WHEN THE CLIMATE BECOMES A THREAT

Evidence of Climate Change Induced Loss and Damage in Nepal

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FOREWORD

For vulnerable people and communities in Nepal, climate change is a reality and a threat. Melting glaciers, and more intense rain, lead to devastating flooding and landslides in the mountain country in the Himalaya.

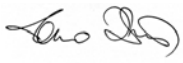
This report is based on case studies from three Municipalities in Nepal that have all faced climate change induced impacts during the last five years. These impacts have included both flooding and landslides, two dangerous phenomena that can wipe away lives, houses, and livestock.

The research showed that people in all three communities faced loss and damage due to climate-related hazards. It also showed that there is limited capacity, and assistance, to respond and recover. Some people have chosen to leave the communities due to the extreme events and can thus be called climate induced migrants. Other people have taken loans to pay for reconstruction and resettlement.

Science stresses that climate change is linked to emissions of greenhouse gasses. Thus, big polluters have a big responsibility. However, people in the three communities have very small carbon footprints, and their responsibility for global warming is minimal. Still, they are the ones paying the price, through loss and damage, caused by climate change.

Loss and damage could possibly have been prevented if sufficient adaptation measures had been taken in advance. However, for these three communities, as for many other communities in poor and vulnerable countries, adaptation is lacking. The conclusions of the paper are therefore clear: more international support is needed, both for adaptation, and for addressing the loss and damage people face.

I would like to thank my colleagues Rajan Thapa who have led this research, together with technical team members Samjhana Bista, Mattias Söderberg and Alma Garcia. I also acknowledge research team member Binita Khadka and Ozal Pradhan for their valuable contributions to the study as well as Rigendra Khadka, Malati Maskey, Ayshna Rajbhandary, Dinesh Gurung and Sunjuli Singh Kunwar for finalising the publication.



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LIST OF ABBREVIATIONS

AC	Adaptive Capacity
AR	Assessment Report
CCA	Climate Change Adaptation
DHM	Department of Hydrology and Meteorology
DRR	Disaster Risk Reduction
EWS	Early Warning System
FGD	Focus Group Discussion
FY	Fiscal Year
GDP	Gross Domestic Product
GHGs	Green House Gases
GLOF	Glacial Lake Outburst Flood
GoN	Government of Nepal
ICIMOD	International Centre for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change
KII	Key Informant Interview
KM	Kilometer
MoFE	Ministry of Forests and Environment
MoHA	Ministry of Home Affairs
NPC	National Planning Commission
NPR	Nepali Rupees
UNFCCC	United Nations Framework Convention on Climate Change
VRA	Vulnerability and Risk Assessment

EXECUTIVE SUMMARY

Context of the study

The term “loss and damage” refers to the negative impact of extreme and/or slow-onset weather events to which people are unable or unwilling to adapt. Loss and damage is the actual and/or potential manifestation of impacts associated with climate change that negatively affect human and natural systems, where “loss” refers to the negative impacts of reparation or restoration being impossible, while “damage” relates to those aspects that are recoverable but at a cost.

Loss and damage will occur despite both mitigation and adaptation efforts: according to the Intergovernmental Panel on Climate Change (IPCC, 2014) ‘under all assessed scenarios for adaptation and mitigation, some risk for adverse impacts remains (very high confidence)’. The projected economic cost of loss and damage by 2030 is estimated to be between 290 and 580 billion USD in developing countries alone (Markandya and González-Eguino, 2018). In the global climate regime, the Paris Agreement has recognised loss and damage as a permanent feature, opening up a space to conduct research to improve understanding and build evidence about loss and damage as a reality for vulnerable people today, and not just as a future threat. Furthermore, there is a large gap in researching the non-economic and the social and cultural dimensions of loss and damage in developing countries, which this study aims to contribute to filling. There is strong scientific evidence showing that climate impacts are becoming increasingly visible and affecting all sectors and regions in Nepal. The average annual economic loss from climate-induced disasters is about 0.08% of GDP (2018/19 figures at the current price), whereas in extreme years like the 2017 Terai floods, the economic loss and damage from this single disaster event was around 2.08% of GDP (2017/18 figures). Even if global heating can be limited to 1.5°C, around 36% of the glaciers in the Himalayas will vanish by the end of the century. This will result in irreversible loss and damage to the lives and livelihoods of two billion people in South Asia. As a result, loss and damage in Nepal is easy to understand but very difficult to manage. Though there have been some good initiatives on framing climate-induced loss and damage, there is still a lack of mechanisms to assess and quantify the loss and damage caused by climate change. Ongoing initiatives in climate-change adaptation and disaster risk management often ignore the irreversible risks and impacts when conducting assessments and designing programmes. Traditionally, the focus has been on responding to disasters after their occurrence, rather than on taking preventative actions that can help reduce loss and damage. To bridge these gaps and generate evidence on loss and damage, this study has evaluated both economic and non-economic loss and damage caused by landslides in Aathbis Municipality (Dailekh) and Panchadewal Binayak Municipality (Achham) and the Babai floods in Barbardiya Municipality (Bardiya). It also identifies the residual gap in responding to both economic and non-economic loss and damage, examines local communities' perceptions of climate-induced loss and damage and the support they received, and describes the preventive measures they adopted to address these issues.

Methodological Approach

The study has employed a modified Kees Van Der Geest and Koko Warner (2013) framework to assess potential household loss and damage as a result of climate change. First, it used tools such as district wise hydro-meteorological data collection, household surveys, focus-group discussions and interviews, including key informant interviews, to collect field evidence and information from people who had experienced loss and damage. In turn, this allows an assessment of climate-induced events and their trend. Second, the residual gaps and non-economic loss and damage were also quantified. Third, recommendations have been drawn up to address loss and damage in harmony with climate-resilient policies and plans.

