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Assessing and addressing **CLIMATE-INDUCED LOSS AND DAMAGE IN NEPAL**

Background

Loss and damage associated with climate change has gained increasing importance in international climate change negotiations, research, and policy making in recent years. It is a significant consequence of inadequate action from the international community on delivering climate action. Loss and damage is already happening in developing countries like Nepal and it is important to understand how this can be assessed and addressed at national and sub-national level. This study examines how the issue of loss and damage is evolving in international policy and in Nepal. Most importantly, by reviewing the existing risk and impact assessment tools and proposing how these can be strengthened, it aids the national policy process in understanding how loss and damage will impact communities and nature.

Authors: Prabin Man Singh, Janakee Kiran Shrestha, Sunil Acharya, and Madhab Uprety

With contributions (including study conceptualization and review) from
Bikram Rana Tharu, Colin McQuistan, Dharam Raj Uprety, and Kriti Shrestha

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About Practical Action

We are an international development organization putting ingenious ideas to work so people in poverty can change their world.

We help people find solutions to some of the world's toughest problems. Challenges made worse by catastrophic climate change and persistent gender inequality. We work with communities to develop ingenious, lasting, and locally owned solutions for agriculture, water and waste management, climate resilience, and clean energy. And we share what works with others, so answers that start small can grow big.

We're a global change-making group. The group consists of a UK registered charity with community projects in Africa, Asia, and Latin America, an independent development publishing company, and a technical consulting service. We combine these specialisms to multiply our impact and help shape a world that works better for everyone.

In Nepal, Practical Action works in areas of Climate and Resilience, Farming that Works, and Energy that Transforms.

Practical Action is a member of the Zurich Flood Resilience Alliance, a multi-sectoral partnership focusing on finding practical ways to support communities in developed and developing countries strengthen their resilience to flood risk. Members of the Zurich Flood Resilience Alliance are funded by the Z Zurich Foundation, with the exception of Zurich Insurance Group. However, the views expressed in this publication do not necessarily reflect the official position of either the Foundation or the company.

FOREWORD

There are many inevitable consequences of climate change that can neither be mitigated nor adapted to. These inevitable consequences of climate change, also known as ‘loss and damage’, have gained increasing importance in climate change negotiations, research, and policy making in recent years. Climate-induced loss and damage results from inadequate action from the international community on delivering climate action. Loss and damage is already happening in developing countries like Nepal, which are exposed to a multitude of climate-related hazards and vulnerable to the impacts of climate change. In terms of policy, Nepal’s Nationally Determined Contribution (NDC) and Climate Change Policy 2019 emphasize the need to conduct research and studies on loss and damage associated with climate change impacts and develop and implement measures to reduce climate vulnerabilities. However, there are many challenges when it comes to comprehending, assessing, and institutionalizing loss and damage issues such as limited contextual know-how, inadequate research, and challenges to attribute loss and damage to changing climate.

Practical Action, as a part of the Zurich Flood Resilience Alliance, with funding support from the Zurich Foundation, undertook this study to generate relevant knowledge and evidence on how loss and damage could be assessed in communities on the front lines of climate change and, more importantly, how this can be addressed and ultimately reduced. Building upon the case study of flood-impacted communities in the lower Karnali region of western Nepal and a review of existing literature, this study attempts to develop common understanding on climate-induced loss and damage in Nepal. The study commenced on October 2019 and the field visits for case studies in lower Karnali were undertaken during November and December 2019.

This is one of the first studies in Nepal on climate-induced loss and damage, which builds on the existing tools and methodologies from climate change and disaster risk reduction that can be adopted to address the gaps in understanding of the loss and damage scenario in Nepal. Overall, this research study aims to strengthen policies aimed at reducing climate-induced loss and damage in Nepal and support policy makers in formulating adequate long-term solutions to deal with residual impacts of climate-related shocks and stressors that cannot be or have not been avoided.

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Achyut Luitel
Regional Director
Practical Action, Nepal

CONTENTS

Foreword	ii
Abbreviations and acronyms	iv
Executive summary	1
Introduction	4
What is loss and damage?	5
A review of lived experiences of loss and damage at the community level	11
Analysis of existing approaches and methods to assess loss and damage in Nepal	22
Review of institutional capacity	33
A framework to assess and address loss and damage in Nepal	38
Conclusion and recommendations	43
Notes	46
References	46

ABBREVIATIONS AND ACRONYMS

CC	climate change
COP	Conference of the Parties
CSDA	Cluster Specified Detailed Assessment
CVCA	Climate Vulnerability and Capacity Assessment
DDRC	District Disaster Relief Committee
DDMC	District Disaster Management Committee
DEOC	District Emergency Operations Centre
DRR	disaster risk reduction
DRRM	disaster risk reduction and management
EWS	early warning system
FGD	focus group discussion
GHG	greenhouse gas
ha	hectare
IRA	Initial Rapid Assessment
LAPA	Local Adaptation Plan of Action
LDCRMP	Local Disaster and Climate Risk Management Plan
LEOC	Local Emergency Operations Centre
IPCC	Intergovernmental Panel on Climate Change
LDMC	local disaster management committee
MIRA	Multi-Cluster Initial Rapid Assessment
MoFE	Ministry of Forests and Environment
MoHA	Ministry of Home Affairs
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NDRRMA	National Disaster Risk Reduction and Management Authority
NRCS	Nepal Red Cross Society
PDMC	provincial level disaster management committees
PDNA	Post-Disaster Needs Assessment
PRA	participatory rural appraisal
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VRA	Vulnerability and Risk Assessment
WIM	Warsaw International Mechanism

EXECUTIVE SUMMARY

Loss and damage associated with climate change has gained increasing importance in international climate change negotiations, research, and policy making in recent years. It is a significant consequence of inadequate action from the international community on delivering climate action. Loss and damage is already happening in developing countries like Nepal and it is important to understand how this can be assessed and addressed at national and sub-national level.

This study examines how the issue of loss and damage is evolving in international policy and in Nepal. Most importantly, by reviewing the existing risk and impact assessment tools and proposing how these can be strengthened, it aids the national policy process in understanding how loss and damage will impact communities and nature.

First, this study documents the lived experiences of loss and damage of people living in the flood-prone lower Karnali region of Nepal. In doing so, the study has given prime importance to the non-economic losses and damages experienced by the communities that are not often assessed or reported by the existing impact assessment processes. The result is the long list of economic and non-economic loss and damages categorized against the United Nations Framework Convention on Climate Change (UNFCCC) developed groupings.

Second, the study reviews existing approaches to and methods for vulnerability and risk assessment, post-disaster impact assessment, and insurance schemes to understand their extent and relevance in comprehensive loss and damage assessment. Each tool has its strengths and weaknesses. It was evident that these tools do not recognize the difference between tolerable and intolerable risks. Furthermore, most of the tools do not quantify the risk in monetary terms. Additionally, these tools do not cover non-economic loss and damages such as psychological trauma to the communities, indigenous knowledge, cultural heritage, and biodiversity and ecosystem services.

Third, it examines the mandates and functions of existing government institutions working on climate change and disaster risk management in assessing and addressing loss and damage. The study finds that most of the institutions at federal, provincial, and local level require additional mandates and responsibilities along with more understanding and technical know-how on assessing loss and damage, particularly for non-economic loss and damage. This lack of understanding has limited these institutions' capabilities to internalize loss and damage and enforce measures to minimize and address loss and damage.

Fourth, the study proposes a methodological framework to guide the assessment as well as developing a plan of action to identify approaches to address loss and damage. The framework proposes areas in which the existing 10 assessment methods and tools, which are used in the assessment of climate change and disaster risk reduction (DRR) sector as well as the insurance sector, can be strengthened and further developed to assess climate-induced loss and damage in Nepal.

Finally, the study provides recommendations on concrete actions that can be taken to strengthen loss and damage assessment, policy and institutional coordination, and implementation measures, which are as follows:

Assessment of loss and damage

- The Ministry of Forests and Environment (MoFE) should initiate a process to define loss and damage associated with climate change impacts in the context of Nepal.
- MoFE, as the nodal ministry for climate change as well as the primary institution for developing vulnerability and risk assessment tools, needs to initiate the process to revisit the existing vulnerability and risk assessment methods and tools to incorporate economic and non-economic parameters and categorize risk into acceptable, tolerable, and intolerable risk level.
- The Ministry of Home Affairs (MoHA) and the National Disaster Risk Reduction and Management Authority (NDRRMA) need to initiate the process to revisit existing post-disaster impact assessment methods and tools to incorporate missing economic and non-economic loss and damage parameters.
- All the concerned agencies conducting loss and damage assessment in future can take guidance and apply the stages and steps elaborated in the methodological framework proposed by this study.
- The National Planning Commission and Ministry of Finance should undertake macroeconomic impact analysis of climate-induced loss and damage of key sectors in Nepal and include the measures for addressing them in the annual and periodic planning processes.
- MoFE should initiate the process to gain a better understanding of non-economic loss and damage and the socio-cultural implications for people dependent on natural resources for their livelihoods, and assessment of non-economic loss and damage on biodiversity and ecosystems.
- Commission research and studies to substantiate understanding of loss and damage in different sectors and areas and its implications in Nepal, with particular focus on intangible loss and damage that is not easy to convert to a monetary value such as loss of lives, heritage and cultural losses, and ecosystem losses.
- Concerned agencies in provincial and local governments should undertake periodic provincial and local level loss and damage assessments to inform their planning processes.

Policy and institutions

- Internalize the concept of loss and damage, taking steps to incorporate enhanced understanding of climate change and associated loss and damage in laws, policies, and plans for DRR and climate change in all three levels of government.
- Build synergies and develop institutional mechanisms for integration of climate change and DRR in the planning and implementation processes that are currently under the separate remit of MoFE and MoHA.
- Invest in strengthening and building synergies of DRR and climate change institutions across all three tiers of governments.
- Expand the function and roles of existing institutions including NDRRMA to consider climate-induced loss and damage in their institutional mandates.
- Explore appropriateness of parametric weather index-based insurance schemes in transferring risks associated with climate impacts led by the *Beema Samiti* (Insurance Board).

Implementation

- Build knowledge and capacities of concerned agencies working on climate change and DRR including government, non-government, and civil society organizations to better understand loss and damage. Particular focus should be on assessing loss and damage and identifying and implementing approaches to address them.
- Facilitate learning and sharing among climate change and DRR practitioners and experts and build collective understanding on loss and damage.
- Mobilize civil society to support the government in building knowledge and capacities as well as learning and sharing of approaches to address loss and damage.

Introduction

Loss and damage that exemplify the inevitable consequences of climate change has gained increasing importance in climate change negotiations, research, and policy making in recent years. The loss and damage concept emphasizes that climate change impacts are exceeding the adaptive capacity of communities, countries, and ecosystems. Many avoidable impacts are not being avoided and some impacts cannot be avoided even with large improvements in climate mitigation and adaptation. Hence, it needs to be addressed retrospectively. The costs and consequences often elude quantification but are reversing development gains, causing suffering and are preventing sustainable development.

Climate-induced loss and damage is a significant consequence of inadequate action from the international community on delivering climate action. Loss and damage is already happening in developing countries like Nepal, exposed to a multitude of climate-related hazards and vulnerable to the impacts of climate change. Nepal's Nationally Determined Contribution (NDC) and Climate Change Policy 2019 emphasize the need to conduct research and studies on loss and damage associated with climate change impacts, and develop and implement measures to reduce climate vulnerabilities. However, limited contextual know-how, inadequate research, and difficulties in attributing loss and damage to changing climate are posing a challenge for the country to comprehend this issue and design effective measures to assess and address loss and damage.

Against this background, Practical Action, as part of the Zurich Flood Resilience Alliance, with funding support from the Z Zurich Foundation, undertook this study to generate relevant knowledge and evidence on how loss and damage could be assessed in communities who are living on the front lines of climate change and, more importantly, how this can be addressed and ultimately reduced. Building upon the case study of flood-affected communities in the lower Karnali region of western Nepal and a review of existing literature, this study attempts to develop common understanding on climate-induced loss and damage in Nepal. The study commenced in October 2019 and the field visits for case studies in lower Karnali were undertaken during November and December 2019. Specifically, the study tries to answer the following questions:

- What are the economic and non-economic loss and damages experienced by communities and how are they dealing with the impacts?
- What are the gaps and limitations for assessing loss and damage associated with climate change in existing tools and methods used for assessing post disaster response and recovery needs? And what are the gaps and limitations in the tools for vulnerability and risk assessment for DRR and climate change adaptation planning?
- How can these tools be adapted to effectively assess loss and damage at local and national levels?
- What is the current state of institutional gaps and challenges for addressing climate-induced loss and damage in Nepal and what are the specific capacity requirements at institutional and systems level?
- What further research and policy considerations are required at the country level to address loss and damage due to climate-related shocks and stressors?

Overall, this study aims to strengthen policies aimed at reducing climate-induced loss and damage in Nepal and support policy makers in formulating adequate long-term solutions to deal with residual impacts of climate-related shocks and stressors that cannot be or have not been avoided.

