



STOCKTAKING STUDY

CLIMATE-INDUCED LOSS AND DAMAGE IN NEPAL





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Authors:

Prabin Man Singh and Yutshu Shrestha

With Contributions from:

Dharam Raj Uprety, Pradeep Bhattarai, Pragya Sherchan, Pratap Maharjan and Sajjan Neupane

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BACKGROUND

In the period between 2011-2020, the earth's average surface temperature was 1.1 degrees Celsius higher than it was in the pre-industrial (1850-1900) age. And unless deep reductions occur in greenhouse gas emissions immediately, estimates suggest that global warming of 1.5°C – even 2°C – will exceed during the 21st century. This could be catastrophic to the world and its people. Already, human-induced climate change is creating climate extremes in regions across the globe and evidence of observed changes in extremes, such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened (IPCC, 2021).

The frequency and magnitude of climatic disasters are also increasing worldwide. The number of climate and weather-related disasters has risen by 35% since the 1990s (IFRC, 2020). In 2021 alone, 432 disastrous events related to natural hazards were recorded worldwide, of which 91% were climate and weather-related disasters¹. The annual average number of disasters recorded for the period between 2001-2020 is 347, with Asia being the continent most hit by disasters in 2021 (CRED, 2021).

More and more people are being affected by these disasters every year as well. In 2021, the total number of human affected by disasters was 101.8 million globally, with 22.3 million people being displaced internally due to weather-related disasters. In the period between 2001 and 2020, the average annual number of humans affected by disasters was 193.4 million. While the number of people being affected by climate-induced disasters is increasing, the number of human casualties by disasters is decreasing. In 2021, the total human death by disasters was 10,492, a significant reduction in comparison to the average annual human death of 61, 212 in the period between 2001 and 2020.

Though the number of disaster-induced human casualties is declining, economic loss by disasters have increased in the last two decades. In 2021, total economic losses by disasters was reported to be USD 252.1 billion, compared to an annual loss of USD 153.8 billion in the period between 2001 and 2020. Of the losses, 77% were reported from climate and weather-related disasters (Ibid).

As a geographical diverse nation, Nepal is exposed to multiple hazards and disasters. These disastrous incidents claim a large number of lives and cause significant economic loss every year. A total of 9,886 small and large weather and climate-related disaster incidents were reported between January 2020 to September 2022 (32 months). These disaster incidents claimed the lives of 1,173 people and 1,282 livestock, and destroyed 4,945 houses and other types of infrastructure. The total economic loss was accounted for approximately USD 45 million.

¹ Drought, Extreme temperature, Flood, Landslide, Storm and Wildfire

Till date, several studies had been conducted to assess the loss and damage incurred due to different climate-induced disasters in Nepal. This paper reviews the studies and consolidates existing knowledge on climate-induced loss and damage.

OBJECTIVE AND SCOPE OF THE STUDY

This paper's objective is to stocktake existing knowledge on climate-induced loss and damage based on different studies related to recent climate-induced disasters in Nepal. This paper covers five climatic disasters that hit Nepal in the last 20 years, of which loss and damage reports were published. This paper includes both academic and non-academic papers. Non-climatic disasters and other climatic disasters that hit Nepal have not been included.

In 2021, two massive floods in the Melamchi region and in Manang caused massive loss of life, livelihoods and properties. However, detailed studies of loss and damage incurred because of the recent floods have not been carried out till date. Hence, these floods have not been covered in this paper.

METHODOLOGY

This study is based on secondary data collection, with a rigorous literature review, to examine the types of loss and damage caused by climate change-related disasters, as well as the financial valuation of loss and compensation provided to disaster survivors. Various reports that have recorded the types of disasters occurred in Nepal were reviewed to explain the types of loss and damage occurred and also to assess the valuation of the loss caused due to these disasters. The reports that were studied are: Loss and Damage from a catastrophic landslide in Sindhupalchok district, Nepal (Van Der Geest & Schindler, 2016); Loss and Damage: A case study of landslides in Darbung village, Gorkha district, Nepal (B.K. Sapkota, 2017); Assessing and addressing climate-induced loss and damage in Nepal (Practical Action, 2021); When Climate becomes a Threat, Evidence of Climate Change Induced Loss and Damage in Nepal (DanChurchAid Nepal, 2021); Nepal Flood 2017: Post Flood Recovery Needs Assessment (National Planning Commission (NPC), 2017); Managing seeds and agricultural losses in the wake of extreme climate events: Lessons from Nepal (Beshir, A., Mahato, M., & Shrestha, S., 2022).