Observed Loss and Damage

According to the Vulnerability and Risk Assessment Report (MoFE, 2021), Barbardiya Municipality in Bardiya Districts and Panchadewal Binayak Municipality in Achham District are rated high in terms of their vulnerability to climate-change impacts, and Aathbis Municipality in Dailekh District is ranked very high. The study found that most respondents had experienced heavy rainfall as extreme climate events over the past twenty years. Based on 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), 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 were 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.

Despite the support received from local government and other non-state actors, the residual gap in the case of landslide-affected households ranged from a minimum of USD 1,000 to 2,300 (NPR 10,000 – 230,000) and from USD 70 to 13,580 (NPR 7,000 to 1,358,000) in the flood-affected community of Barbardiya. The affected communities from Aathbis and Panchadewal Binayak Municipality did not receive any financial aid to cope with the post-disaster consequences. Financial support for compensation was also limited in Barbardiya. Those affected were temporarily stabilised and provided with food by government and non-state actors during the post-disaster period. However, the support proved ineffective in the long term, and many were compelled to migrate to safer regions after taking out loans to acquire land on which to build new homes.

Only Barbardiya had an early warning system (EWS) in place as part of its risk-management programme. However, 51% of people surveyed in this area responded that communication was not timely, and only 18% responded that it was effective. People in the Aathbis and Panchadewal Municipalities who were surveyed used wire-mesh gabion walls, earth dams and planting as conventional preventative methods to protect themselves from landslides in the future. People in Barbardiya, on the other hand, deployed wire-mesh gabion walls, plantations and earth dams near residential areas and agricultural fields, simply redirecting flood water into residential areas as a flood-prevention technique. However, only 9.52% of respondents were able to

recover quickly from the effects of landslides in Aathbis and Panchadewal Binayak, and only 6.94% of respondents have been able to recover from the effects of flood in Barbardiya. The main obstacles inhibiting appropriate loss and damage responses in landslide and flood-affected areas, according to respondents, are poor knowledge and institutional mechanisms (23.56%) and the lack of a plan (23.56%).

Conclusion and way forward

Climate change is causing increasing loss and damage in Nepal. The global debate on loss and damage has its roots in national contexts and is specific to climate-change impacts that go beyond adaptation and mitigation. Adaptation and mitigation actions often leave residual gaps as a result of recognising the limitations of the actions taken in response to and to adapt to negative impacts. Landslide and flood-affected communities showed limited knowledge of preventive measures and chose simple precautionary measures that were insufficient to cope with the impending disasters. The major challenges impeding proper loss and damage responses with adequate community engagement were limited knowledge and institutional mechanisms and a lack of adequate infrastructure. Despite substantial investment in early warning systems, due to the limited human resources, technological knowledge and, in some cases, the manual modality of the early warning system, there were significant problems that prevented timely communication. The study also encountered forced displacement (internally displaced) as a result of climate-induced disasters. Given the two major flood incidents recently and the increasing frequency of small floods every year, the people of Barbardiya are still coping with the trauma they have faced. The findings reveal that communities like Barbardiya, Aathbis and Panchadewal Binayak will continue to experience loss and damage due to a lack of knowledge about climate change adaptation, a lack of adequate infrastructure, limited and institutional mechanisms, and a lack of technical and financial assistance and support. As a result, both economic and non-economic loss and damage is very evident in Nepal and is a common concern, as well as an issue of climate justice.

Recommendations: On the basis of findings from different literature reviews and evidence of study, the following recommendations are made for operationalising loss and damage:

- **Support to local actors.** Based on the perceptions of the local population and local government during the interview, they believe that the local response is the first response and that in many cases the local response is also important for the post-disaster response in respect of rehabilitation and reconstruction. Therefore, technical and financial support to local government and organisations is very important, and the issue of climate change adaptation and climate-induced loss and damage should be aligned with the political call for localisation.

- **Action research on loss and damage.** Cross-sectoral and geographical research is required to provide additional scientific data on climate-induced loss and damage. Likewise, it is also recommended to start creating and documenting climate data, threshold levels and their correlation with natural ecosystems and socio-economic conditions to confirm that climate-induced loss and damage is more evident in Nepal.

- **Loss and damage finance.** The issue of loss and damage has remained highly contentious in the UN climate negotiations, and the financial mechanism has yet to be agreed. Nepal can take an exemplary initiative in allocating budget to local institutions to respond to climate-induced loss and damage and should continuously push for dedicated loss and damage finance, in addition to increased overall climate finance.

- **Information and Technology transfer.** Several good initiatives on early warning systems were observed during the field studies. However, due to the limited reach and mechanisms of information flow, many people are still lagging far behind this information technology. Therefore, more investment should be made in flood, landslide and heavy rainfall warning systems that can help minimise possible losses and damage. Similarly, appropriate investments should be made in enhancing institutional and community capacity to cope with climate-induced disasters.

- **Coordination among stakeholders.** Based on the findings, there is a need for synergies among state and non-state actors, especially in climate change adaptation and mitigation actions, response mechanisms and information collection mechanisms to develop a comprehensive plan with strong evidence for addressing climate-induced loss and damage. Thus, coordination mechanisms should be made to strengthen and build synergies of DRR and climate change institutions across all three tiers of governments.

- **Response mechanisms.** A strong infrastructure with technical knowledge in mapping the risk of climatic hazards and the desire to move to a safe place apart from financial constraints are the current needs that the affected communities are looking to solving. Therefore, the immediate next step for both state and non-state actors should be to identify potential climate risks and analyse whether they are acceptable, tolerable or unacceptable within the limits of existing adaptation interventions. Similarly, encouraging disaster preparedness plans, comprehensive loss and damage action plans, and insurance policies for agriculture and crops should be initiated to minimise and resolve the loss and damage from climate change.