What is loss and damage?

Definitions and classification

There is no formal definition of loss and damage in the UNFCCC and the Paris Agreement. The researchers and practitioners use diverging definitions of loss and damage. The United Nations University Institute for Environment and Human Security (Geest and Schindler, 2017) describes loss and damage as ‘adverse effects of climatic stressors that occur despite mitigation and adaptation’. Similar commonly used definitions refer to loss and damage as ‘residual impacts’ resulting from insufficient adaptation and mitigation actions to prevent all climate change impacts. The residual impacts can result from both sudden onset extreme events, such as flooding and cyclones, and slow onset events, including sea level rise, glacial retreat, desertification, and others (UNFCCC, 2012).

Some researchers make the distinction between losses, which are associated with irreversibility, for example, fatalities from floods and landslides or the permanent destruction of glaciers or loss of land, and damages, which are referred to as impacts that can be restored or repaired, such as damages to buildings or siltation of land from floods. Others have classified loss and damages as avoided, unavoided, and unavoidable as explained in Table 1.

Table 1 Classification of losses and damages

Avoided	Unavoided	Unavoidable
Avoidable losses and damages that can and will be avoided by climate change mitigation and/or adaptation measures	Losses and damages that are and will not be addressed by further mitigation and/or adaptation measures, even though avoidance would be possible. Financial, technical, and political constraints, as well as case-specific risk preferences narrow down the adaptation space	Losses and damages that cannot be avoided and adapted to through further mitigation and/or adaptation measures, for instance impacts from slow onset processes that have started already, such as sea level rise and melting glaciers

Source: Mechler et al., 2019

According to the United Nations University Institute for Environment and Human Security (Geest and Schindler, 2017), the kinds of loss and damage that take place due to inadequate mitigation and adaptation or risk management are known as **avoidable loss and damage**. However, **unavoidable loss and damage** are those which occur when mitigation, adaptation, or risk management are ineffective, for example due to locked-in emissions, or where the scale of the climate impact exceeds the capacity of the adaptation approach to respond. Some measures to address this loss and damage are suggested in Table 2.

Table 2 Nature of losses and damages and ways to address them

Nature of loss and damage	Ways to address loss and damage
<p>Avoidable</p> <p>Impacts due to inadequate mitigation, adaptation or risk management</p>	<p>Reduce greenhouse gas emissions</p> <p>Remove constraints to adaptation</p> <p>Improve effectiveness of adaptation</p> <p>Enhance DRR (preparedness)</p> <p>Increase resilience and coping capacity</p>
<p>Unavoidable</p> <p>Mitigation, adaptation or risk management are ineffective, for example due to locked-in emissions</p>	<p>Social protection and safety nets</p> <p>Resettlement</p> <p>Assisted migration</p> <p>Insurance solutions</p> <p>Compensation</p>

Source: Geest and Schindler, 2017

The UNFCCC (2013) classified loss and damage as **economic** and **non-economic**. It defines **economic loss and damage** as the loss of resources, goods, and services that are commonly traded in markets, whereas **non-economic loss and damage** can be understood as the remainder of items that are not commonly traded in markets. It describes five types of economic loss and damage – business operations, agricultural production, tourism, infrastructure, and property – that directly impact income and physical assets. According to UNFCCC there are nine types of non-economic loss and damage, categorized by their direct relevance to individuals, society, and environment. They are (loss of) life, health, and human mobility at the individual level; territory, cultural heritage, indigenous knowledge, and societal/cultural identity at society level; and biodiversity and ecosystem services in the environment (ibid.). Economic and non-economic loss and damage can be associated with both slow onset events and extreme events. Figure 1 illustrates the loss and damage associated with the impacts of climate change.



Figure 1 Loss and damage associated with the impacts of climate change

Source: UNFCCC, 2017: 7

Distinguishing ‘adaptation’ from ‘loss and damage’

There is a lot of confusion between what constitutes adaptation and loss and damage and what differentiates them. These are two important and intertwined terminologies in climate change discourse and are often difficult to separate.

Adaptation is generally defined as the actions undertaken to help societies, communities, and ecosystems cope with changing climate conditions. It refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change (IPCC, 2014a).

The notion of loss and damage starts with the assumption that there is ‘a limit to adaptation’. A limit to adaptation is a threshold point beyond which climate risks cannot be tolerable through adaptive actions. The Intergovernmental Panel on Climate Change (IPCC) further classifies the limits into ‘hard adaptation limit’ and ‘soft adaptation limit’. **Hard adaptation limit** refers to the extreme point beyond which no adaptive actions are possible to avoid intolerable risks. **Soft adaptation limit** generally refers to the point beyond which intolerable risks cannot be avoided through adaptive action with current levels of knowledge and technologies (IPCC, 2014b). The soft limit may shift and expand with the development of science and technology.

The latest UN emission gap report found that greenhouse gas (GHG) emissions continued to rise at a rate of 1.5 per cent per year between 2009 and 2018. It also suggests that by 2030, emissions would need to be 25 per cent to 55 per cent lower than in 2018 to put the world on the least-cost pathway to limiting global warming to below 2°C and 1.5°C, respectively (UNEP, 2019). However, there is no sign of GHG emissions peaking in the next few years (ibid.). This is also correlated well with the very low levels of mitigation ambition currently submitted in NDCs by individual countries. The cumulative mitigation ambition of all countries is not sufficient to limit the global temperature rise to below 2°C (Geiges et al., 2019). As the global temperature continues to rise, impacts of climate change intensify and impose high risks to communities and ecosystems. A limit to adaptation is reached and loss and damage becomes inevitable and escalates in line with increasing climate impacts.

Adaptation constraints is an equally important concept in loss and damage. This refers to the factors that make it harder to plan and implement adaptation actions. These constraints include knowledge, awareness, and technology; physical constraints; biological constraints; economic and financial constraints; human resources constraints; social and cultural constraints; and governance and institutional constraints (Klein et al., 2014). These constraints restrict timely and proper implementation of adaptation actions. Lack of adequate adaptation actions exposes communities and ecosystems to high risk. High risk increases the probability of loss and damage triggered by climate-induced hazards.

There are broadly three approaches to distinguish adaptation and loss and damage. The ‘beyond adaptation’ approach defines loss and damage as actions dealing with the residual, adverse impacts of climate change, which remain even after taking mitigation and adaptation measures. The second approach distinguishes loss and damage from adaptation by focusing on whether the climate-related impacts can be avoided or will be avoided by appropriate measures (adaptation) or the impacts cannot be avoided or will not be avoided in the future by mitigation or adaptation (loss and damage). According to the third approach, adaptation involves responses to keep risks within the

range of tolerable risk, whereas loss and damage involves responses to risks that cannot be kept within the range of tolerable risks and so become intolerable. This is the risk tolerance approach and is about fostering collective decision-making and capacity building to assess climate risk as acceptable, tolerable, and intolerable (Wallimann-Helmer et al., 2019). Figure 2 summarizes the key approaches that have emerged globally to distinguish adaptation from loss and damage.

Approaches	Adaptation		Loss and damage
	Soft boundary to adaptation →	Hard boundary to adaptation →	Adaptation no longer feasible
Beyond adaptation	Adaptation		Beyond adaptation
Avoidable/unavoidable impacts	Avoidable impact – avoided	Avoidable impact – unavaoided	Unavoidable impact
	Adaptation	Avert and minimize loss and damage	Address loss and damage
Risk tolerance	Acceptable/tolerable risk		Intolerable risk
	Adaptation		Loss and damage

Figure 2 Approaches to distinguish adaptation and loss and damage



Evolution of loss and damage in the UNFCCC

Loss and damage has remained a contested topic in the UNFCCC negotiations. It was initially raised in 1991 by the Alliance of Small Island States as a proposal to be included in the UNFCCC. Unfortunately, it took several years to place loss and damage on the agenda. In 2007, the Bali Action Plan, for the first time, referred to loss and damage in its decision text. In 2010, the Cancun Conference of the Parties (COP) of the UNFCCC established a work programme on loss and damage. The most significant progress was made in 2013 with the establishment of the Warsaw International Mechanism (WIM) for loss and damage associated with climate change impacts. This led to formation of a 20-member executive committee, with equal representation of developed and developing countries. The committee carries out three functions: 1) enhancing action and support, including finance, technology, and capacity building; 2) strengthening dialogue, coordination, coherence, and synergies among relevant stakeholders; and 3) enhancing knowledge and understanding of comprehensive risk management approaches. Since 2018, the committee has been working on a 5-year rolling work plan, which covers slow onset events; non-economic losses; comprehensive risk management approaches; migration, displacement, and planned relocation; and action and support.

The Paris Agreement has a separate article on loss and damage and recognizes the importance of averting, minimizing, and addressing loss and damage through enhancing understanding, action, and support. It provides the list of areas of cooperation and facilitation on loss and damage, as follows:

- early warning systems;
- emergency preparedness;
- slow onset events;
- events that may involve irreversible and permanent loss and damage;
- comprehensive risk assessment and management;
- risk insurance facilities, climate risk pooling, and other insurance solutions;
- non-economic losses;
- resilience of communities, livelihoods, and ecosystems.

At the UNFCCC COP 25 in 2019, loss and damage was one of the contested issues for the negotiations. The WIM was due for review and the member countries have diverse views on making it functional. Several factions of the developing countries lobbied for a separate and dedicated arm for financing loss and damage. The COP agreed to consider loss and damage financing under the financial mechanisms of the convention including the Green Climate Fund, but without any obligation of the developed countries to provide new and additional finance. It also established the Santiago Network on loss and damage to catalyse technical assistance to developing countries.

Many developed country parties prescribe *insurance* as a risk transfer measure to deal with loss and damage associated with climate change impacts. Critical issues such as providing financial and technical support to vulnerable countries; enhancing understanding and clarity on *non-economic loss and damage, displacement, and migration induced by climate change*; along with *attribution questions*, remain outstanding in the negotiations.

Loss and damage in Nepal's national policy landscape

Loss and damage is relatively new in climate change policy discourse in Nepal. In legal and policy documents, very few references have been made mainly emphasizing research and studies to enhance understanding of climate-associated loss and damage. They largely fail to differentiate between adaptation and loss and damage. The National Climate Change Policy 2019 warned of increased climate-induced loss and damage in the future. It primarily focuses on adaptation and mitigation as key measures to address climate change impacts across eight vulnerable sectors identified (GoN, 2020).¹ Risk assessment and management is embedded as the policy aims to build resilience across all vulnerable sectors. The policy has not internalized the core concept of loss and damage (beyond adaptation) and the majority of the prescriptive actions largely contribute to adaptation and mitigation. Few actions like insurance, social security, post-disaster resettlement, and reconstruction can be linked to loss and damage directly. There is no clarity on whether these actions are targeted to contribute to building adaptation or to address loss and damage. The policy has provisioned regular assessment and maintenance of a database of climate-induced financial and non-financial loss and damage in different regions and development sectors (ibid.). Similarly, the NDC of Nepal 2016 has included a provision for research and study on climate-induced loss and damage together with scientific and academic communities (GoN, 2016).

The Disaster Risk Reduction and Management (DRRM) Act 2017 has envisioned a national DRRM authority at federal level and DRRM committees at federal, provincial, district, and local levels. Accordingly, the National Disaster Risk Reduction and Management Authority (NDRRMA) was formed. They are supposed to undertake, among other activities, development of DRR and management plans and policies, and compilation of data and information related to disasters (GoN, 2019). The Ministry of Home Affairs (MoHA) has recently established the Building Information Platform Against Disaster (<http://bipad.gov.np/>) for integration of disaster-induced losses and impact-related data entered from all levels into the system. Likewise, Disaster Risk Reduction National Policy 2018 aims to reduce losses caused by disasters to life and property, health, livelihoods and production, physical and social infrastructure, and cultural and environmental heritage (GoN, 2018). The National Disaster Response Framework 2013 has identified 11 clusters,² each of them led by concerned government line agencies and co-led by UN agencies and/or international agencies (GoN, 2013).

A clear institutional architecture for DRR exists across all tiers of government yet climate change is missing. These institutions have assigned roles and responsibilities related to DRR actions, including risk assessment and management, preparedness and post-disaster response, and recovery and rehabilitation. These functions overlap with climate change actions, particularly loss and damage associated with climate-induced disasters, but this link is not explicitly made. Hence, in the absence of a clear mandate and functions, these institutions are unlikely to advance the discourse and implementation of approaches to address loss and damage.

A review of lived experiences of loss and damage at the community level

This section reviews the Karnali flood disaster events and analyses community perception to understand the type of loss and damage experienced by the communities and support systems available to them.