The Government of Nepal's policies were also reviewed in the process. Reconstruction of private housing affected by monsoon disaster and rehabilitation grant procedure, 2021; Standards for identification and relief of cold waves and cold-affected disasters, 2013; and Rescue and relief of disaster victims (Sixth Amendment) standards, 2021 were some governmental guidelines which provide financial relief to disaster victims for their loss and damage and were reviewed for the purpose of this study.

A workshop was also organized to share the initial findings and get feedback from the stakeholders. The feedback was incorporated in finalizing the paper.

WHAT IS CLIMATE-INDUCED LOSS AND DAMAGE?

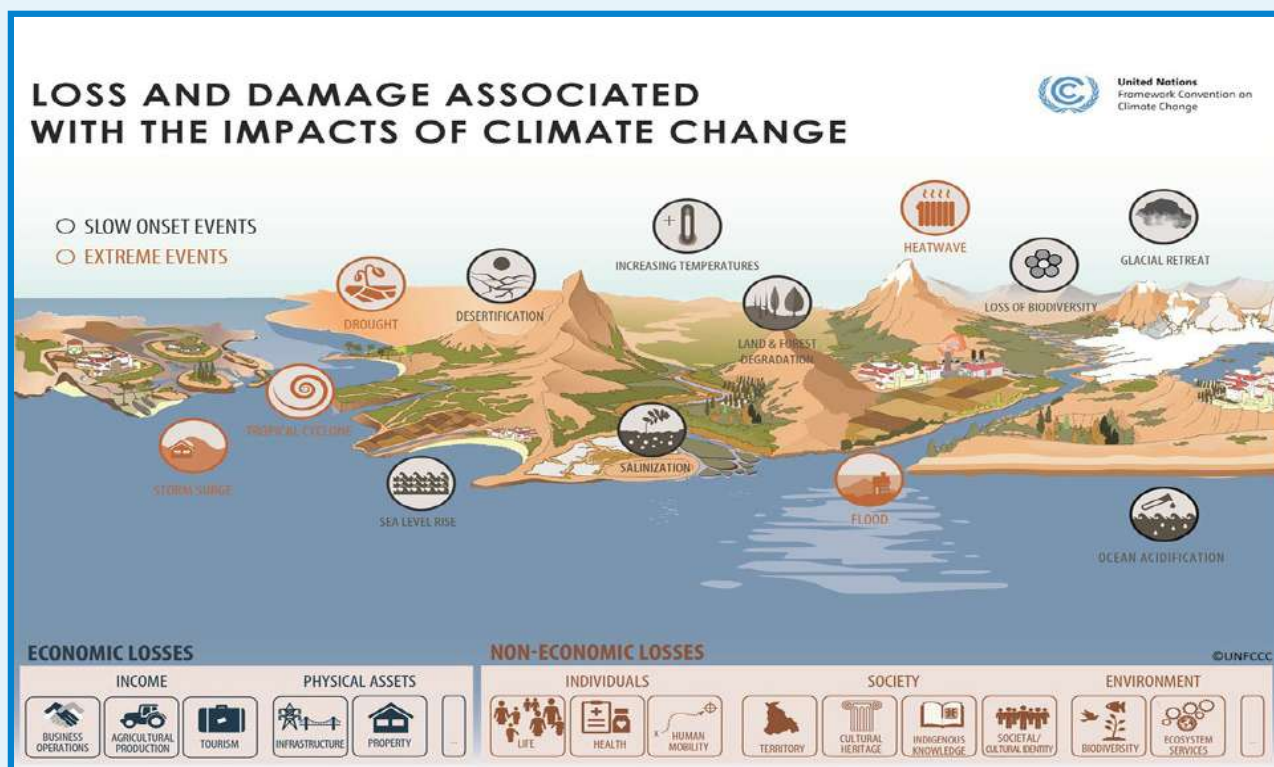
The United Nations Framework Convention on Climate Change's Subsidiary Body for Implementation (UNFCCC/SBI) defines Loss and Damage (L&D) as "the actual and/or potential manifestation of impacts associated with climate change in developing countries that negatively affect human and natural systems".