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CHAPTER I

CLIMATE CHANGE - INDUCED LOSS AND DAMAGE; WHY IT MATTERS FOR NEPAL

Flood havoc after Jure Landslide in Sindupalchok

1.1 Background

The phrase "loss and damage" describes the negative impacts of extreme and/or slow-onset weather events that people are inadequately or entirely unable to cope with or adapt to (Warner, K. and van der Geest, K.,2013). Loss and damage is the actual and/or potential manifestation of impacts associated with climate change that negatively affect human and natural systems: whereas "loss" refers to the negative impacts in which reparation or restoration is impossible, "damage" describes those aspects that are recoverable but at a cost (UNFCCC, 2012). The government of Nepal has also defined loss and damage as actual and/or potential negative manifestations of climate change on sudden-onset extreme events, such as heatwaves and extreme rainfall, as well as on slow-onset events, such as snow loss, drought and glacier retreat, to which people in Nepal's mountains and hills, and Tarai region are not able to cope with or adapt to when the country's natural ecosystems, infrastructure and institutions are overwhelmed, leading to loss of life, livelihoods, and cultural heritage (MoFE,2021a).

Strong scientific evidence shows that climate impacts are becoming increasingly visible and affecting all sectors and regions in Nepal. If we go back over recent disaster events in Nepal, we find that rare disaster events are becoming more frequent and that, due to the limited knowledge, skills and technical and financial resources, Nepal is more vulnerable to climate-induced disasters. As a result, loss and damage in Nepal is easy to understand but very difficult to manage.

The overall objective of this study is to contribute towards an increased understanding of loss and damage due to climate change. The current level of loss and damage will continue to escalate in the next decades. While developed countries will have the financial resources to respond appropriately, developing and climate-vulnerable

countries like Nepal require financial assistance to manage climate-induced loss and damage. The government of Nepal has adopted several initiatives to tackle the effects of climate change at the local to national levels, such as the National Climate Change Policy of 2019 (revised), but it still lacks a framework for assessing climate-induced loss and damage with evidence, and a very limited number of initiatives have touched on the "Residual Gap"[1] and financial schemes. Likewise, non-economic loss and damage, such as socio-cultural loss and damage, including displacement impacts upon the segment of the society (marginalised groups, indigenous people, women) and their association with longer-term developmental impacts have not been assessed with supporting case studies. As a step towards adding new findings on loss and damage, Practical Action (2021) published a report on "Assessing and Addressing Climate Induced Loss and Damage in Nepal". The study was mainly focused on reviewing the existing approaches and mandates of existing governments in the flood prone low Karnali region. To support and add more evidence, this study examined economic and non-economic loss and damage from climate-induced disasters (floods and landslides) in two different geographical regions. The study calculated the residual gap and developed a situational analysis from the perspective of people by using a systematic assessment approach. This assessment report adds value to policy initiatives and presents the real situation of communities that are vulnerable to climate change, providing a strong basis for policies to avert, minimise and address loss and damage. This study has attempted to connect the local context with global processes related to climate change, particularly under the aegis of the United Nations Framework Convention on Climate Change (UNFCCC). This assessment provides evidence of climate-induced loss and damage and of the scale of support required to address its severity and vulnerability.

1.2 Climate Change Vulnerability and Loss and Damage in Nepal

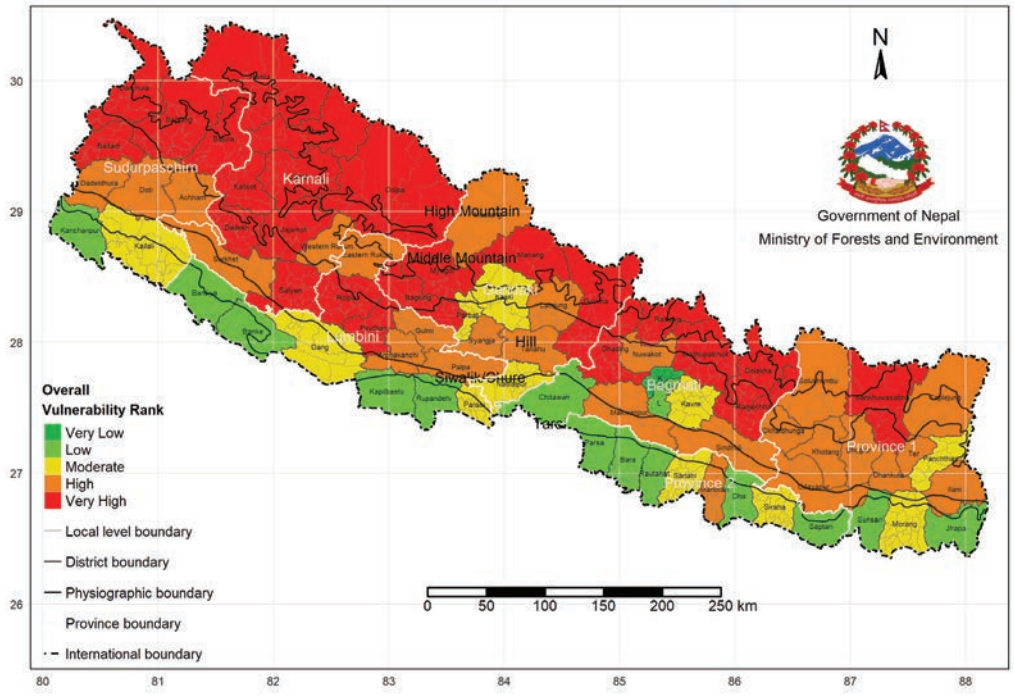
The climate change trend in Nepal (1971-2014) shows that its annual maximum temperature is increasing by 0.05°C/yr. According to a report released by the Ministry of Forests and Environment (MoFE) and the International Centre for Integrated Mountain Development (ICIMOD) in 2019, average annual precipitation is expected to rise in both the short term (2030) and long term (2050). In addition, the average temperature may rise by 0.92-1.07°C in the medium term and 1.30-1.82°C in the long term, and it might increase by 1.72-3.58°C until the end of the century. As the global temperature target is to limit temperature growth to 1.5°C, the above projection shows that the future will be even more challenging for Nepal.

The study calculated the residual gap and developed a situational analysis from the perspective of people by using a systematic assessment approach.