Understanding flood loss and damage in Karnali

The Karnali river is the largest river of Nepal with a catchment size of 45,000 km². It originates from the Tibetan plateau, flows across Nepal, and crosses into India to join the Ganges. Near Chisapani (where the government has a flood monitoring station), the river splits into the Geruwa and Karnali branches forming an inland delta, and then branches to form the Ghagra river in India. Rajapur municipality lies between the two branches of Karnali, while Tikapur municipality lies in the north-western part of the Karnali branch. The river has a long history of recurrent flooding and the communities recalled major floods in the Karnali river in 1983, 2009, 2013, and 2014.

The study examined the impacts of the 2014 floods in Karnali river as a typical case of climate-induced loss and damage. From 14 to 15 August 2014 a large, slow moving weather system deposited record-breaking rainfall in the foothills of the Babai and Karnali river catchments. Rainfall of 200 mm to 500 mm over a 24-hour period was recorded at the eight meteorological stations in the region (MacClune et al., n.d.). The precipitation records of three hydro-met stations upstream of the study sites are listed in Table 3. These torrential rains resulted in an exceptional flood event, potentially a 1-in-1,000-year event, exceeding the previous largest flood by nearly a metre. The flood killed 222 people and badly affected 120,000 others, causing huge loss and damage across various sectors (ibid.).

Table 3 Precipitation recorded during the 24-hour period 14 to 15 August 2014

Station	Rainfall (mm)
Rajapur	233
Birendranagar	423
Chisapani	493

Source: MacClune et al., n.d.

The study focused on flood impacts in four key sectors — agriculture and food security, shelter, education, and protection – given their importance in people’s lives. The flood caused widespread devastation in these sectors rendering hundreds of families homeless, jeopardizing a large number of rural families’ livelihoods, and adversely impacting on education, one of the most significant social sectors. All these combined, the flood caused huge economic and non-economic loss and damage in lower Karnali. Similarly, no particular attention seemed to have been paid to protection of certain sections of society – women, children, ethnic minorities, the elderly, and people with disabilities – especially from violence, coercion, and deliberate deprivation during and after the floods.

Table 4 Impacts of the 2014-flood in Bardiya district as reported by District Disaster Relief Committee (DDRC)

Affected population	
Fully affected population	93,189
Partially affected population	71,811
Missing	13
Deaths	12
Loss of physical assets	
Health	Loss worth NPR 755,000 of infrastructures, instruments, medicine, and furniture in district hospital (1), health post (1), and sub-health posts (2).
Livestock	Loss worth NPR 67.6 m of 2,052 cattle and 19,853 birds (chickens, ducks, and others)
Road	NPR 110.6 m in loss to highways
Irrigation	An estimated NPR 270 m required to repair damaged irrigation canals and NPR 112 m in loss to 249 shallow tube wells.
Land erosion	NPR 30 m worth in loss to 25 <i>Bigha</i> of land
Agriculture	NPR 471 m worth of loss of paddy, maize, vegetable, and fisheries covering 5,653 hectares of land and loss worth NPR 630 m to stored grains and seeds. Total loss was NPR 1.1 bn.
Local infrastructure	Loss worth NPR 158 m to infrastructure such as roads and culverts.
Forest	NPR 26 m worth of loss of 2,629 trees (1,910 m ³) and 76.4 hectares of forest land eroded.
Education	95 schools and 95 primary learning centres affected; 30,676 students affected; loss of textbooks, school uniforms, and education materials. Total loss: worth NPR 98.5 m.
Drinking water	Loss worth NPR 4.9 m of water pipe and ground water boring.
Electricity	Loss worth NPR 2.73 m of electric poles and other materials.
Suspension bridge	Two suspension bridges totally destroyed. An estimated cost to restore the bridges is NPR 16.8 m.
Total loss of physical assets NPR 3.7 bn	

Note: NPR 100 ≈ US\$1.02 as of 14 August 2014; 1.48 *Bigha* = 1 hectare

Source: DDRC Bardiya, 2014

Table 4 shows that although the number of human casualties and injuries are reported, the primary focus lies on loss of physical assets across different sectors and the lost assets have been given monetary values. Physical assets can also be termed ‘economic goods’. Despite of the use of the term ‘loss’ in the District Disaster Relief Committee (DDRC)/District Disaster Management Committee (DDMC) report, the majority of the impacts reported falls under ‘damage’ that has the possibility of ‘reparation and restoration’. Only some of the reported impacts such as human casualties and land erosion can be described as ‘loss’, which is irreversible and permanent. However, it is difficult to distinguish between ‘loss’ and ‘damage’ in many cases. Importantly, non-economic loss and damage, except for human casualties, have gone unreported by DDRC/DDMC.

This study attempted to look at the economic and non-economic losses and damages across the four sectors in three affected municipalities (Geruwa, Rajapur, and Tikapur) situated along Karnali riverbank. These losses and damages have been captured based on discussion with the affected communities and interviews with key actors with first-hand experience working in flood response and recovery. It was difficult for the communities to relate the impacts to particular flood events as several recurrent floods have affected them in their lifetimes. However, this provides a typology of economic and non-economic loss and damage that the communities have been experiencing in subsequent floods.

Agriculture and food security

A focus group discussion (FGD) in Tikapur municipality in Kailali revealed that people from Magar and Chaudhary (ethnic), and Dalit (historically considered ‘untouchables’) communities living along the riverbank were most vulnerable and affected. Some Dalit families were even compelled to migrate to Bardiya. Floods swept away large swathes of paddy fields, damaged stored food grains, and killed livestock, while sediment deposits rendered a huge area of agricultural land totally unproductive. This led to a sharp decline in agricultural production, the main source of food for the people in the area.

Swathes of agricultural land are highly vulnerable to floods and so are several settlements in the ward. The people in the area also perceive that due to climate change they have been experiencing a more gradual drop in temperature during winter, and erratic precipitation over the last couple of years compared with the average. Similarly, thousands of hectares of land have been filled with sand causing a major setback to agricultural production, affecting the livelihoods of a large number of people. Many families are living hand-to-mouth, because the little money that their male relatives working in India can send them is the only means of managing their daily essentials.

The case of Rajapur Municipality in Bardiya is no better. Despite the availability of irrigation facilities, people in the area are suffering equally. Inundation is the biggest problem in the Rajapur area, according to a ward Chairperson, who added that the highly productive lands in the area are yielding far less due to inundation and should such an adverse impact on the agriculture sector continue unabated, it will surely have serious implications for livelihood and food security. As learned from FGD participants at Sonaha Village of Geruwa Rural Municipality, which was hardest hit by the floods in 1983, 2009, and 2014, most of the families lost their houses, crops, stored grains, livestock, chickens, and fish ponds, depriving them of almost all sources of income. The affected families from poor economic backgrounds, especially those who are still homeless, are depending on earnings from labour work in India, supplemented by loan and relief materials provided by different agencies. An outbreak of crop pests the year after the floods adversely affected their agricultural yield, they said.

While the aforementioned losses and damages can be termed economic, the floods have caused more non-economic losses and damages that are difficult to assess in economic terms. These non-economic losses may be more significant for developing countries for which such losses should become a central aspect of climate change policy. When land is lost or rendered unsuitable for agriculture the rich land-owners may suffer greater loss in economic terms. But apart from its productive value linked to livelihoods and food security, land ownership, regardless of the land size, for the marginalized communities often becomes the determining factor between a life with dignity and security, and exposure to different vulnerabilities and uncertainties.

Some of the FGD participants said, ‘Although loss of life in Kailali and Bardiya was minimal, the level of stress and anxiety among people affected by the floods was very high. We even feared that some of them might even commit suicide’. With the loss of land and agriculture, the key or only livelihood option for many in the area, men from the flood-affected households are forced to go to India and other countries in search of jobs and wages. The women are left behind to take care of the children and elderly, and cope with the situation as it unfolds.

When crops and lands are lost in floods, data collected based on existing tools show that the well-off families are affected more than the small landholders. Based on the finding, it is naturally the rich families who receive higher amount of relief compared to the poor ones. However, in terms of resilience, the relief distribution should have been just the opposite as the well-off families should have been more resilient. When a poor family loses a small piece of land, they lose everything as there is no provision for compensation and such family has very low resilient capacity. The existing mechanisms, however, overlook such issues.

The year following each flood event witnesses a sharp drop in agricultural production as huge areas of arable lands are filled with sand and not appropriate for agricultural activities, while even the safe lands cannot be irrigated due to heavy sediment deposits in the irrigation canals. Given this situation immediate relief alone doesn’t help. What is required is a long-term and well thought out strategic planning based on the history and trend of change in temperature, precipitation, flood events, and learning from the success or failure of the ongoing (adaptation and mitigation) measures, if food security of vulnerable people is to be protected through protection of land, crops, and livestock from recurrent floods.

(Excerpts from key informant interviews with representatives of the humanitarian agency which is supporting the communities in education and food security sectors in Tikapur municipality)

The DRR practitioners and communities in the area understand the adverse impact of floods on biodiversity and implications for agriculture and food security. They note that community, leasehold, and agriculture forests have multiple benefits in terms of their contribution to maintaining soil fertility, mitigating floods, and recharging water, but continue to be lost in floods. They have also experienced gradual extinction of bird species, frogs, and useful insects such as bees, and an increase in unfamiliar diseases, agricultural pests, and invasive alien plant species. However, they pointed out that the current practice to collect data on loss and damage does not cover these aspects.

‘Children in this settlement are no longer scared of floods’, said a Dalit women from Simreni in Tikapur-8, a settlement of 14 Dalit households on the Karnali riverbank. She did not sound happy while saying this. She purportedly meant that recurrent floods have made them insensitive. ‘As children don’t get panicky during floods, it provides a little respite, but the way they seem to be accepting floods and disturbances in their “normal” lives as something very much part of their lives is very sad’, she explained.

She also said, ‘The 2010 flood swept away my house. Loss of the house was not as painful as the loss of children’s school bags, books and notebooks including their clothes, and damage to the road to their school. Water logged and later crumbled away, making it impossible for the children to go to school for several months – some of them even quit school for good. I lost all my kitchen utensils, food grains in store, about a dozen of my chickens, and about NPR 7,000 earned painstakingly sent to me by my husband working in India. For some time my children had to remain without food and clothes. I had to feed my children by borrowing rice from families that were not affected much from the flood. Local agencies collected data on the flood, but I didn’t get anything in spite of such huge loss that I suffered. I was however smart enough to save my citizenship certificate, which I grabbed and ran away when the flood occurred’.

Shelter

Shelter is one of the sectors hardest hit by the Karnali floods. In Tikapur’s wards 5 and 8 more than 1,200 families have lost their homes to floods since 1998. In the aftermath of floods, the affected people survived by staying under trees, in make-shift camps, and staying in their neighbours’ homes for about six months. Out of the families rendered homeless by the 2014 floods, about 100 families are still languishing in the camps for internally displaced people in Tikapur. Some of the families might return to their previous homestead but about a dozen families, who do not have their own land in the village, are going to stay in the camp unless and until the government evicts them, Ward 5 Chairperson said in an interview. He also mentioned that the Karnali river diverted its course in 1998/99 converting Sri Lanka settlement into an island, and that the flood in 1983 swept away two entire wards (1 and 9) of the then Dhansinghpur Village Development Committee; hence the number of internally displaced people is high in Tikapur. Almost 1,500 houses are still highly vulnerable to flood, he added.

According to the DDRC report on the 2014 flood in Bardiya (DDRC Bardiya, 2014), Rajapur Rural Municipality witnessed damage to 852 houses, 37 of them severely damaged; 4,587 people were affected, 127 of whom were rendered homeless. Return and resettlement of the displaced families is fraught with challenges. It is risky for them to return to their previous place of settlement and no appropriate land is available in Bardiya for their relocation, the report says. Although a technical committee has already been formed as per the ‘working procedure for resettlement of the disaster survivors, 2014’, the affected families are hesitating to fill in the demand form as they are not happy with the size of land they will be allotted through the working procedure. Meanwhile, they have a suspicion that once they accept the land for relocation the government will acquire their registered land. The majority of the houses damaged by the floods belonged to landless families, the report said, adding that it takes a long process to ascertain whether or not they are genuinely landless. Resettlement of such families might still take quite a long time.

Apart from loss and damage that can be calculated in monetary terms, people have suffered other kinds of losses and damages. Often no monetary value can be attached to them and this is the

trouble for the affected people. Through FGDs and key informant interviews it can be deduced that people have **lost a sense of belonging** due to displacement. Those who are still in the camp have a **deep sense of uncertainty** as even after years there is no sign of their return to their villages or resettlement elsewhere. Those of the displaced families who have resettled by clearing forests are equally stressed, as they don't have the land ownership certificates for the land they are living on. They are in *constant fear of eviction* at any time. 'This is very unsettling, that is giving rise to a sense of insecurity among them; they feel their lives got stuck', said Ward 5 Chairperson. Those who have managed to shift elsewhere after displacement from their village and restart their life are also living in pain. The relocation entails a lot of disruption. Some of the FGD participants in Rajapur and Geruwa from Bardiya shared with the study team that:

while it takes years to adapt to a new social environment, the pain of leaving the village where they spent long years of their lives, separation from friends, leaving behind a well-established social network and a sense of loss of social identity in a new place and environment is too deep to fathom.