The United Nations Framework Convention on Climate Change (UNFCCC) classifies loss and damage into economic and non-economic losses. Economic losses are defined as the loss of resources, goods and services

commonly traded in the markets. The UN body describes five types of economic loss and damage as business operations, agriculture production, tourism, infrastructure and property.

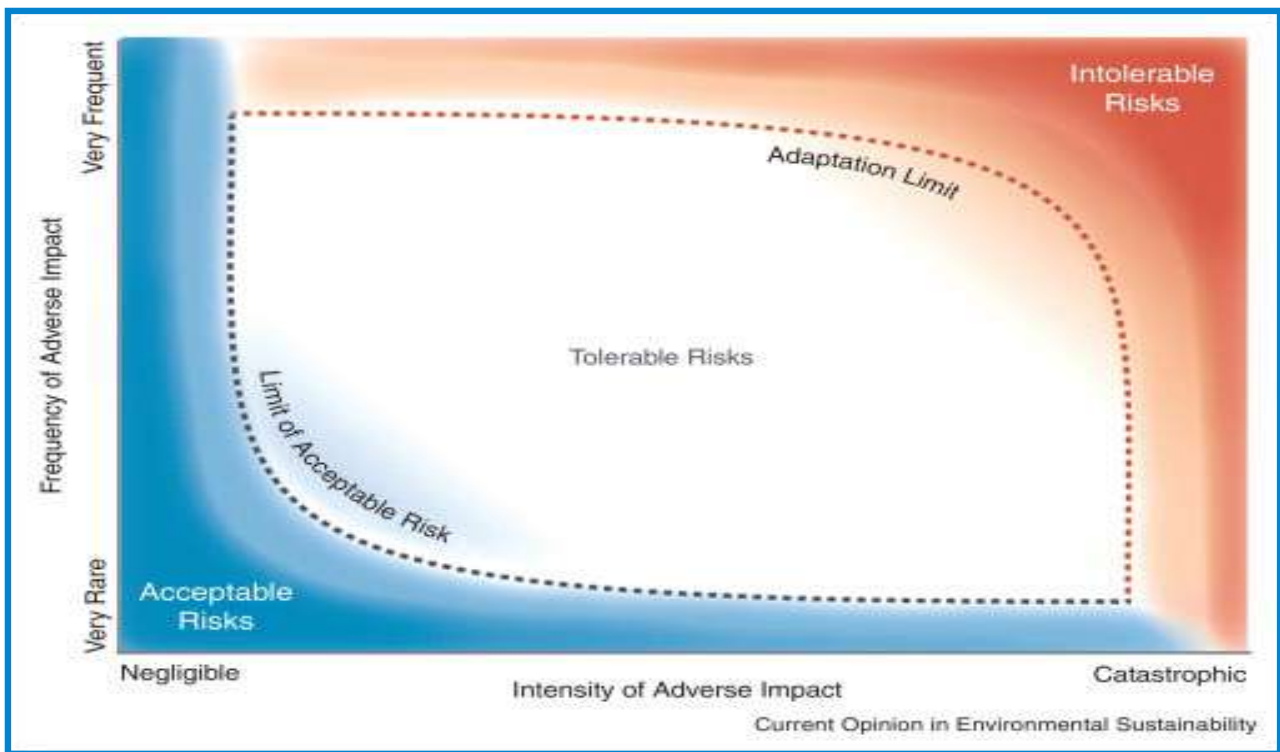
Non-economic losses on the other hand cover losses and damages that are not easily quantifiable in economic terms. The UNFCCC has categorized non-economic losses into three broad types: losses that affect individuals, society and the environment. Each type is further categorized into nine sub-types. These include human life, health, human mobility, territory, cultural heritage, indigenous knowledge, societal/cultural identities, and biodiversity and ecosystem services.

The figure below summarizes the UNFCCC classification of Loss and Damage.



Source: UNFCCC, 2017

Loss and damage related to climate change can also be understood from the 'risk approach' point of view. This approach classifies climate-induced risks as 'acceptable risk', 'tolerable risk' and 'intolerable risk'. When the risk is 'acceptable' and 'tolerable', adaptation measures can address climatic disasters. But when the risk is 'intolerable', which is likely with global inertia to cut GHGs emissions, adaptation measures will be inadequate to address the high risk. Loss and damage thus can be viewed as a 'beyond adaptation' approach, wherein L&D are actions dealing with the residual, adverse impacts of climate change, which remains even after taking mitigation and adaptation measures (Walliman-Helmer, Meyer, Mintz-Woo, Schinko, & Serdeczny, 2019). This is shown in a figure below.