Nepal is highly vulnerable to climate change and natural disasters. Globally, it ranks fourth, eleventh and thirtieth in terms of vulnerability to climate change, earthquake and flood risks respectively. Climate-related natural disasters such as floods, landslides, droughts and extreme weather events have resulted in loss of life, property and livelihoods, as well as extensive damage to all climate-sensitive sectors and the country's economy (MoFE 2018). According to the recent climate-change vulnerability and risk assessment report (MoFE, 2021b), 50 districts out of 77 rank high to very high in term of vulnerability to the effects of climate change.

[1]The residual gap refers to the gap that exists after the financial support received from local government and other non-state actors.

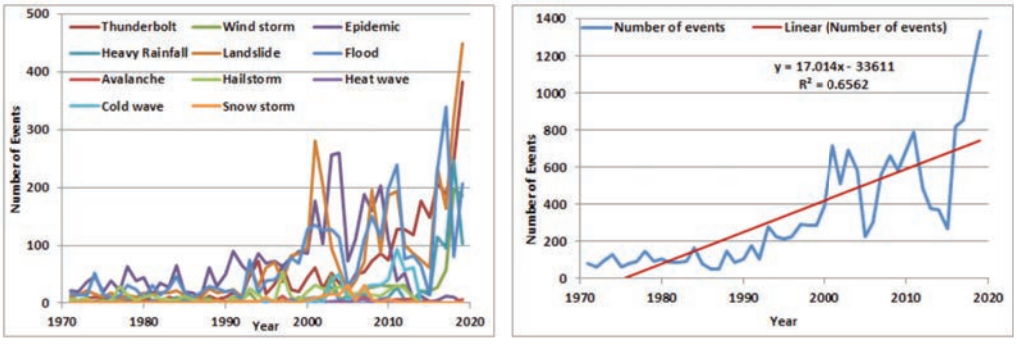
Figure 1: Climate Change Vulnerability Ranking



(Source: MoFE, 2021b)

Floods, landslides and droughts are the main climatic disasters in Nepal, which are more likely to be aggravated by climate change in the future. The disaster database for Nepal records 15 weather-related disasters, namely floods, landslides, epidemics, fires, lightning, heavy rain, drought, glacial lake outburst flood (GLOF), heat waves, cold waves, storms, avalanches, blizzards, hail and wildfires. The trend analysis of 14 types of climate-related disasters (except GLOFs) shows that the incidence of disasters has significantly increased, especially since 1990. Except for meteorological drought, all disasters show an increasing trend.

Figure 2: Climate-related Disaster Trends in Nepal

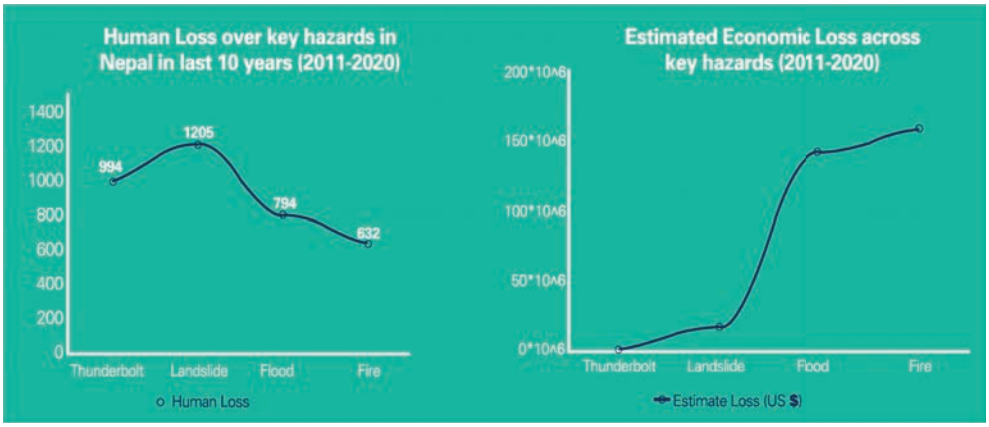


(Source: MoFE, 2021b)

Floods, landslides, epidemics and fires are the main climate-related disasters in Nepal. A hazard comparison of demographic and economic losses affected by deaths shows that epidemics caused the most deaths (52.8%), followed by landslides (16.7%) and floods (12.7%). However, floods affected approximately 71% of the total affected

population, followed by landslides (9.5%) and epidemics (8.2%). Fires caused the largest number of economic losses (56.6%), followed by floods (31%) and landslides (3.7%). The figure below shows the key hazards in the last ten years (2011-2020): the greatest numbers of deaths (losses) have occurred from landslides and floods combined, and then from fires. The maximum economic loss is reported from fires, with flooding and landslides second and third respectively.

Figure 3: Human and Economic Losses Due to Key Hazards



(Source: MoFE, 2021b)

Research by the Institute for Environment and Human Security (UN University) on the Jure landslide found that out of 478 families affected by the landslide only 16% were able to bounce back, about 78% of those affected adopted three or more measures to cope with the impacts of landslides, around 58% adapted migration as an adaptive measure, and most of them never recovered from the landslide (Geest & Schindler, 2016). If we look at the trend in climate-induced disaster events in Nepal (1971-2019), the number is continuously increasing, with on average 647 people dying from climate-induced disasters each year. The average economic loss per year due to climate-induced disasters is USD 27.78 million (NPR 2,778 million), or 0.08% of Nepal's national GDP. The rainfall recorded in June 2021 unleashed floods that killed more than fifty people, damaged twelve hydroelectric plants and washed away roads, bridges and homes across central Nepal. The heavy rains followed a five-month winter drought that set off unprecedented nationwide wildfires (Rijal, 2021).

The average economic loss per year due to climate-induced disasters is USD 27.78 million (NPR 2,778 million).