Education

Educational institutions along with associated facilities such as water supply and toilets are severely affected by floods. Inundation and damage to roads to the school is also a common phenomenon in flood events, which badly disrupts access to education. The communities also report damage to school buildings, which leads to closure of the school for a long time or relocation to a safer area thereby triggering a high rate of drop out. It has also been learned that given the vulnerability of schools and their own children to floods, parents become reluctant to send children to school during the monsoon period. Such disruption certainly has a direct bearing on the motivation of parents and children, and the quality of their education. In such a situation parents from a poor economic background would rather engage their children in livelihood activities.

An example is from a school in Tikapur. Karnalishwar Secondary School was swept away by floods so the students had to shift to another school. They had to travel a longer distance to reach their new school and it took them quite some time to adjust to the new environment. Many of them hesitated to continue their education. While awareness about education among the communities, especially in families from a poor economic background, is already very low, the upheavals following the floods kept many of the students out of school. After floods swept away Karnali Primary School and Kalika Primary School in Ward 8 of Tikapur along with nearby land and crops, including stored food grains, many affected families migrated to India with their children, thus discontinuing their education.

Geruwa Rural Municipality-3 did not witness complete damage to the school buildings. However, students remained out of school for months as the area was heavily inundated and the children lost their school bags along with their books, which their parents could not afford to replace.

Despite the high level of vulnerability of children, the existing approaches do not help promote a children-friendly situation in schools in terms of safety, security, and the necessary facilities. This is because immediate need is the only focus of post-flood assessment and the data is collected accordingly. There are scores of children forced into labour and even into early marriage that denies them their childhood, their right to education, and affects them mentally, physically, and socially. There is no particular tool and practice to collect data about these children after the floods.

Therefore, authentic data is not available on the real impact of floods on the lives of children and their education nor is priority given to the psycho-social problems of school children.

An adolescent girl (name withheld) who lives in Rajapur Municipality-3 Nagapur together with another eight family members, is an example of how the floods throw life out of gear for many students like her in the areas affected by the Karnali flood:

When I was 12 years old I experienced the Karnali flood in 2014 which destroyed my home compelling my family to stay and sleep under open sky. Grippled by fear of wild animals which was further intensified by whining of stray dogs, I spent many sleepless nights. At that time, I was preparing for my exam at home. But as my text books and note books were swept away by the flood and everything was in a shambles I was not able to appear for the exam. I could not go to school for almost one month; I stayed with my parents, helping my mother in household works, who was in a trauma. While the road to my school was not commutable, my worry about my mother also kept me out of school for the entire month. Even after I went to school the flash back to the devastation by the Karnali flood haunted me whenever it rained. The apprehension of similar flood deeply worried me thereby diverting my mind from my studies. However, I tried to somehow compose myself. As my parents couldn't afford to buy books and notebooks for me again, I borrowed them from my friends and tried my best to limp back to normal. One of my friends left school for good after the flood.

After the flood a number of people, I don't know from where, started coming to Rajapur. But they drove only up to the road head; they did not come to see real affected people and place in our ward. They took a lot of pictures but didn't provide any support to the affected people like us. I want to continue my study but due to many problems facing my family I cannot study properly.

Protection

Local agencies including Nepal Red Cross Society and some other organizations collect data on loss of life and property including land, crops, and livestock and distribute some relief materials to families affected by floods. 'However, they didn't collect such information as how many of the affected women are pregnant and lactating mothers, how many of the affected are children and infants, elderly and disabled, and what are their specific needs et cetera', stated participants of a FGD in Tikapur. They continued, 'Those who need special care and attention are rather ignored and treated as everybody else and their specific needs are not considered even in the camps for the displaced.' They reported that for a variety of reasons women particularly remain highly depressed during and after disasters/floods. The reasons range from their unmet specific needs, departure of their male counterparts, mainly to India to support the families' livelihood, leaving women to shoulder huge loads of work, to stress caused by an uncertain future for them and their children, whose education usually is disrupted.

According to FGD participants at Sonaha Village of Geruwa-3, Bardiya, at times of flooding it is a big challenge to take the elderly and people with physical disabilities up to the safe shelter, which is more than 1 km from the village. Affected people from Sonaha Village also experienced discrimination when they reached the safe shelter in another settlement. People from the same community, who were already there, were not accommodative; they told the affected people from Sonaha Village to stay there if they could find any space after accommodating all affected people

from the local community. 'It was quite humiliating but we had to put up with it as we didn't have any other option', they said.

A nutrition specialist working in the area talked about the increased likelihood of morbidity and mortality, especially among children, infants, pregnant women, and the elderly during and after floods. Issues such as whether the needs and concerns of these groups are not properly taken care of remain to be addressed. Do displaced lactating mothers feel comfortable breastfeeding their babies where they are living? Will pregnant and lactating women, children, infants, and the elderly get adequate nutritious food on time? Are they satisfied with the relief service? These are some of the questions that need to be answered by those engaged in impact assessment and who will provide relief services later on.

Nangapur village in Rajapur Municipality-3, in the Bardiya district experienced a massive flood affecting about 140 households in 2014. Many of the families lost their homes, livestock, stored food grains, children's books and clothes, and utensils. Members of the women-only FGD held at the village related their stories to the study team as follows:

Women, especially those whose husbands were working in India, children, and the elderly were affected the most by the flood. With no food to eat, especially for the children and the elderly, no roof over our heads, children remaining out of school, constant fear of attack from wild animals and influx of strangers, which creates some kind of fear psychosis, we (women) remained mentally disturbed during and also a long time after the flood. During this and other flood events, the conditions of pregnant, lactating mothers and newly born babies became all the more precarious as they didn't get enough food, let alone nutritious food. The place they were compelled to stay was in no way safe and hygienic nor appropriate for nursing mothers to breastfeed their babies.

Elderly people feel very insecure and afraid of the multitude of problems that come with the floods, which are beyond their coping capacity. They say they would rather die in their homes, and remain adamant that they will not leave, come what may. In such a situation we feel helpless and can do nothing but cry. For those families in a weak economic situation, the absence of the men, who usually go to India to earn their families' living, further increases the women's woes.

Table 5 outlines different types of loss and damage caused by the Karnali floods on the four sectors based on UNFCCC categories of economic and non-economic loss and damage. The economic losses and damages are fairly similar to the impacts on physical assets as reported by Bardiya DDRC/DDMC. One notable omission in the report is that while reporting on economic loss and damage it does not account for the impacts on livelihood options other than agriculture, whereas this study shows that shops and businesses were also impacted; that is, temporarily closed during the floods. Food grains and other items (for sale in the shops) were damaged and washed away by floods.

The DDRC/DDMC report includes human casualties only as non-economic loss and damage. The study, however, shows a wide range of the flood-induced non-economic loss and damages experienced by individuals, the community, and the environment, which are difficult to account for and measure.

Table 5 Economic and non-economic loss and damage as reported by communities in the study sites

Income		Economic loss and damage
Business operation	Closure of shops and business	
Agriculture production	Crops Stored food grains Livestock Agricultural tools	
Tourism	<i>Not reported</i>	
Physical assets		
Infrastructure	Irrigation canals School buildings Roads	
Property	Houses Toilets Land Cattle sheds Kitchen utensils Clothes and bedding Water pumps Carts Loss of important documents	
Individual		
Life	Loss of childhood, disruption in education; children are affected mentally, physically, and socially Stress and anxiety Deep sense of despondency Loss of life Fear and pain Increased vulnerability	
Health	Illness due to water borne diseases Increased morbidity Effects on infants' normal growth	
Human mobility	Migration Loss of a sense of belonging Increased male migration to India (at times including children) Men working in India constantly worried about their families back home, home sickness Women back home feel helplessness and haunted by unpredictability of the situation	
Society		Non-economic loss and damage
Territory	Not considered in the study as it relates to political borders	
Cultural heritage	Rituals, practices lost with having to cope in new environment, locations	
Indigenous knowledge	Traditional weather and flood prediction practices	
Societal/cultural identity	Loss of dignity, identity, and security Exposure to different vulnerability and uncertainties Loss of networks Possibility of increase in child labour and child marriage	

Environment	
Biodiversity	Gradual extinction of bird species, frogs, and useful insects such as bees, and an increase in new diseases, agricultural pests, and invasive alien plant species
Ecosystem services	Loss of community, leasehold, and agriculture forests badly impacting on soil fertility, flood mitigation, and water recharge, leading to multiple losses Loss of agriculture biodiversity Soil

Based on the study findings it can be safely argued that, on one hand, reports on Karnali flood-induced economic and non-economic loss and damage are heavily skewed towards economic loss and damage with the omission of non-economic impacts, and, on the other hand, not all types of economic loss and damage are reported. Economic loss of or damage to land, houses, crops and food grains, and infrastructure, mainly roads, irrigation canals, and school buildings, received a lot of attention when collecting data and reporting on the flood impacts. While non-economic loss and damage, except for human casualties, are unreported, many kinds of non-economic loss and damage explored by this study do not fit in well with the UNFCCC-categorized non-economic loss and damage.

Local practices for dealing with loss and damage

In view of the high vulnerability of the study area to climate-induced and other disasters, mainly floods, and their severe impact on, among other sectors, agriculture and food security, shelter, education, and protection, several efforts are under way to minimize the impacts and enhance preparedness. Early warning system (EWS), construction of embankments, safe shelters, and elevated drinking water taps are some of the examples.

Construction of embankments has prevented large-scale flooding since 2014. EWS is playing a vital role in alerting people on time and helping to minimize loss of life; people in vulnerable areas save their important belongings from floods by keeping them in upper parts of their houses or in neighbours' houses, which are in safer places. Some mechanism also exists at ward level to collect data on loss and damage. The Community Disaster Management Committee, search and rescue committee, and first aid committee are part of the mechanism. Some rescue materials are stored in the community and trained volunteers have been prepared for mobilization in rescue work at times of floods. With floods filling agricultural lands with sand, people in the affected areas have started river bed farming and cultivating sugar cane as an alternative crop, which does well even if the soil is not that fertile. With floods destroying community forest in the area, the local people have started growing and conserving cane and bamboo, which checks the flow of flood waters, conserves soil, and gradually becomes a good source of income for the local government.

Other measures taken by the community to minimize flood-induced loss and damage include keeping seed grains at neighbours' houses or other safe places at home or in nearby villages. According to FGD participants at Rajapur, local people receive SMSs about the water level in the Karnali river and get prepared accordingly. Safe places and safe shelters, elevated water pumps, and toilets in safe shelters also exist in the community. The Rajapur municipality has also set up a disaster management fund.

The local government representatives also said that people in the community have heard about agriculture and livestock insurance but they do not seem interested in the scheme. A local NGO representative specializing in agriculture and economic development explained this further. They mentioned that although the crops and livestock insurance scheme launched by the federal government sounds good, as it promotes local insurance companies to expand their services to include remote areas throughout the country, it does not have a package covering crucial elements. Thus, the scheme is not so popular among local people. Had the insurance scheme covered areas such as an irrigation canal, which would benefit hundreds of families, siltation, and soil fertility, it may have been too attractive a scheme for the people to say no.

Tikapur wards No. 5 and 8 were hardest hit by floods in 1983, 2009, 2012, and 2017. The local Rose Park, roads and irrigation canals, agricultural crops including banana farming – which is picking up as a potential enterprise in the area – and livestock suffered huge loss and damage. Sugar cane cultivation started in the sand-filled lands, which are no longer suitable for paddy and other crops. But there are no sugar mills around, so farmers are not benefitting as expected. The embankment has been of little support as it cannot check large floods. The community cobbled together a temporary flood-defence system with the support of the Rani Jamara Irrigation Project, which also built a 1-km concrete embankment in the area.

The officials of the municipality are not well versed in the concept of climate-associated loss and damage. However, the municipality has developed and started implementing a Disaster Management Act and has started incorporating DRR considerations in development planning and budgeting. It is developing a long-term plan factoring in 3 per cent of the total budget for DRR activities. It is making sure that plans and budget at the ward level are DRR responsive. As a result the municipality currently has about NPR 3.5 m (US\$30,000) in its emergency fund. The Ward Committees are supporting construction of elevated taps and toilets, safe storage facilities, and safe shelters.

The municipality does not lead the data collection, especially to avoid possible and perceived (political) bias in loss and damage data collection and relief distribution. It is led by Nepal Red Cross Society (NRCS) with the support of Nepal Police and local government, and the data is submitted to the District Emergency Operations Centre (DEOC). As the municipality already has some emergency funds, a couple of rubber boats, ropes, airlift bags, and 33 high shelters, among other things, it is confident that even if the highway is blocked by floods, it has the capacity and resources to manage everything for about a week. The municipality has a plan to record the location of all the houses in the municipality in a GPS locator, launch an awareness campaign at ward level, prepare 15–20 search and rescue volunteers every year through a week-long training, implement a building code, and ensure all new construction including roads are ‘flood resistant’.