Source: (Klein, et al., 2014)

POLICY LANDSCAPE OF CLIMATE-INDUCED LOSS AND DAMAGE

LOSS AND DAMAGE IN UNFCCC

Loss and damage has gained ground in recent years in the UNFCCC negotiations. The establishment of the Santiago Network on Loss and Damage (2019) and Glasgow Dialogue on Loss and Damage (2021) provided strong foundations for speeding up the negotiation on loss and damage, but the approach was first introduced back in the early 1990s with the Alliance of Small Islands States (AOSIS) proposal for compensation and insurance for losses caused by climate change. The first major breakthrough was made in 2013 with the establishment of the Warsaw International Mechanism on Loss and Damage.

Article 8 of the Paris Agreement recognizes the importance of averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage.

Santiago Network on Loss and Damage was established to connect vulnerable, developing countries with providers of technical assistance, knowledge, and resources which they need to address climate risks comprehensively in the context of averting, minimizing and addressing loss and damage. It catalyzes the technical assistance of relevant organizations, bodies, networks and experts, for the implementation of relevant approaches for averting, minimize and addressing L&D at the local, national and regional level, in developing countries that are particularly vulnerable to the adverse effects of climate change

In 2021, the **Glasgow Dialogue on Loss and Damage Finance** was established to bring together a broad range of stakeholders in a pragmatic discussion on the arrangements for the funding of activities to avert, minimize and address loss and damage, giving visibility to the frontline communities and those most vulnerable to the adverse effects of climate change.

The UNFCCC COP27 in Sharm El-Sheikh, Egypt made a historic agreement to establish a fund for climate-induced loss and damage. A 'transition committee' has established to work on an operational modality of the fund.

NATIONAL POLICIES ON LOSS AND DAMAGE

Loss and damage is a relatively new and emerging subject in the climate discourse in Nepal, but various policies surrounding it are already in place. Climate change and disaster risk reduction policies recognize economic and non-economic loss and damages caused by climate-induced disasters. National Climate Change Policy 2019 also prioritizes research on loss and damage in various geographic and thematic areas in Nepal. Nepal's second Nationally Determined Contribution also targets to devise a national strategy and action plan on loss and damage associated with climate change by 2025, and develop a climate financing framework that differentiates sources of finance for adaptation, mitigation and loss and damage.

The National Framework on Loss and Damage, which was adopted in 2021, also prioritizes loss and damage assessment methodological framework; climate-induced migration and displacement; approaches to avoid climate risks and impacts; and climate negotiation on loss and damage. More importantly, the framework calls for collaboration among key stakeholders working on climate change and disaster risk reduction, particularly the Ministry of Forests and Environment, the National Disaster Risk Reduction and Management Authority, the Department of Hydrology and Meteorology, provincial governments and municipalities, in addressing loss and damage.

The 15th plan targets to reduce human, material, economic, social, cultural, and environmental loss caused by all kinds of natural disasters and human-induced disasters. Others specific targets are:

- ✳ Reduce GDP loss by disasters from 2.5 % (2018/19) to 1.5% (2023/24)
- ✳ Decrease the number of deaths in disasters from 1.7 person in 100,000 (2018/19) to 1 person (2023/24)
- ✳ Decrease the number of households affected by disasters from 17.1 households in 1,000 (2018/19) to 9.8 households (2023/24)

The policies and strategic action plans of Disaster Risk Reduction and Management (DRRM) provide a good foundation in strengthening the loss and damage policy framework in Nepal. DRRM policies on risk assessment; post disaster rescue, response, recovery and rehabilitation; methods and tools for assessment and documenting loss and damage; and compensation for loss and damage are a few points where climate change and DRRM can collaborate.



Floods across Nepal in 2017

In 2017, the monsoon brought excessive rainfall within a compressed calendar, resulting in flash floods across a wide swathe of Nepal's plains. Incessant rainfall from August 11 to 14, 2017, resulted in widespread floods across 35 of the country's 77 districts. The impact was severe in 18 districts, with extensive loss of life and property. The district of Rautahat reported 16,145 houses as fully destroyed, the highest among all the 18 severely affected districts. A total of 99 health facilities were damaged, of which 5 were fully destroyed and 94 partially damaged in Banke, Dhanusha, Jhapa, Mahottari, Morang, Parsa, Rautahat, Saptari and Sarlahi districts. The 2017 floods completely destroyed 41,626 houses and partially damaged 150,510 houses. The estimated loss due to this event was NPR 60,716.6 million.