UNFCCC (2012) identified glacial retreat and related impacts as a slow-onset event influenced by climate change. Similarly, the fourth assessment report (AR4) of the IPCC in 2007 designated the Hindu Kush Himalayas as a "white spot" for climate change. Being a mountainous country, Nepal is at the forefront of such slow-onset events in high altitude and downstream communities at high risk. A report by ICIMOD (2011) has identified 21 of the 2,070 glacial lakes in Nepal as potentially dangerous. Looking at previous GLOF events in Nepal, there is a high possibility that such loss and damage will continue to be faced in the future. The table below illustrates some of the past GLOF events, reflecting different levels of economic and non-economic loss and damage.

Table 1: Example of Magnitude and Downstream Impact of GLOFs in the Past

Name of Glacial Lake	Date of Outburst	Downstream Impact
Nare, Dudhkoshi	Sept. 3, 1977	Flood surge down to 90 km
		Loss of life and infrastructure (3 persons, 1 building, 10 bridges) down to 35 km
Nagama (Phucan), Tamor basin	June 23, 1980	Eroded riverbed down to 23 km
		Loss of life and infrastructure (8 persons, 10 houses, 4 bridges) down to 72 km
Zhangzanbo, Bhotekoshi/ Sunkoshii	July 11, 1981	Flood surge down to 50 km (16 times larger than the average annual floods)
		Vertical erosion down to 6 km; lateral erosion between 6-20 km; lateral erosion and deposition between 20-50 km
		Major damage between 20-55 km (5 persons killed, 191 injured; 84 houses; 2 highway bridges; 10 suspension bridges; 27 km road; 1 hydro dam; 1 km transmission line)
		Power supply cut for 31 days; road blocked for 36 days
		Road rehabilitation cost USD 3 million; work lasted for 3 years
Dig Cho, Dudhkoshi	August 4, 1985	Alternation of erosion and accumulation activity down to 42 km; most of the eroded materials redeposited within the first 25 km
		Loss of life and infrastructure (4-5 persons, 30 houses, 14 bridges, 1 hydropower plant, 8 km of trails, 20 ha cultivated land) down to 40 km
		Economic loss amounting to USD 4 million

Source: Modified (CFGORRP, 2014)

Loss and damage is not only a future issue for Nepal but something that vulnerable communities are experiencing right now.

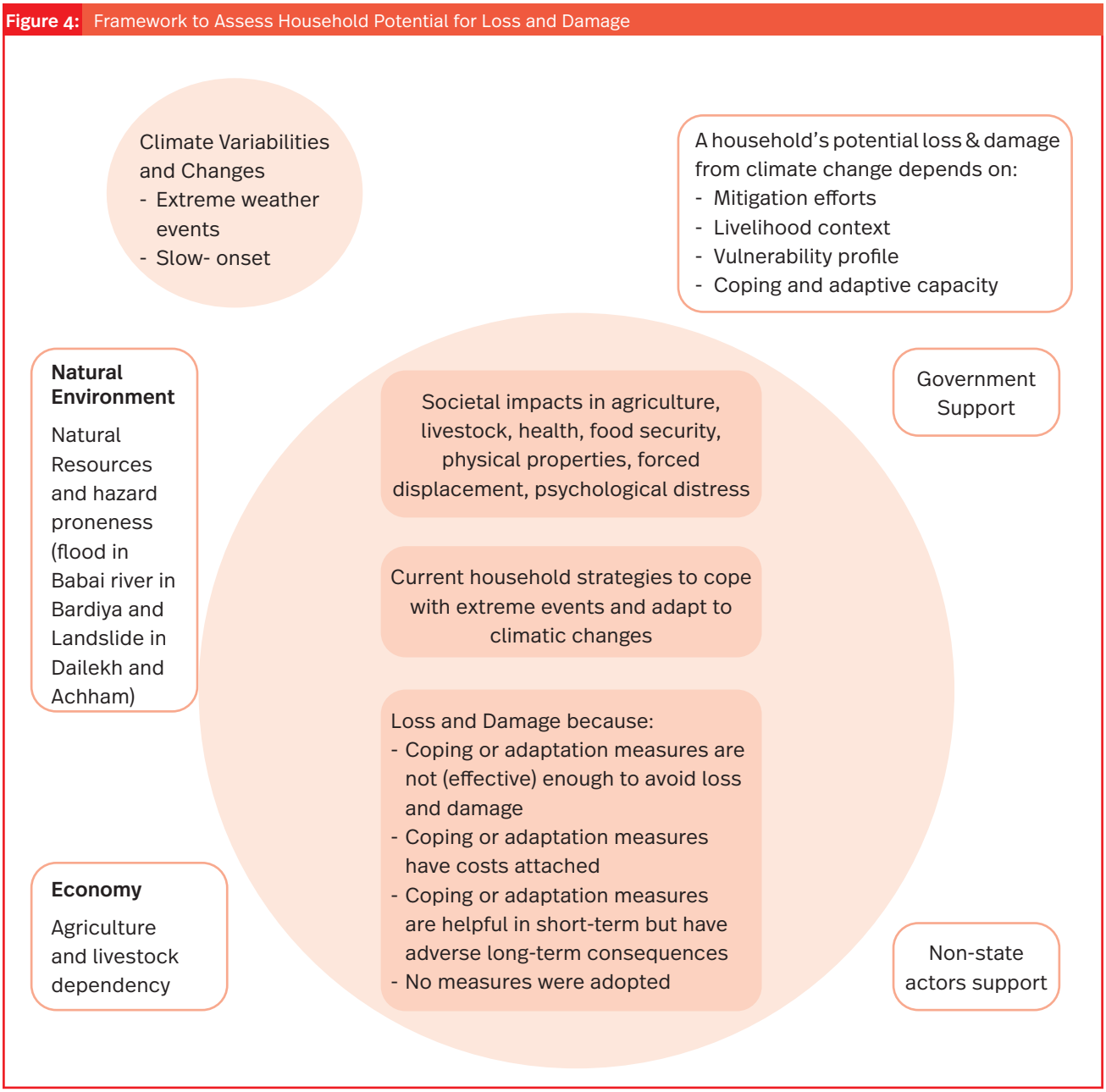
Loss and damage that is taking place right now will continue to rise in future decades. While developed countries have the financial resources to act accordingly, developing and climate-vulnerable countries like Nepal need financial support to address climate-induced loss and damage. When mitigation and adaptation actions are not adequate, people and communities may face "loss and damage". Thus, loss and damage is not only a future issue for Nepal but something that vulnerable communities are experiencing right now.