(Excerpts from key informant interviews with previous and current DRR focal persons at Tikapur Municipality Office)

Analysis of existing approaches and methods to assess loss and damage in Nepal

In Nepal, DRR and climate change communities are using several approaches and methods for post disaster damage and loss estimation to design response and recovery programmes as well as vulnerability and risk assessment for disaster preparedness and climate change adaptation planning.

The study reviewed eight such approaches and methods and tools commonly used by DRR and climate change practitioners to check their relevance and completeness for assessing loss and damage associated with climate change. In addition, the study reviewed two insurance schemes implemented in Nepal. These tools and methods have their own utility for the purpose they are designed for but this study tries to review these from the perspective of their usefulness, shortcomings, and possible integration for assessing climate-associated loss and damage. A list of the reviewed methods and tools are presented in Table 6.

Table 6 Existing tools and methods for assessing loss and damage

Climate change vulnerability and risk assessment methods and tools	DRR planning and impact assessment methods and tools
Framework for Local Adaptation Plan of Action (LAPA), 2011 Vulnerability and Risk Assessment (VRA) Framework for National Adaptation Plan, 2017 Climate Vulnerability and Capacity Assessment (CVCA), 2019	Local Disaster and Climate Risk Management Plan (LDCRMP), 2011 Initial Rapid Assessment (IRA) Multi-Cluster Initial Rapid Assessment (MIRA) Cluster Specified Detailed Assessment (CSDA) Post Disaster Needs Assessment (PDNA)
Insurance product Agriculture and Livestock Insurance Programme Weather Index-based Insurance Product	

Methods and tools used by climate change adaptation communities

These methods and tools are primarily used for a variety of different purposes related to risk assessment due to climate-induced disasters across different sectors and in the community. These are explained in detail below.

Vulnerability and Risk Assessment Framework

The **Vulnerability and Risk Assessment (VRA) Framework** was adopted in the course of formulating the National Adaptation Plan (NAP) to analyse climate risk. This framework considers risk as a function of hazard, exposure and vulnerability, and includes sensitivity and adaptive capacity (MoPE, 2017). A set of indicators for hazard, exposure, sensitivity, and adaptive capacity have been identified for seven vulnerable sectors: 1) agriculture and food security, 2) climate-induced disasters, 3) forest and biodiversity, 4) public health, 5) tourism, natural and cultural heritage, 6) urban settlements and infrastructure, 7) water resources and energy; and two cross-cutting areas – gender and marginalized groups, and livelihoods and governance – have been identified.

There are eight steps in conducting the VRA. These are:

1. Scoping vulnerability and risk
2. Developing the VRA framework
3. Identifying key indicators of hazards, exposure, and vulnerability for the different thematic and cross-cutting areas
4. Exploring data sources, nature and character of climate trends and scenarios, and sector-specific data
5. Data collection, tabulation, filtering, and normalization
6. Weightage and composite value
7. Analysis of data
8. Identifying climate change impacts and risks (MoPE, 2017)

This is a comprehensive tool among other methods and tools currently developed to assess climate risk in Nepal. A set of indicators is developed to identify hazards, exposure, and vulnerability associated with each sector and cross-cutting area. A detailed review of these indicators shows non-economic parameters are not duly considered while designing the indicators. The majority of indicators provide detailed information on economic parameters used to quantify risk.

National Framework for Local Adaptation Plan of Action

The **National Framework for Local Adaptation Plan of Action (LAPA)** was developed by the Government of Nepal with the aim to integrate climate adaptation activities into local and national development planning processes and to create a situation for climate resilient development (GoN, 2011). Climate vulnerability and adaptation assessment is a key step that assists in identification of climate vulnerable communities and selection of adaptation outcomes and actions. It is a combination of a top-down approach to assessing the status and quality of systems and resources at the village and ward level (Gateway Systems Analysis) with a bottom-up, community-based vulnerability assessment approach to assessing the extent to which vulnerable men, women, communities, and households can access climate resilient services provided by these systems and resources (ibid.). A number of participatory rural appraisal (PRA) tools such as hazard mapping, resource mapping, well-being ranking, seasonal calendars, hazard trend analysis, and others are used to assess vulnerabilities. Geographical information system maps are also used to assess and locate vulnerabilities.

There are seven steps in the approach to formulate the LAPA by the local government bodies:

1. Climate change sensitization
2. Climate vulnerability and adaptation assessment
3. Prioritization of adaptation options
4. LAPA formulation
5. LAPA integration into planning process
6. LAPA implementation
7. LAPA progress assessment

Unlike a VRA, this tool does not have predefined indicators and specific sector focus. The tool assesses disaster risk based on the information provided by the communities from their experiences and memories by using PRA tools. It is likely that this tool can generate information on both economic and non-economic parameters, provided PRA tools are used wisely with due

consideration to both parameters. Non-economic losses are mainly of a subjective type and not easily identified as elaborated in the Karnali floods case story. An open-ended assessment method and tool can better document non-economic loss and damage than a predefined set of indicators given the nature and characteristics of non-economic loss and damage.

The LAPA not only conducts a VRA but also identifies the priority adaptation actions. The execution is done through mainstreaming the priority adaptation actions in village/municipal level planning processes.

Climate Vulnerability and Capacity Assessment

The **Climate Vulnerability and Capacity Assessment (CVCA)** process provides a basis for identifying options for building climate resilience. It uses participatory research, as well as secondary research, to gain a locally specific understanding of vulnerability to climate change and existing resilience capacities (CARE, 2019). Key parameters used in identification of climate resilience options are: climate risk and changes, existing resilience capacities, and barriers to resilience. Besides these, this method also considers gender equality, ecosystems, and inclusive governance as cross-cutting issues to consider while conducting the assessment (ibid.).

In this assessment, the components of vulnerability assessment are carried out in several steps. In Step 2 (getting organized) and Step 3 (gathering background information), information related to climate context, climate impacts, current response to climate risks, community strategies to increase climate resilience, livelihood context, institutional actors, gender context, governance context, and ecosystem context is documented from secondary sources. In Step 4 (participatory research), nine participatory tools are used to collect data and information related to vulnerabilities. These tools are, hazard map, historical timeline, seasonal calendar, daily clock, household decision making pile sorting, impacts chains, vulnerability matrix, Venn diagram, and adaptation pathways.

The CVCA process comprises seven steps:

1. Defining the objective and scope of the analysis
2. Getting organized
3. Gathering background information
4. Participatory research
5. Analysing the information
6. Validating the analysis
7. Documenting the analysis

Similar to the LAPA, this method applies PRA tools and relies on information shared by the communities for making inferences on disaster risk. This tool focuses on gender and governance as well as vulnerable sectors, as these are the critical elements when assessing risk associated with climate change.

Table 7 Summary of reviewed DRR, climate change, and insurance methods and tools

	Tool name	Agency	Scope	Spatial scale	Sectors	Quantitative/ qualitative	Pre or post disaster assessment
Climate change adaptation (all climatic hazards)	Vulnerability and Risk Assessment Framework	Ministry of Forest and Environment	Adopted in course of formulating National Adaptation Plan (NAP) to analyse climate risk. It considers risk as a function of hazard, exposure, and vulnerability (sensitivity and adaptive capacity) and uses a developed set of indicators	National	Agriculture and food security; climate-induced disasters; forest and biodiversity; public health; tourism, natural and cultural heritage; urban settlements and infrastructure; water resources and energy; gender and marginalized groups; and livelihoods and governance	Quantitative and qualitative	Pre disaster
	Framework for Local Adaptation Plan of Action	Ministry of Federal Affairs and General Administration	Integration of climate adaptation activities into local and national development planning processes and to create a situation for climate resilient development; use of participatory tools to assess vulnerability and capacities	Local	Not specific to any sector	Qualitative	Pre disaster
	Climate Vulnerability and Capacity Assessment	CARE	A participatory research tool, as well as secondary research, to gain a locally specific understanding of vulnerability to climate change and existing resilience capacities	Local	Not specific to any sector	Qualitative	Pre disaster

DRR (all hazards)	Local Disaster and Climate Resilience Plan	Ministry of Federal Affairs and General Administration	To build resilience by institutionalizing disaster and climate change through mainstreaming in periodic and annual plans and programme of local governments; use of PRA tools to assess vulnerabilities and capacities	Local	Not specific to any sector	Qualitative	Pre disaster
	Initial Rapid Assessment (IRA)	Red Cross	Use within 24 hours of disaster event. Provides initial data to identify immediate needs of disaster-affected communities for survival. Helps to prioritize response actions	Local	Demographic, infrastructure and agriculture and livelihoods	Quantitative	Post disaster
	Multi-cluster Initial Rapid Assessment (MIRA)	UN Agencies	Use within 7 to 15 days of disaster event. Use if response is required in two or more sectors	Local	Shelter and non-food items; food security; water and sanitation; protection; nutrition, health, education; emergency; communication; logistics; camp coordination and management	Quantitative and qualitative	Post disaster
	Cluster Specific Detailed Assessment (CSDA)		Use within 15 to 45 days of disaster event. Use if additional response required for any sector. Use to develop response and recovery plans with quantitative and qualitative information for each sector	Local	Health, drinking water, sanitation and hygiene promotion; shelter/housing; food security; logistics; camps management; education; child protection; emergency communication; nutrition	Quantitative and qualitative	Post disaster
	Post-Disaster Needs Assessment (PDNA)	The World Bank, UNDP and the European Union	Use after early recovery phase of disaster event. Account disaster-induced losses and needs for reconstruction and long-term development of disaster-affected areas. Only use in case of large-scale disaster with approval by the Government of Nepal led by sectoral experts	National	Housing and human settlements; health and population; nutrition; education; cultural heritage; agriculture; irrigation; commerce and industry; tourism; financial sectors; electricity; communication; community infrastructure; transport; water, sanitation, and hygiene; governance, DRR; environment and forestry; employment and livelihoods; social protection, gender equality and social inclusion	Quantitative and qualitative	Post disaster

Methods and tools used by disaster risk reduction communities

Disaster risk reduction methods and tools are applied to assess risk associated with disaster and also to estimate impacts caused by disaster events. In Nepal, several methods and tools are used to assess post-disaster impacts in different time intervals after the event. Generally, the first assessment is done within 24 hours of the disaster event, then between 7 and 15 days of the disaster event, and the third assessment is done within 45 days of the disaster event (GoN, 2015). These assessments are carried out to support post-disaster response, recovery, and rehabilitation. These methods and tools are used for both climatic and non-climatic disasters.

Local Disaster and Climate Resilience Plan

The **Local Disaster and Climate Resilience Plan (LDCRP)** aims to build resilience by institutionalizing disaster and climate change through mainstreaming in periodic and annual plans and programme of local governments (GoN, 2017a). Vulnerability and capacity assessment is a key part in the formulation process that comprises four major components. The components are: collection of information and data on disaster and climate change; vulnerability and capacity assessment; analysis of vulnerable areas and land-use plans; and development of a vulnerability map. A range of PRA tools such as historical timeline, pair-wise ranking matrix, seasonal calendars, and resources mapping are widely used to collect information and data on vulnerability and capacities. Besides these, land-use maps are also used to analyse vulnerabilities (ibid.).

There is a five-step process:

1. Preparation and coordination
2. Vulnerability and capacity assessment
3. Formulation of local disaster and climate resilience plans
4. Approval, mainstreaming, and implementation of the plans
5. Monitoring, evaluation, and review

This method is similar to the LAPA, applies PRA tools, and relies on the community's information to assess risk of disaster. In addition, the tool uses a land-use map to analyse vulnerabilities.

Initial Rapid Assessment

An **Initial Rapid Assessment (IRA)** is the first assessment done to assess the impacts of disaster within 24 hours of the disaster event. It provides initial data on the immediate survival needs of disaster-affected communities and also identifies and prioritizes the sectors for the response. Generally, data are reported on gender-disaggregated affected households and population; impacts on infrastructure and services such as schools, roads, and bridges; health; communication, electricity, and others. Similarly, impacts on agriculture and livestock are also documented.

These data were collected through personal and group interviews, observation, and key informant interviews. A three-member team comprising a secretary or representative from the ward/municipality, Nepal Police, and Nepal Red Cross Society carry out this assessment under the leadership of the Chief District Officer.

Multi-Cluster Initial Rapid Assessment

A **Multi-Cluster Initial Rapid Assessment (MIRA)** is the second assessment done within 7 to 15 days of the disaster event. This is done if post-disaster response is needed in two or more sectors. It provides both quantitative and qualitative data on the disaster-affected populations and helps in development and implementation of a sector-wide response plan. The sectors covered are shelter and non-food items, household food security, water and sanitation, protection, nutrition, health, education, emergency communication, logistics, and camp coordination and management. Many of these sectors are interrelated and information is overlapping. A few sectors such as logistics, emergency communication, and camp coordination and management are essential to carry out response work but are not directly related to impacts.

Data are collected through interviews, observation, focus group discussions, and from the secondary sources. This assessment is done by a group of government and non-government agencies with sector expertise under the guidance of the National Disaster Risk Management Committee.

