based livelihoods, may hinder rural development, and the long-term implications could take years to become evident. The change in economy is also reliant on the energy sector. However, developing hydroelectric facilities around the country creates a plethora of causative and correlative issues. Facilities are vulnerable to natural hazards such as GLOFs, they impact natural river ecosystems, and create secondary vulnerabilities to agriculture due to increased reliance on irrigation reservoirs.

Also, large reservoirs may impact weather patterns due to potentially increased precipitation, and large reservoirs have found to enhance seismic waves. Thus, sustainable future development is facing immense challenges in Nepal, and not only due to threat of disaster risk.

More integrated actions across different development domains shall be pursued to enhance coherency and maximize the benefits. In an urban context, urban development master plan should integrate all aspects including housing, infrastructures, environment, disaster and climate resilient urban design, social welfare, and inclusive urban growth. For this to happen, inter-agency coordination and collaboration is essential. Platforms should be developed among line agencies leading development, DRR and CCA including NPC, MoHA, MoFALD, Ministry of Population and Environment, Ministry of Land Reforms and Management, as well as Ministry of Urban Development.

7.2 Priority Issues

Nepal has expressed its commitment to grow through resilient development, aligned with the SDGs. DRR and CR are incorporated into implementation priorities in the highly relevant targets such as SDGs 11 and SDGs 13. Nepal is also affirmative to integrate SFDRR into country interventions, based on its risk profile, critical gaps and needs. With endorsement of the DRM Act (2017), the government is in the process to revitalize institutional arrangements among concerned agencies and different levels of authority under the federal system. Revision of existing laws and regulations pertaining to DRR is envisaged to address the overlap, conflict or gaps in the legal provisions, and the process should be prioritized.

However, collecting, analyzing and managing disaster and climate related data remains inadequate, and it is not accessible to many of the local level planners and the private sector. To support the process of prioritizing investments, and to further the understanding of sectoral impacts of climate change and disasters to the vulnerable sectors, collection and analysis of data should be reinforced at all levels of government through technical support and capacity building. A need remains to collect local level risk information based on levels of risk for all urban and rural municipalities. The vulnerable sectors of which more data is required to determine risks included private homes, schools and health facilities, as well as government- and public buildings.

Risk information should also be gathered through conducting multi-hazard risk assessments based on detailed, sectoral data and SADD. Systematic collection, management and consolidated of data from different sources is considered an essential start with risk analysis, post-disaster needs assessments and country's progress monitoring against SFDRR targets. MoHA, UNISDR, UNDP and ADPC are currently collaborating on setting up Disaster Information Management Systems, in

response to this need. Among other priorities indicated in Nation DRR Policy (2018) and National DRR Strategic Action Plan (2018- 2030) are the end-to-end multi-hazard early warnings, increased public investment in resilient infrastructure, strengthened emergency response capacity and improved standards for Search and Rescue.

Localization of the DRR and CR agenda should also be highlighted as a high priority for the government. In context characterized by limited resources and low local capacities, the ability of sub-national level disaster authorities to effectively respond and manage disaster events must be rapidly enforced. Given that local actors are usually the first responders, the success of immediate rescue, for example, often correlates largely with their available equipment and capacity to instigate operations. Empowering province- and local governments to assume effective and efficient roles in leading DRM activities in their respective localities should be increasingly emphasized in the future.

Finally, managing trade-offs between sustainable development and economic growth in a context characterized by numerous hazards and severe impacts of climate change is increasingly important and necessary to consider in development planning. Developing hydropower facilities in regions highly prone to GLOF events and seismic activity is not only endangering the settlements along the downstream river basins, but it also threatens the continuity of electricity output and thus, industry. Ensuring their seismic resistance and considering the future effects of glacier melt and changes in river flow volumes is necessary preceding the phases of construction. Furthermore, hydropower facilities may also impact the fish stocks and ecological systems in adverse ways, due to which environmental impact assessments should be enforced, monitored and carefully conducted not just for dams, but for all development taking place in a fragile setting.

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