CHAPTER II

METHODS

This study attempts to examine the economic and non-economic loss and damage caused by climate-induced disasters in two different geographical regions and the residual gap and provides a situational analysis from the perspective of those who have suffered from. Regarding the loss and damage assessment, several frameworks have been developed and are still under development. This study takes a systematic approach to assessment that includes tools such as household surveys, focus-group discussions and interviews with key informants. To bring this study in line with the global perspective, a modified version of the framework from Kees Van Der Geest and Koko Warner (2012) has been used to measure potential household losses. The modified framework addresses the major components and variables required for a household questionnaire survey to explore grassroots information among the community regarding climate-induced loss and damage.

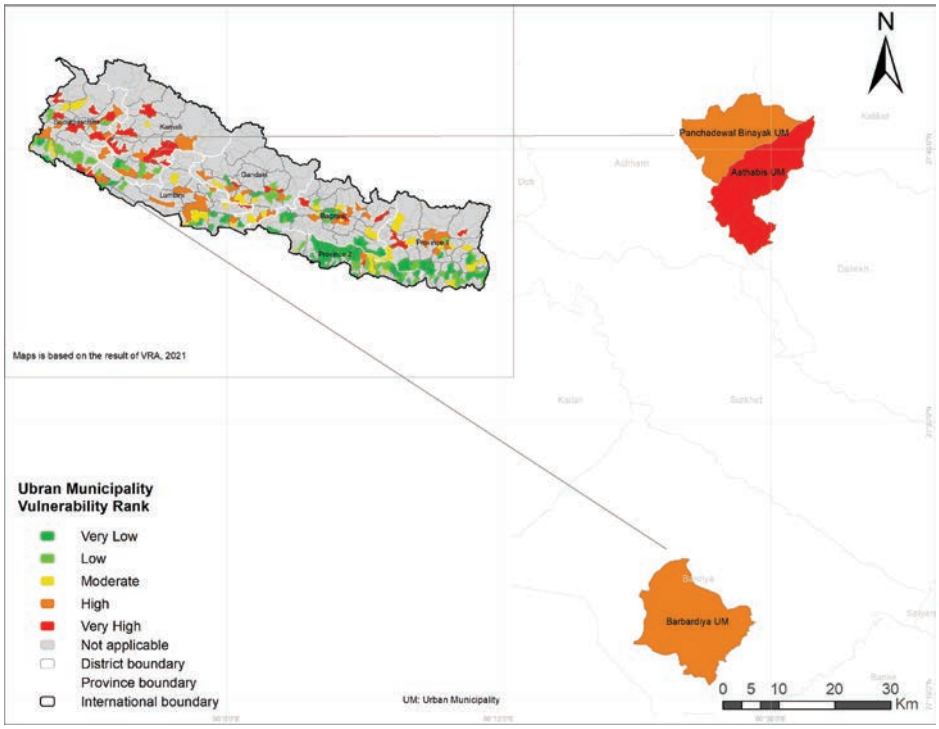
Figure 4: Framework to Assess Household Potential for Loss and Damage



2.1 Study Area

Nepal is already experiencing climate change, and its impact is very visible. Moreover, because of its fragile geography, the country is characterised by a different ecosystem and exposes itself differently to climate risk. According to the Vulnerability and Risk Assessment Report (MoFE, 2021), Barbardiya Municipality in Bardiya District and Panchadewal Binayak Municipality in Achham District are ranked high and Aathbis Municipality in Dailekh District very high in terms of vulnerability to climate change impacts. The baseline context of flood hazards shows Bardiya to be a flood-prone district and Dailekh a landslide-prone district. In support of published reports and consultation with local governments, Aathbis, Panchadewal Binayak and Barbardiya Municipality in Dailekh, Achham and Bardiya District were selected for this study.

Figure 5: Study Area and it's Climate Change Vulnerability Ranking



Study Base: The study was centred on the following base

- Assess both economic and non-economic loss and damage amongst flood impacted communities in Bardiya and the landslide affected communities of Dailekh and Achham district.
- Examine and identify support required to address loss and damage from either Nepalese authority, non-state actors (e.g., national, or international NGOs), and international donors.
- Identify the residual gap in terms of responding to both economic and non-economic loss and damage

2.2 Research Framework

The research framework presented below is used for exploring the scenario of climate-induced loss and damage from rigorous literature reviews, followed by an exploration of qualitative data from the household questionnaire survey, focus-group discussions, key informant interviews and supporting case studies.