Cluster Specified Detailed Assessment

A **Cluster Specified Detailed Assessment (CSDA)** is done only if additional response is needed in a specific sector. It is done within 15 to 45 days of a disaster event. It helps to develop and implement the response and recovery plan. Generally CSDA is carried out in the following sectors: health, water supply and sanitation, shelter/housing, food security, education, child protection, nutrition, logistics, and camp coordination and management.

In each sector, both quantitative and qualitative data on loss incurred and current status of disaster-affected communities is documented. Accordingly, response and recovery needs of households and communities are identified.

Again, the data collection methods are similar to MIRA. It largely depends on data collected through interviews, observation, focus group discussions, and from secondary sources. It is done by a group of specialized organizations from the specific sector required.

Post-Disaster Needs Assessment

A **Post-Disaster Needs Assessment (PDNA)** is conducted to assist government to assess the full extent of a disaster's impact on the country and, on the basis of these findings, to produce an actionable and sustainable recovery strategy for mobilizing financial and technical resources. It evaluates the effect of the disaster on infrastructure and assets, service delivery and access to goods and services, governance and social processes, and estimates the damage and loss caused by the disaster to physical infrastructures, productive sectors, and the economy, including an assessment of its macro-economic consequences. It also identifies recovery and reconstruction needs and develops a recovery strategy including an estimated cost of recovery and reconstruction. It covers a wide range of sectors: social (housing, education, health, culture, and nutrition); infrastructure (water and sanitation, community infrastructure, energy and electricity, transport, and telecommunication); productive (agriculture, livestock and fisheries, commerce, trade and industry, tourism); macro-economy (gross domestic product, balance of trade); human and social development (Sustainable Development Goals, Human Development Index, poverty); finance (banks and financial institutions); and cross-cutting sectors and themes (governance, DRR, environment, gender, employment, and livelihoods) (EU et al., 2013). It is also used for international appeals to call for funding support.

The method follows a six-step process:

1. Pre-activation and activation
2. Preparing a PDNA
3. Data collection and validation
4. Consolidation and analysis
5. Formulating the recovery strategy
6. Resource mobilization and implementation mechanism

In Nepal, PDNAs have been conducted twice. Firstly, one was conducted to assess the impacts of the 2015 earthquake and secondly for the 2017 floods. The National Planning Commission of Nepal led both the assessments in close coordination with Ministry of Home Affairs and other line ministries. Post-Flood Recovery Needs Assessment 2017 is the key tool used for loss and damage from floods in Nepal. It is considered the basis of recovery planning and for averting future risks as well. The PDNA for flood exercise is rigorous and builds on a scientific base of measurements. It incorporates both the loss calculation and estimation of recovery needs. However, the PDNA is done after the major disaster event only.

The key informants are of the view that hazard-wise common standards should be developed for assessments and indicators, and means of verification elaborated. They should be supported by the related data prepared and collected beforehand so that the calculation of losses can be more precise. Human resource capacity enhancement is a critical factor for improvement of the results. Table 8 gives a summary of the Post-Floods Recovery Needs Assessment of the 2017 monsoon floods.

The 2017 monsoon flood spanned the entire breadth of the country. A total of 35 districts were affected of which 18 were severely impacted. There were 134 deaths – 44 women and 90 men – and 22 people were injured. In the 18 severely affected districts, the floods affected a total of around 1.7 million people (866,993 men and 821,480 women). Table 8 summarizes the total damages and recovery needs across the most affected sectors.

Table 8 Summary of Post-Flood Recovery Needs Assessment 2017

Sectors	Total damages (in US\$ m)	Total needs (in US\$ m)
Social sector		
Housing	187.9	375.8
Health	6	6.5
Education	11.5	11.5
Productive sector		
Agriculture	69.5	61.6
Livestock	102.7	26.9
Irrigation	168.1	168.1
Infrastructure sector		
Transport	28.3	28.3
Water and sanitation	8.5	20.9
Energy	2.12	2.33
Total	584.7	705.1

Source: GoN, 2017b

Insurance schemes

Insurance is considered an important mechanism to address loss and damage caused by climate change in international policy discourse. Critics of expanding insurance schemes to address loss and damage refer to the limitations of the mechanism especially in relation to the principles of common but differentiated responsibilities and respective capabilities, and intergenerational equity as well as economic and gender inequality. Also there are limits to insurance as it cannot provide appropriate financial response to address the full range of loss and damage experienced (Nordlander et al., 2019).

In Nepal, the government has introduced both indemnity insurance schemes as well as index-based parametric insurance schemes, which provide compensation for loss and damage. The majority of the insurance schemes in use at the moment are the **indemnity type**. In these schemes, risks of multiple types of pre-agreed hazards are covered. Hazards covered can be both climatic and non-climatic. Risk of major climate hazards affecting agriculture and livestock are popularly covered by these schemes. Table 9 categorizes hazards covered in the insurance based on their relevance to climate.

Table 9 Types of climatic and non-climatic hazards covered in the Nepal government’s Agriculture and Livestock Insurance Programme

Climate-based hazards	Non-climate-based hazards
Fire and thunderstorms	Earthquake
Floods, inundation, and drought	External reasons for emergencies (wild animal attack)
Landslides and erosion	Loss cause by chemicals (fishery)
Windstorms, hailstorms, snowfall, and frosts	Other risks specific to crop types
Insects and diseases	

One of the major schemes is agriculture and livestock insurance as a priority programme of the government. It aims to minimize risks associated with agriculture and livestock for farmers and to compensate for any loss and damage. The Government of Nepal formally introduced the programme in January 2013. Since then, there has been a steady increase in the number of farmers joining the programme. In FY 2017/18, 67,843 farmers had insured their crops and livestock for a total of NPR 15.26 bn (US\$1.3 bn). Under this programme, different types of cereal crops, spices, oilseeds, pulses, vegetables, mushroom, fruits, livestock, fisheries, and bee keeping are currently insured. Twenty insurance companies operating in Nepal are providing agriculture and livestock insurance services.

There are two approaches for calculating the insurance amount and premium. The first approach is based on **cost of production**. In this approach, the total cost of production (per hectare of land) is calculated by adding variable cost and fixed cost. The variable cost and fixed cost for each crop type are fixed by the Department of Agriculture. These costs are calculated on the market value and vary with locations. The second approach is based on **product value**. The product value is calculated by multiplying productivity (per hectare) and farm gate price (per tonne). The productivity of the crop is fixed by the Department of Agriculture and the farm gate price is the market price of the crop.

Cost of production (per hectare) = variable cost (per ha) + fixed cost (per ha)

Product value = productivity (per ha) × farm gate price (per tonne)

For the majority of crops, fruits, and livestock, the premium amount is 5 per cent of the insured total using the cost of production approach. The amount is slightly higher at 7 per cent for a few crops (vegetables and ginger) using the product value approach. In the case of index type insurance for apple, the premium amount is 8 per cent. For ostrich farming and bee keeping the premium amount is 2 per cent and for poultry (broiler) the amount is 1.25 per cent. The government provides a 75 per cent subsidy on the premium amount. The maximum amount that can be claimed is 90 per cent of the insured total.

Recently, the **index-based parametric insurance scheme** has been introduced in Nepal with pilots in apple farming. With index-based insurance, farmers are not protected against actual losses but receive a pay-out based on a weather index parameter so it only covers certain indexed hazards. In such schemes, the insurance company makes payment to a farmer based on a predefined weather index being met, with the index closely correlated to agricultural production, such as rainfall and temperature. Other indexes include minimum temperature, maximum temperature, humidity, frost, velocity of wind, snowfall, and other measurable weather conditions. The payment will be made when the index exceeds a certain threshold, often referred to as a trigger. For example, in the apple example, rainfall is used as an index. If the recorded rainfall is less than 60 mm in the location, the enrolled farmers get the payment from the insurance company regardless of the actual loss or damage they incurred.

A detailed review of each of the tools and methods explained above was conducted to understand and analyse how these tools covered different types of economic and non-economic elements of loss and damage as defined by the UNFCCC. Table 10 presents a summary of the findings of the review of tools and methods used for climate change vulnerability and risk assessment as well as DRR planning and impact assessment tools. This does not mean that these tools are comprehensive in the aspects covered but highlights how these aspects could relate to loss and damage.

Table 10 Types of economic and non-economic loss and damage covered by existing tools and methods

Loss and damage types/ tools	Climate change methods and tools			Disaster risk reduction methods and tools					
	LAPA	VRA/NAP	CVCA	LDCRMP	IRA	MIRA	CSDA	PDNA	
Economic loss and damage	Income								
	Business operations	✓	✓	✓	✓	✓	✓	✓	✓
	Agriculture production	✓	✓	✓	✓	✓	✓	✓	✓
	Tourism	X	✓	X	X	X	X	X	✓
	Physical assets								
	Infrastructure	✓	✓	✓	✓	✓	✓	✓	✓
	Property	✓	✓	✓	✓	✓	✓	✓	✓
Non-economic loss and damage	Individual								
	Life	✓	✓	✓	✓	✓	✓	✓	✓
	Health	✓	✓	X	✓	X	✓	✓	✓
	Human mobility	✓	✓	X	X	X	✓	✓	✓
	Society								
	Territory	X	X	X	X	X	X	X	X
	Cultural heritage	X	✓	X	X	X	X	X	✓
	Indigenous knowledge	✓	✓	X	✓	X	X	X	X
	Societal/cultural identities	X	X	X	X	X	X	X	X
	Environment								
Biodiversity	✓	✓	X	X	X	X	X	✓	
Ecosystem services	X	✓	X	X	X	X	X	X	

Review of institutional capacity

Building upon the review of lived experiences of loss and damage at the community level as well as methods and tools used currently, the study attempted to understand the current role and functions of the relevant institutions involved in risk reduction and preparedness, response and post-disaster recovery, DRR, and climate change adaptation planning.

As discussed above, there is a practice of conducting post-disaster rapid assessment by using tools such as IRA, MIRA, CSDA, and PDNA. However, such assessments are done for the sole purpose of response. Experience from the lower Karnali river basin shows that assessment of loss and damage to physical assets is carried out jointly by Nepal Police and NRCS, while assessment of flood impact on agriculture and livestock falls within the purview of the District Agriculture and Livestock Office. Cluster-based data collection is also used in practice. However, non-economic loss and damage such as trauma are not captured by the existing data collection tools, which are focused on quantity of loss and damage rather than the impact of such loss and damage on the affected households.

On the management and utilization of the data and information collected, it was found that, generally, initial information is collected by the MoHA through its security network, namely the Nepal Police. Detailed assessment is carried out for specific disasters by the sectoral ministry and departments. In the case of PDNA exercises, the National Planning Commission leads the processes in close coordination with the sectoral agencies. Initial Rapid Assessment tools finalization and use is led by the MoHA. Cluster leads are directed and facilitated for the MIRA as well if required. For PDNA, the MoHA is a core agency. Overall facilitation of data collected is the responsibility of the MoHA. In case of disasters occurring regularly and at small scale, the MoHA has its security networks throughout the country for initial assessment and data collection. In addition, there is a mechanism to conduct a detailed assessment of damage and loss by sector using IRA and MIRA tools as the related agency provided a detailed calculation of the loss.

Primarily, the information collected is analysed and shared among the stakeholders by the MoHA. It encourages sectoral agencies to use the data to guide response and recovery and for their incorporation in the sectoral recovery plan.

The vulnerability and risk assessment methodology and tools used for climate change adaptation planning are aimed at understanding the prospective and anticipated impacts of climate change so that appropriate adaptation interventions can be designed. The lead agency for developing such frameworks and tools is the Ministry of Forests and Environment (MoFE). There have been several initiatives to understand climate change vulnerability and risks with the first comprehensive vulnerability assessment conducted during the National Adaptation Programme of Action (NAPA) preparation process in 2010 (GoN, 2010). To conduct climate change vulnerability assessment at the local government level, the National Framework for Local Adaptation Plan of Action (LAPA) is used. However, this process is primarily led by external agencies (UN agencies, NGOs, consulting companies, etc.) and later endorsed by the local government. Currently, the National Adaptation Plan (NAP) formulation process is under way to identify medium- and long-term risks of climate change and measures to tackle them. The process has developed a framework for vulnerability and risk assessment and the MoFE is conducting this assessment with external support.

On the insurance side, some high value crops are being insured, such as banana and apple, based on the cost of inputs. Cost of inputs is calculated, disaggregated by life span of the crop, and

compensated on damage caused. The premium is calculated based on the historical loss trend and possibilities of damage that might occur. The premium is adjusted by geographical location.

The study found that detailed assessment methodology is yet to be prepared for capturing the loss and damage that are direct and cumulative in nature. Direct economic losses are easier to calculate whereas the non-economic and consequential impacts are hard to estimate. Uniform standards and methodology need to be developed and agreed so that every agency maintains uniformity in their assessments.