Karnali Flood, 2014

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. These torrential rains resulted in an exceptional flooding event, potentially a 1-in-1,000-year event, exceeding the previous largest flood by nearly a meter. The flood killed 222 people and badly affected 120,000 others, causing huge loss and damage across various sectors. The total loss of physical asset caused by the flood was estimated to be NPR 3.7 million.

Jure Landslide, 2014

On 2 August, 2014, a major landslide struck in a densely populated area, 80 km northeast of Kathmandu. It was one of the deadliest landslides in Nepal's history that killed 156 people. It affected 478 families and 117 houses were fully and/or partially damaged. A hydropower plant was also affected, which reduced the country's electricity generation capacity by 10%. A section of the Araniko highway was also destroyed because of the landslide and the disaster also created a 55-metre-high dam in the Sunkoshi River. On 7 September, 2014, after 36 days, a part of the dam breached, reducing the water level in the lake by 18 meters. There were no casualties, but riverside farmland and houses downstream were damaged by the outburst flood. The major impact for the people of Sindhupalchok district due to the landslide was on physical infrastructure, including the damage to and blockage of the Araniko Highway which disrupted the only road connection between Nepal and China, with severe consequences for cross-border trade, causing estimated losses of nearly USD 400,000 per day. In addition, the landslide also caused loss of land with the largest proportion of households incurring losses worth between USD 10,000 and USD 100,000: 115 houses were completely destroyed and the lives of 156 people were lost. All this also caused significant psychological impact to the disaster victims and the family member of the casualties.

Floods and landslides in three municipalities of Sudurpaschim province of Nepal, 2013

Based on the likelihood of occurrence, landslides at Aathbis and Panchadewal Binayak and floods at Barbardiya ranked first in increased frequency and intensity in recent years. The overall economic loss of people surveyed in the three municipalities was around USD 388,355 (NPR 38,835,496), with average loss per household being around USD 4,176 (NPR 417,586), including losses in agriculture (18%), livestock (4%), physical properties such as houses and land (75%) and other, i.e., storage of food grains and lentils (3%). Human injury or death as a result of landslides or floods was not reported in the study region, although tremors and post-disaster psychological distress appeared to be more noticeable as a result of flood or landslide impacts.

Darbung Village Landslide, 2002

The Khanikhola landslide incident of 2002 affected four wards (4, 6, 7 and 9) of Darbung village in Gorkha district, where 34 households were found as totally damaged, 12 partially damaged, 173 households affected and 500 households in a vulnerable condition. The cost of loss and damage of private property (livestock, cultivated crops, land and houses) was estimated to be NPR 380,994,000 and the loss and damage of public property was estimated to be NPR 71,500,000. The total cost of loss and damage was found to be NPR 452,494,000.

FINDINGS

DISASTERS AND LOSS AND DAMAGE TYPES

Loss and damage studies have been done only for sudden onset disasters in Nepal, such as floods and landslides, in the form of post disaster assessments. Among them, the Post Flood Recovery Needs Assessment of the 2017 floods across Nepal is the most comprehensive loss and damage study conducted till date. USD 584.7 million worth of loss and damage was estimated across social, productive and infrastructure sectors by the single event (NPC, 2017). Another study conducted by CIMMYT of a 2021 flood reported loss of ready-to-harvest crops worth USD 0.1 billion (AbduRahman Beshir, 2022). Glacier Lake Outburst Floods (GLOFs) is the only type of slow onset disaster event studied in Nepal. But a detailed study of loss and damage by GLOFs has not yet been carried out. Other types of slow onset disasters have not been studied yet.

Sudden Onset Disaster

Disaster that occurs quickly and unexpectedly due to a hazardous event, causing immediate destruction. The examples of rapid onset disaster are floods, avalanches, landslides etc.

Slow Onset Disaster

Disasters that emerge gradually over a period of time. Droughts, desertification, GLOFs, sea-level rise, epidemic disease etc. are examples of slow onset disasters.