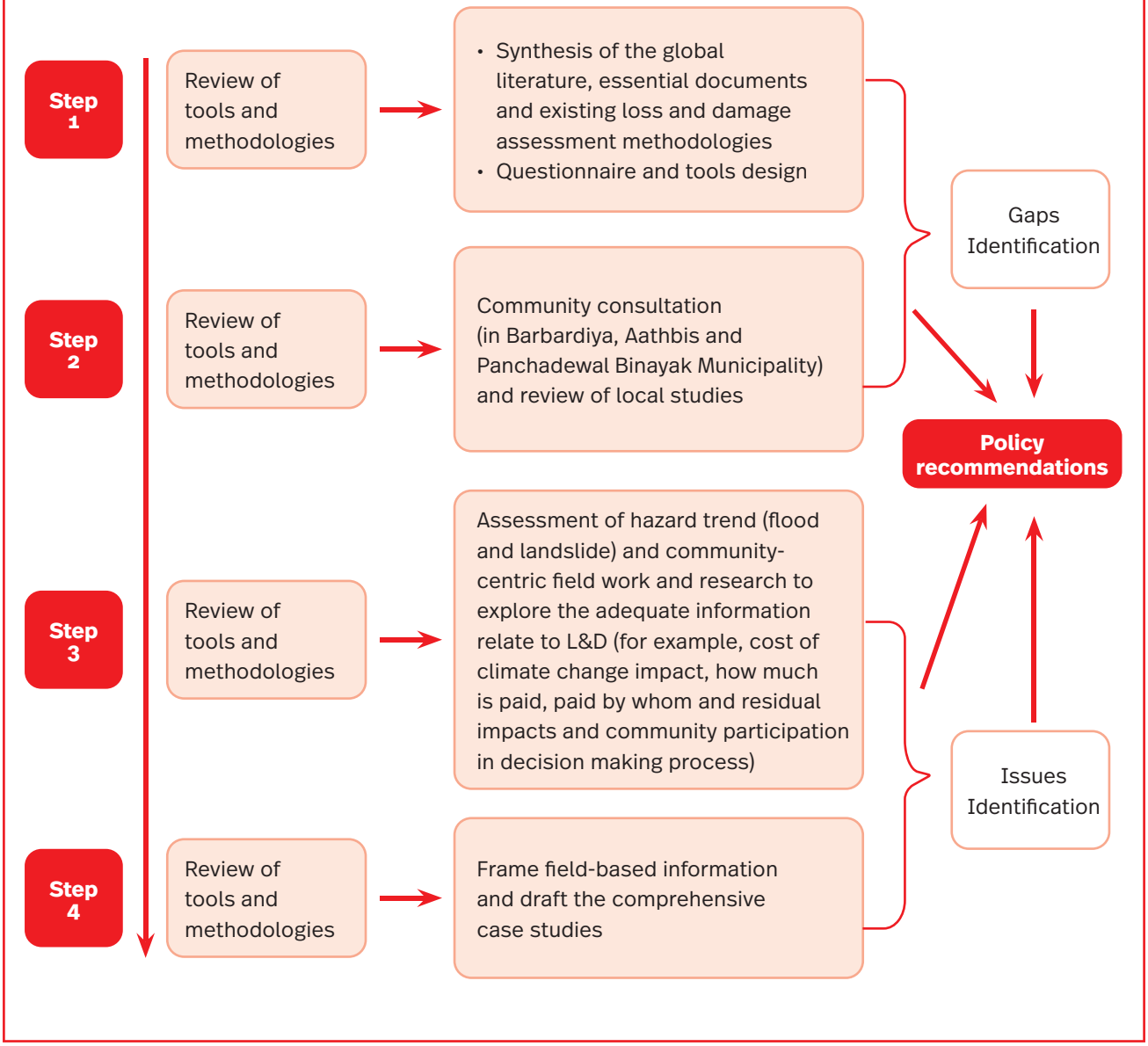
The household survey was conducted with 93 respondents, one from each household. The fieldwork also included the key expert interviews with local government representatives and senior citizens who have lived in these areas for more than twenty years and focus-group discussions. Altogether 5 FGDs, (1-Aathbis, 1- Panchadewal Binayak and 3-Barbardiya) were conducted to adequately document people's perceptions of loss and damage and its scenario.

Household Survey: This survey was conducted with 93 respondents in order to bring out the quantitative measurements and qualitative understandings of climate-induced loss and damage. The survey questionnaire includes both open and close-ended questions.

Focus Group Discussion (FGD): FGDs were conducted on 5 sites (landslide and flood-affected communities) in a local government consultation with more than 15 people at a time to complement the information collected from household surveys. The group included respondents aged 16-65 years and had nearly 80% female participation.

Key Informant Interview (KII): KIIs were conducted with at least two personnel (at least one local government representative and other from among the oldest senior citizens) from each site to obtain information that is not easily obtained from household surveys and FGDs. In particular, local government plans to address climate-induced loss and damage, aid and support, etc. are collected from local representatives, as well as senior citizens perceptions on the frequency and extremities of climatic events from the past twenty years. It further assesses the hazard trends (floods and landslides) of the past twenty years by means of a community participatory approach supported with scientific evidence.

Figure 6: Research Framework



CHAPTER III

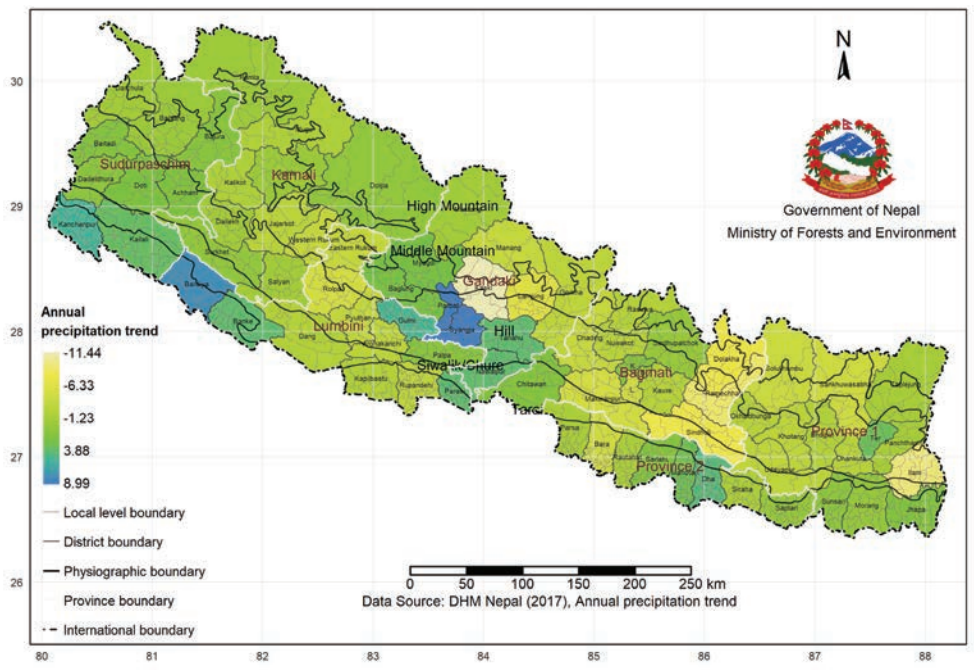
EVIDENCE OF LOSS AND DAMAGE IN VULNERABLE COMMUNITIES IN NEPAL

This chapter presents key findings from the field study in the three Municipalities of Aathbis, Panchadewal Binayak and Barbardiya. The study covers people perceptions of the frequency and extremities of rainfall and disaster events in the past twenty years, whereas rest of the study, including the calculation of loss and damage, only covers the most recent five years. As landslides are a common climate-induced event in Panchadewal Binayak and Aathbis Municipalities, most of the data have been interpreted together, but those for Barbardiya are presented separately, as they cover loss and damage due to flood events. This chapter also describes case studies of the three Municipalities and the challenges they face in responding to loss and damage.