Robust tools and standards are yet to be developed to incorporate hazard-specific economic and non-economic loss and damage. Human resources should be developed for the data collection. In addition, use of technology for loss and damage estimation and calculation such as satellite imagery for generating data on impact would be more effective.

The municipalities and associated bodies like local disaster management committees (LDMCs) and local emergency operations centres (LEOCs) will play a critical role in collecting and documenting evidence of loss and damage and executing risk reduction and adaptation interventions to protect people, life, and livelihoods from climate-induced disasters. Presently, it is difficult to assess the roles of provincial institutions as there is no clear legal mandate for these institutions despite the constitution devolving the mandate to work on DRR and climate change to all three tiers of government.

Loss and damage is a relatively new concept to the majority of stakeholders across all three tiers of government. Limited understanding and lack of technical know-how on assessing loss and damage, particularly for non-economic loss and damage, have limited these institutions' capabilities to internalize loss and damage and enforce measures to minimize and address loss and damage.

Overall, there is no 'fit for purpose' institutional set up that exists for climate change and DRR. Multiple institutions exist at different tiers of government with overlapping and contradictory functions and roles.

Institutions at all three tiers of government can play roles in assessing loss and damage associated with climate change. In particular, federal ministries need to facilitate the integration of loss and damage into existing laws, policies, and plans on DRR and climate change. The National Disaster Risk Reduction and Management Authority (NDRRMA) role will be instrumental in institutionalizing loss and damage across all three tiers of government. It needs to start working on new standards on DRR and climate change assessments considering comprehensive risk management approaches along with harmonization of risks and impacts concepts.

Table 11 summarizes current roles and responsibilities and capacity gaps of key institutions at all three tiers of government in assessing loss and damage associated with climate change. It also lists prospective roles and responsibilities of these institutions to conduct the assessment.

Table 11 List of institutions, current roles and responsibilities, and gaps and prospective roles in loss and damage

Institutions	Current roles and responsibilities	Capacity gaps	Prospective added roles and responsibilities for loss and damage assessment
Local level (municipality/<i>palika</i> and district)			
<i>Palikas</i> /municipalities	Develop policy and plan on DRR and climate change in a municipality Enforce risk reduction and adaptation interventions based on the risk and impact assessment studies Allocate resources to implement risk reduction and adaptation interventions	Limited human resource capacity to work on DRR and CC Lack of understanding on climate-induced loss and damage	Internalize loss and damage concept in DRR and climate change policies and plans Capacity building of LDMCs and LEOCs on loss and damage
LDMCs/DDMCs	Conduct risk assessment and impact assessment studies	Limited technical know-how in assessing non-economic loss and damage	Put the emphasis on non-economic loss and damage in the assessments
LEOCs/DEOCs	Keep records and updates on disaster information	Limited human resources and technical capacities to keep records of economic and non-economic loss and damage	Maintain records of both economic and non-economic loss and damage
Provincial level			
Ministry of Internal Affairs and Law	Develop and enforce laws, policies and plans on DRR in a province Allocate resources to implement risk reduction and adaptation interventions	Limited institutional capacity to work on DRR and CC Lack of understanding on loss and damage	Internalize loss and damage concept in DRR and climate change laws, policies, and plans. Build institutional framework and capacity to work on DRR and CC Capacity building of provincial level disaster management committee (PDMC) members on DRR, CC, and loss and damage

Institutions	Current roles and responsibilities	Capacity gaps	Prospective added roles and responsibilities for loss and damage assessment
Provincial level disaster management committees (PDMC)	Lead on post disaster search and rescue and response works Develop, maintain, and update disaster information system	No clarity on roles and functions of the committees Lack of technical know-how on assessment of loss and damage	Build internal capacity in conducting risk and impact assessments with emphasis on non-economic loss and damage
Federal level			
Ministry of Home Affairs (MoHA)	A government focal agency in DRR Lead on post disaster search and rescue and response works Formulate laws, policies, and plans on DRR and execute them	Lack of understanding on climate change and resulting loss and damage	Internalization of climate change and loss and damage in DRR laws, policies, and plans and practices Develop and internalize comprehensive risk management approaches
National Disaster Risk Reduction and Management Authority (NDRRMA)	Conduct orientation, training, and develop standards on DRR Formation of flying squads for DRR and build capacity Safe storage and distribution of relief materials during disaster Provide necessary guidance to federal, provincial, and local governments on mainstreaming DRR in development process. Coordinate mobilization and monitoring of government agencies, NGOs, and private sector on disaster management	Limited human resources and technical capacities Limited understanding on climate-induced loss and damage and its implications for Nepal	Lead on harmonization of risk reduction and impacts and develop new and update standards on risk assessment and impact assessment including loss and damage elements Develop and revise existing DRR and CC methods and tools to incorporate comprehensive risk management and loss and damage elements. Capacity building of DRR stakeholders at local, provincial, and federal level on loss and damage
Ministry of Federal Affairs and General Administration	Lead on disaster risk assessment by implementing LDCRMP and LAPA Capacity building to municipalities on DRR and CC	Limited understanding on loss and damage Lack of technical know-how to assess loss and damage	Capacity building support to the municipalities/ <i>palikas</i> on developing approaches to address loss and damage

Institutions	Current roles and responsibilities	Capacity gaps	Prospective added roles and responsibilities for loss and damage assessment
Ministry of Forest and Environment (MoFE)	<p>The Government of Nepal focal agency on climate change</p> <p>Formulate and revise laws, policies, and plans on climate change</p> <p>Lead on implementing several programmes and projects on climate change</p>	<p>Limited understanding on loss and damage and its implications for Nepal</p>	<p>Internalize loss and damage concept in climate change laws, policies, and plans</p> <p>Facilitate research and studies on loss and damage</p> <p>Provide technical expertise to sectoral ministries and agencies to develop loss and damage assessment methodologies and approaches to address loss and damage</p>
<i>Beema Samiti</i> (Insurance Board)	<p>Insurance sector regulatory authority of Nepal under Ministry of Finance</p> <p>Approve and regulate insurance schemes designed by companies</p>	<p>Limited understanding on weather index-based parametric insurance</p>	<p>Systemize, regularize, develop, and regulate parametric insurance that helps transfer risk of climate change impacts including loss and damage</p>

A framework to assess and address loss and damage in Nepal

The review of the existing practices, methods, and approaches to assess and address vulnerabilities and risks of disasters and climate change revealed that loss and damage is not given sufficient consideration. It is evident that new measures are required to assess and deal with loss and damage associated with climate change; however, this should be done by building synergies with existing approaches and agendas that include climate change adaptation, disaster risk management, and the Sustainable Development Goals.

The study proposes a methodological framework that can be used for comprehensive assessment of climate risks and impacts that result in loss and damage. The framework is suitable for application in a harmonized way for assessing loss and damage resulting from ongoing impacts from climate extremes and stressors as well as future climate risks. It is also accommodative of the existing tools and methods used by disaster risk management and climate change adaptation communities in Nepal.

The framework has three interrelated but non-linear stages. The first stage is about developing a comprehensive but periodic climate risk scenario that profiles loss and damage in the country. The second stage deals with assessment of loss and damage triggered by ongoing climate extremes and slow onset events and looks into immediate and cascading losses and damages in the long term. The third stage is about developing the plan of action to minimize and address loss and damage. The first and second stages are independent and can directly progress to the third stage of planning. The framework is presented in Figure 3 and is explained in the following sections.



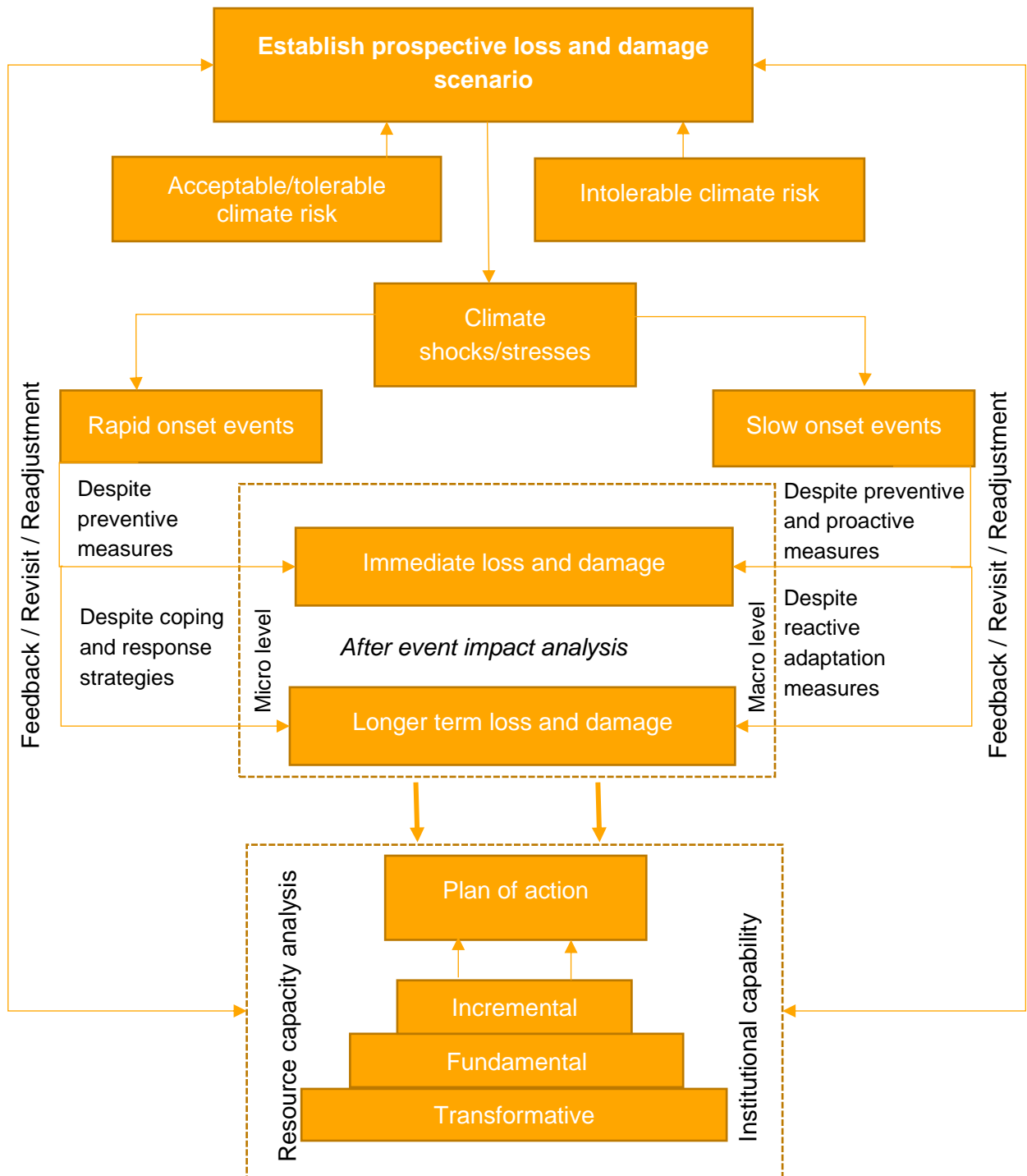


Figure 3 A framework for assessing loss and damage in Nepal

Stage A: Establishing prospective loss and damage scenario

The purpose of stage A is to better understand current and future climate risks that will affect people and nature and have potential to result in loss and damage. This contributes to the Government of Nepal's climate policy objective of periodic assessment of climate change vulnerability and risks as well as research on the impacts of climate change effects and potential climate risks and their levels that can result in and/or exacerbate loss and damage in future. This also helps stakeholders proactively identify and plan possible options to address loss and damage.

Step 1: Establish the focus area of assessment

This is the starting point where the focus area is defined, and scale and scope of the assessment is established. Based on the country, policy, or project priorities, this step identifies the focus area of the assessment. This can be:

- Administrative scale (national, provincial, and local)
- Ecoregion-specific (*himal, pahad, terai*, river basin, etc.)
- Sector-specific (sectors as identified by National Climate Change Policy 2019 such as water, agriculture, health, infrastructure, biodiversity, tourism, etc.)
- Hazard-specific (landslide, flood, drought, glacial lake outburst floods, etc.)
- Temperature rise scenario (potential loss and damage at 1.5°C, 2°C, and 3°C, etc.)
- Human and social dimension (displacement, migration, etc.)

Step 2: Conduct background research

Once the focus area is identified, the next step is to review and screen available information and identify data needs and gaps. This involves stocktaking of the status of climate change risks and impacts for the focus area and climate change scenario. The information for this can be collected based on the impact on social, economic, and ecological dimensions as well as direct and indirect impacts. Further background information can include existing climate change and DRR policies and programmes, and institutional analysis.

This can help understand potential climate risks for the focus area of the assessment, develop inventory of past climate and disaster events, examine specific impacts at a sectoral level, and aid verification of the information provided. The tools and methods that can be used for this step are literature and document analysis and key informant interviews among others.