Loss and damage to houses; loss of agriculture land, crops and inputs; damage to health and education infrastructures; damage to road, bridges, energy infrastructures and water supply systems were the most common types of loss and damage reported in the disasters. These types of loss and damage are termed as economic loss and damage.

The disasters often cause human casualties and injuries. Beside this, displacement; diseases and infections; psychological distress, anxiety and trauma; loss of forest land; destruction of worship place and burial ground are



also reported. These types of loss and damage are termed as non-economic loss and damage.

LOSS AND DAMAGE ASSESSMENT AND COSTING METHODS AND TOOLS

The studies reviewed for this paper had applied different methods and tools to assess and estimate cost of loss and damage incurred by disasters. The most common methods were Initial Rapid Assessment (IRA), Multi-cluster Initial Rapid Assessment (MIRA), Cluster Specific Detailed Assessment (CSDA), and Post-disaster Needs Assessment (PDNA). Sample survey, key informant interviews, and focus group discussion were also used to collect data. Satellite remote sensing was also applied in one of the studies.

A 2021 study conducted by Practical Action showed that the above stated methods are useful to collect data on economic loss and damage and on human casualties and injuries, whereas not useful for other types of non-economic loss and damage (Practical Action, 2021). The monetary valuation of non-economic loss and damage of any disaster has not been calculated in Nepal yet.

A United Nations University study had calculated loss and damage incurred by households by the landslide in Jure.

Table 1: DRR and CC Tools and Methods for Loss and Damage

| L&D types/ Tools | | CC methods and tools | | | DRR Methods and Tools | | | | |
|---------------------------------------|-------------------------------|----------------------|---------|------|-----------------------|-----|------|------|------|
| | | LAPA | VRA/NAP | CVCA | LDCRMP | IRA | MIRA | CSDA | PDNA |
| ECONOMIC LOSS & DAMAGE | Income | | | | | | | | |
| | Business Operations | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Agriculture Production | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Tourism | X | ✓ | X | X | X | X | X | ✓ |
| | Physical Assets | | | | | | | | |
| | Infrastructure | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Property | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| NON-ECONOMIC LOSS & 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 | |

Source: Practical Action, 2021.

According to the study, average damages per household was NPR 2,665,588 (USD 27,189) with the median value being NPR 775,000 (USD 7,905). The majority of households losses were below USD 7,905 (Van der Geest, K. & Schindler, M., 2016). Agriculture and livestock; housing, health and education; and infrastructure sectors loss and damaged were also recorded (NPC, 2017 & DCA, 2021).

These studies had assessed and calculated the cost of economic loss and damage incurred by the disasters. And while the number of human casualties and injuries were reported, the cost of non-economic loss and damage were not covered by the studies.

COMPENSATORY MECHANISM OF LOSS AND DAMAGE

The government of Nepal has policy provisions to support the families that have been adversely affected by disasters. Any family that loses their house or suffers irreparable damages gets a cash support worth NPR 300,000 to NPR 500,000 to rebuild their house. The amount varies with geography, family size and severity of loss and damage. A partially damaged house gets NPR 50,000 for maintenance, while a fully damaged house gets NPR 300,000 or more (upto NPR 500,000). In addition, NPR 300,000 cash grant is provided to those families who want to purchase land for housing but do not own land elsewhere. Those families who lose a member receive NPR 200,000, with an additional NPR 100,000 per person for loss of more than one member in the same family. In addition, for emergency food supply during a disaster, NPR 15,000 for a family of 5 members and NPR 20,000 for those with more than 5 members are allotted. Injured victims get free treatment in government hospitals and NPR 1000 as transportation expense.



Besides these, the government has also introduced various risk transfer mechanisms, such as crop and livestock insurance with subsidy in premium amount. Financial Management National Strategy for Disaster Risk 2078 targets infrastructure insurance, social security insurance, property insurance and life insurance programs to build a safe and resilient Nepal. However, the current compensation provision does not cover loss of land (besides housing) and other properties.

The Prime Minister’s Rescue Relief Fund, Central Disaster Management Fund, Province and the Local Disaster Management Funds have also been established to finance post disaster loss and damage.

Table 2: Policy provision of Government of Nepal on compensation to different types of loss and damage in disasters.

| Type of loss and damage | Human life | House | Land | Food | Health care | Crops and livestock |
|-------------------------|---|---|--------------------------------------|---|---|----------------------------|
| Cash | 200,000 per person and additional 100,000 per person lost in the family | 50,000 per household (partial damage) From 300,000 to 500,000 in installments depending on geographical region | 300,000 to purchase land for housing | From 15,000 to 20,000 per family depending on family size. < 5 members - 15,000 >5 members - 20,000 | 1,000 per person (transport to/ from health centre) | |
| Insurance | | | | | | Subsidize insurance scheme |

RECOMMENDATIONS

Based on the findings of the stocktaking exercise, the following recommendations are being made to the government, development partners organizations and civil society organizations in scaling up loss and damage works in Nepal.

- ✳ A national strategy and action plan on loss and damage associated with climate change must be formulated with an institutional mechanism involving all three tiers of government. In addition, a clear road map in addressing existing knowledge gaps on assessment and costing of loss and damage needs to be framed.
- ✳ Post disaster non-economic loss and damage are not documented or understood properly in Nepal. More studies are needed to assess non-economic loss and damage, such as displacement and migration, societal and cultural loss and loss of biodiversity and ecosystem.
- ✳ The existing methods and tools used in post disaster assessments can be improved to calculate all types of climate-induced loss and damage (economic and non-economic) with enhanced reliability and accuracy.
- ✳ Nepal is vulnerable to slow onset disasters, mainly GLOFs and land degradation. Studies on slow onset disasters and a better understanding of loss and damage caused by these disasters are required. A robust

method and tool needs to be developed for assessment and valuation of non-economic loss and damage.

- ✳ Policy makers, practitioners and researchers working on disaster risk reduction and climate change have to converge their knowledge and skills and work together in addressing loss and damage. The Ministry of Forest and Environment and the National Disaster Risk Reduction and Management Authority (NDRRMA) are key government agencies that need to take a lead.

CONCLUSION

Nepal is exposed to multiple hazards, which makes the country prone to disasters. These disastrous incidents claim a large number of lives and cause significant economic loss every year. A total of 9,886 small and large weather- and climate-related disaster incidents killed 1,173 people and incurred a total economic loss of NPR 6 billion in the period between January 2020 to September 2022 (just 32 months). Climate change and disaster risk reduction policies have recognized economic and non-economic loss and damages caused by climate-induced disasters but there is a need to develop tools to assess damages accurately.

The stocktaking study reviewed five climate-induced disasters studied by different organizations to understand existing knowledge and practices of loss and damage in Nepal. Its findings are as follows:

- ✳ **Slow-onset disasters:** Slow onset disasters are least studied in Nepal despite the country being highly vulnerable to Glacier Lakes Outburst Floods (GLOFs) and other slow onset disasters like land degradation, loss of biodiversity, etc. More information on such disasters is the need of the hour.
- ✳ **Non-economic loss and damage:** The current studies on loss and damage lack information on various types of non-economic loss and damage caused by disasters. Non-economic loss and damage caused by disasters needs to be understood with more studies and research.
- ✳ **Loss and damage assessment methods and tools:** Assessment methods and tools applied currently is useful in accounting different types of economic loss and damage, such as loss of housing, agriculture crops and tools, damage to infrastructures and others. Sectoral post disaster assessment of loss and damage are conducted.
- ✳ **Costing of post disaster loss and damage:** Economic implication of all disasters studied have not been conducted. Costing of all types of loss and damage, mainly non-economic losses, were not calculated. Different studies had applied different costing methods.
- ✳ **Compensation:** The government policy provisions to compensate loss and damage by disasters do not cover all types of loss and damages and is inadequate. It covers loss of housing and one-time cash support to families immediately after disaster, but the compensation package is not at all sufficient to support the affected families in rehabilitation.

The study recommends the formulation of a National Strategy and an Action Plan on loss and damage associated with climate change. Slow onset disasters and non-economic loss and damage by disasters needs to be understood and studied further. The existing assessment methods and tools need to be upgraded to cover non-economic loss and damage. Disaster risk reduction and climate change experts need to converge their knowledge and skills to understand and work on loss and damage by climate change.

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Prakriti Resources Centre (PRC)

📍 107/22 Aruna Lama Marga, Ganesh Basti,
Naryan Gopal Chowk, Kathmandu, Nepal

☎ +977-01-4528602

✉ info@prc.org.np

🌐 www.prc.org.np