Step 3: Analyse potential climate risks that might result in loss and damage

This is the most important step of Stage A. Based on the analysis of the reported impacts in the past, this step develops the estimate of future risks determined by the combination of hazard, exposure, and vulnerability. This involves both bottom-up participatory processes as well as top-down methods. This analysis requires scenario planning and risk modelling but can be guided by historic information. The aspects of analysis should include both direct and indirect impacts as well as economic and non-economic impacts.

For the analysis of the potential risks, tools and methods such as the impact chain logic, economic modelling, climate and disaster impact models, and vulnerability and risk assessment can be used for the top-down method. For the bottom-up method tools such as LAPA and LDCRMP that use community-based adaptation planning exercises, vulnerability and capacity analysis, field surveys, and case studies can be used.

Once the potential climate risks are identified, it is imperative to analyse the risks that are acceptable, tolerable, and intolerable. This will help us understand the limits of adaptation interventions and resulting loss and damage. The concept of acceptable, tolerable, and intolerable risks, and how people can bear the risk or not is complex and evolving. These are not fixed but are dependent on socio-economic and cultural factors, status, and risk-coping capacities of people and communities. Literature shows that different models can be used to identify risk categories; however, mostly expert judgement is used. Moreover, care has to be taken because risk that might look acceptable or tolerable to a risk engineer or expert may be intolerable for the people living on the front line of climate change. So, it is important that people impacted be given a voice in decision-making. In Nepal's context, a mixed approach can be used to determine the thresholds for acceptable, tolerable, and intolerable risks. The application of expert judgement requires synthesizing evidence from multiple sources and understanding people's perception, for example through surveys that can then be finalized by consensus of the experts involved in the analysis. In Nepal, model-based approaches have been used for economic impact assessment and climate change scenarios for the mid and long term, primarily for adaptation planning processes. These can be further extended to understand risk thresholds and the scale and types of risk, which will go beyond the capacity to adapt.

Stage B: After event loss and damage analysis

It is important to understand potential climate risks that might result in loss and damage in the future through the Stage A process and develop plans to address those. The impacts of climate change are already crossing limits and the capacity of communities and ecosystems to adapt. The review of the existing approaches that might be useful to assess loss and damage in Nepal revealed that they are focused on immediate and direct impacts. They often exclude indirect and non-economic impacts and plans to address the impacts, instead only considering what can traditionally be done. An improved approach to analyse loss and damage resulting from climate change-induced disasters is thus imperative. This stage provides a twofold process to assess loss and damage in the aftermath of rapid onset events, for example floods, or slow onset events, for example drought, for economic as well as non-economic losses and damages at micro and macro scales.

Step 1: Assessment of immediate loss and damage

As discussed, climate-induced disasters are bound to happen despite the most proactive adaptation actions and preventive risk reduction measures. After disaster strikes, there is a practice in Nepal to conduct loss and damage assessment through IRA and MIRA, complemented later by the PDNA process. For example, 2014 Karnali flood data presented in Section 3 is based on IRA and MIRA.

This framework proposes to build in additional aspects to document and analyse economic impacts traditionally not covered by existing tools. The framework adds approaches to document and analyse non-economic losses and damages, as well as to examine residual risk that might be beyond the capacities of the communities to adapt to, thereby minimizing the cascading and multiplier effects of disasters. In addition, it is important to consider periodic and regular monitoring of slow onset events that cause loss and damage.

Step 2: Assessment of long-term loss and damage

Step 1 in this stage will be instrumental to address immediate and urgent needs arising in the aftermath of disasters. While it is extremely important to make response and recovery plans more streamlined and geared towards minimizing the current impacts, it is also pertinent to consider added emphasis on designing programmes and interventions that also focus on prevention of disasters and the future impacts. Despite the most ambitious coping and response strategies as well as reactive adaptation measures, there might still be residual impacts resulting from the disaster events identified through Step 1 above. In addition, assessment of immediate loss and damage that is carried out in Step 1 of this stage does not investigate the long-term implications of the disasters. This might include inability to recover and reclaim flooded land and infrastructure or inability to continue to grow a particular agricultural product. For this, an assessment that looks into long-term and derived impacts or loss and damage is required. This can be done through the analysis of the effectiveness of the intervention measures, such as risk sharing, transfer, and reduction identified through the assessment from Step 1 above and the identification of additional needs depending on how the disaster impacts are distributed.

Stage C: Develop plan of action

Stages A and B identify the climate risks and impacts that potentially result in loss and damage. The next stage is to identify feasible options to address loss and damage.

While there are a number of measures already implemented in Nepal through various projects and programmes for risk reduction, preparedness, and risk transfer, the purpose of Stage C is to identify options that can deal with residual risks, which could otherwise potentially result in loss and damage. The framework draws from international experience of comprehensive risk management approaches and proposes classification of options to address loss and damage into incremental, fundamental, and transformative.

The **incremental** options are those that are conventionally being implemented through DRR and climate change adaptation programmes, which address specific risks and help minimize potential loss and damage. The examples include mitigation measures such as building check dams to prevent erosion, paying a premium for agricultural insurance, and conservation of degraded ponds.

The **fundamental** options include unconventional approaches to dealing with risks such as distribution of flood tolerant paddy seeds and construction of new ponds.

The **transformative** options include approaches that change the system so that people and livelihoods exposed to risk are safeguarded. These approaches include relocation of settlements from landslide-prone areas and providing people with access to new livelihood options such as a shift from traditional subsistence farming to the service sector.

The identification of options depends upon the socio-economic, technological, and ecological aspects that should be assessed based on the institutional and resource capacities available and then approaches can be planned to provide the missing capacities.

Conclusion and recommendations

Conclusion

Loss and damage is a relatively new concept in climate change discourse in Nepal and globally. Several aspects associated with it, such as non-economic loss and damage, slow onset disasters, and others, are still evolving. Incidents of climate-induced loss and damage are already evident and will be an increasing trend as the global temperature continues to rise.

The study undertook a field-based analysis of flood-affected communities along the Karnali River to understand the type and categories of loss and damage they are already experiencing. A long list of economic and non-economic loss and damages caused by floods in Karnali was developed and grouped against the UNFCCC categories of loss and damage (see Table 5). Apart from damages to personal and public assets, the communities reported loss and damage associated with personal well-being and health, community and socio-cultural, and environment impacts. These intangible losses and damages are not captured in the usual impact assessment processes.

The study reviewed the approaches and methods used by climate change, DRR communities, and insurance schemes in Nepal for risk and impact assessment. The methods and tools were reviewed against the loss and damage types classified by UNFCCC. The review shows that economic loss and damage is covered to a greater extent but non-economic loss and damage is not accounted for in the existing methods and tools. The study found the following limitations that help explain the relevance of these approaches and methods in assessing loss and damage associated with climate change:

- The majority of methods and tools (with the exception of the VRA/NAP and PDNA) collect data using PRA and analysis is made largely based on the information gathered from the communities.
- Some of these methods and tools collect information using predefined indicators and sectors whereas others such as the LAPA and LDCRMP are open-ended.
- The methods and tools do not quantify the risk in monetary terms. The risk assessment is mainly based on analysis of four elements: hazards, exposure, vulnerability, and capacities. These do not provide a monetary value of the elements at risk.
- Few methods and tools quantify sector wise damage and loss caused by disasters and their monetary value. For example, the PDNA only assesses the recovery and reconstruction needs and financing requirement.
- The valuation of loss and damage is done using a market price. This provides only an absolute value of loss and damage caused by disasters. These methods and tools do not assess secondary and tertiary impacts caused by disasters. Hence, these methods and tools do not estimate a total and real value of loss and damage caused by each disaster.
- The methods and tools mainly consider economic parameters in calculating risk and estimating impacts of disasters. All economic types of loss and damage (except tourism) are covered by the eight tools and methods reviewed. Only the VRA and PDNA include tourism.
- Not all types of non-economic loss and damage are accounted for in many of the existing methods and tools. Gender-disaggregated data on human casualties and injuries are reported and some psychosocial aspects are covered in the protection cluster.

- Among UNFCCC non-economic loss and damage categories, territory and societal/cultural identities are not covered by any method or tool. Other categories like indigenous knowledge, cultural heritage, and biodiversity and ecosystem services are partially covered in some of the methods and tools.
- Few methods and tools such as the VRA/NAP and PDNA include displacement and/or temporary migration caused by disaster. Displacement and migration is a very important type of non-economic loss and damage, especially in the Terai region of Nepal given the proximity of the Indian border.

The review of the tools found that there is no clarity on how the impacts of slow onset events are assessed, as most of the existing tools are used for rapid onset events. The methods and tools do not distinguish between acceptable risk, tolerable risk, and intolerable risk. They mainly prescribe adaptation and DRR actions to minimize tolerable risk. Loss and damage, as discussed above, is associated with intolerable risk. The concept of beyond adaptation or limits to adaptation is not addressed by any of the tools and methods reviewed. The tools and methods reviewed also do not consider how to address impacts that can be avoided but have not been avoided, as well as impacts that cannot be avoided (residual risks) despite interventions.

The limitations of insurance schemes to address loss and damage associated with climate change are well known; however, as they are practised at a limited scale in Nepal, further considerations are required to make them an appropriate risk transfer mechanism for poor and vulnerable people.

Based on the findings from the community level as well as the review of existing tools and methods, it was evident that existing processes do not work along the continuum of risk and impact, but deal with them separately, making them less suited for holistic loss and damage assessment. With this backdrop, a methodological framework to assess and address loss and damage associated with climate change impacts has been conceptualized and is presented in Section 6, which builds on the existing comprehensive risk management approach.

Recommendations

Assessment of loss and damage

- The Ministry of Forests and Environment (MoFE) should initiate a process to define loss and damage associated with climate change impacts in the context of Nepal.
- The MoFE as the nodal ministry for climate change as well as the primary institution for developing vulnerability and risk assessment tools needs to initiate the process to revisit the existing vulnerability and risk assessment methods and tools to incorporate economic and non-economic parameters and categorize risk into acceptable, tolerable, and intolerable risk levels.
- The Ministry of Home Affairs (MoHA) and the National Authority for Disaster Risk Reduction and Management (NDRRMA) need to initiate the process to revisit existing post-disaster impact assessment methods and tools to incorporate missing economic and non-economic loss and damage parameters.
- All the concerned agencies conducting loss and damage assessment in future can take guidance and apply the stages and steps elaborated in the methodological framework proposed by this study.

- The National Planning Commission and Ministry of Finance should undertake macroeconomic impact analysis of climate-induced loss and damage for key sectors in Nepal and include the measures for addressing them in the annual and periodic planning processes.
- The MoFE should initiate the process to gain a better understanding of non-economic loss and damage and the socio-cultural implications for people dependent on natural resources for their livelihoods, and assessment of non-economic loss and damage on biodiversity and ecosystems.
- Commission research and studies to substantiate understanding of loss and damage in different sectors and areas and its implications in Nepal, with particular focus on intangible loss and damage that is not easy to convert to a monetary value such as loss of lives, heritage and cultural losses, and ecosystem losses.
- Concerned agencies in provincial and local governments should undertake periodic provincial and local level loss and damage assessments to inform their planning processes.

Policy and institutions

- Internalize the concept of loss and damage, taking steps to incorporate enhanced understanding of climate change and associated loss and damage in laws, policies, and plans for DRR and climate change in all three levels of government.
- Build synergies and develop institutional mechanisms for integration of climate change and DRR in the planning and implementation processes that are currently under the separate remit of the MoFE and MoHA.
- Invest in strengthening and building synergies of DRR and climate change institutions across all three tiers of governments
- Expand the function and roles of existing institutions, including the NDRRMA, to consider climate-induced loss and damage in their institutional mandates.
- Explore appropriateness of parametric weather index-based insurance schemes in transferring risks associated with climate impacts led by the *Beema Samiti* (Insurance Board).

Implementation

- Build knowledge and capacities of concerned agencies working on climate change and DRR including government, non-government, and civil society organizations to better understand loss and damage. Particular focus should be on assessing loss and damage and identifying and implementing approaches to address them.
- Facilitate learning and sharing among climate change and DRR practitioners and experts and build collective understanding on loss and damage.
- Mobilize civil society to support the government in building knowledge and capacities as well as learning and sharing of approaches to address loss and damage.

Notes

1. Vulnerable sectors are agriculture and food security; forest, biodiversity, and watershed conservation; water resources and energy; rural and urban settlements; industry, transport, and physical infrastructure; tourism and natural and cultural heritage; health, drinking water, and sanitation; and disaster risk reduction and management.
2. Clusters are health; water, sanitation, and hygiene (WASH); shelter; food security; logistics; camp coordination and camp management; education; protection; emergency telecommunications; nutrition; and early recovery.

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Contact us

Sunil Acharya

Regional Advisor – Climate and Resilience

Practical Action

Sunil.Acharya@practicalaction.org.np

Practical Action Nepal

Indira House, House No. 1114, Panipokhari Hill, Kathmandu, Nepal

www.practicalaction.org

Flood Resilience Portal: www.floodresilience.net



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