3.1 A Brief Overview of Precipitation Trends in Nepal

The annual precipitation trend in Nepal shows the differences across the districts and provinces. Precipitation is increasing in research study district Bardiya (7.86 mm/yr), and all the districts, including Achham District in Sudurpaschim Province and Dailekh District in Karnali Province. Figure 7 gives the annual precipitation trend in the 77 districts of Nepal (1971-2014).

Figure 7: All-Nepal Precipitation Trend



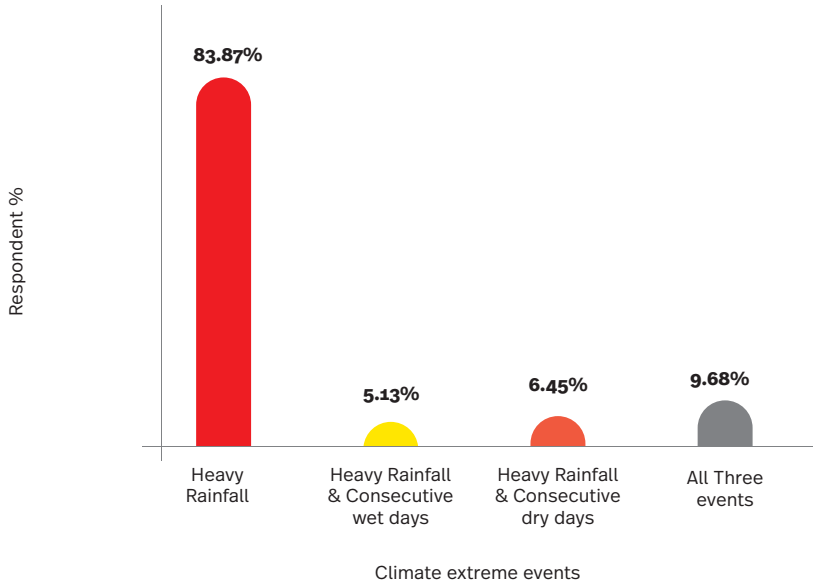
(Source: MoFE, 2021b)

3.2 People's Perceptions of Climate Extreme Events

All residents belonging to the severely flood-affected Municipality of Bardiya (Barbardiya) and the heavily landslide-affected Municipalities of Dailekh and Achham Districts (Aathbis and Panchadewal Binayak) have noticed the irregularities in weather patterns and multiple climate extremities in the past. Regarding the perceptions of local residents, the majority of respondents (83.87%) have experienced heavy rainfall, and 9.68% experienced three events (heavy rainfall, consecutive wet days and consecutive dry days) as climate-extreme events. The overview of people's perceptions (Figure 8) supports the experience of heavy rainfall, which has triggered and increased events

such as floods and landslides in the study area. Similarly, the heavy rainfall recorded in the Nepal Disaster Risk Reduction Portal also shows that this is an increasing trend and is in line with the perception of residents of Aathbis, Panchadewal Binayak and Barbardiya Municipalities.

Figure 8: People's Perceptions of Climate-Extreme Events



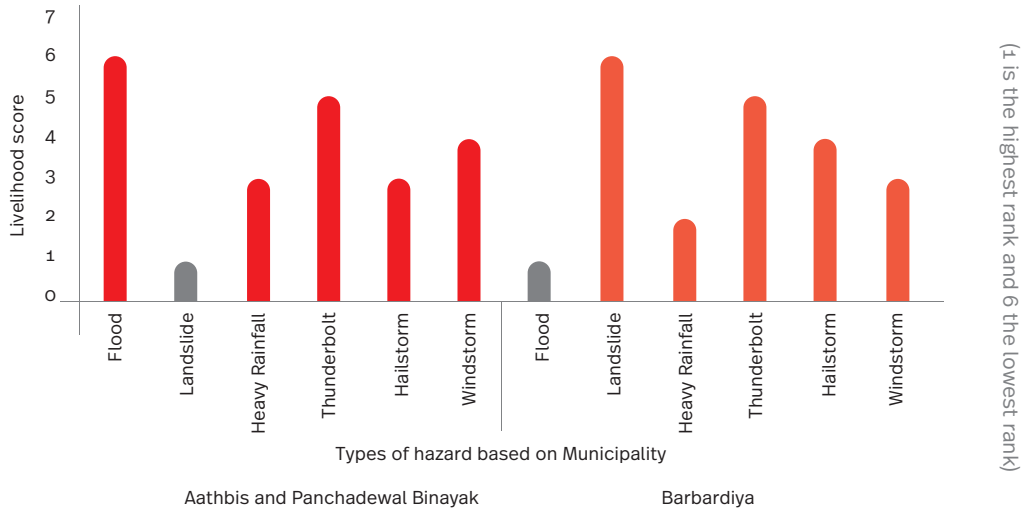
3.3 Climate Induced Hazard: Likelihood of Occurrence

Aathbis and Panchadewal Binayak Municipalities, being located on the sloping terrain of the hills, remain extremely susceptible to climate-induced hazards like landslides, which are considered the most frequently occurring events. Heavy rainfall is ranked second, followed by other events, such as thunderbolts, windstorms and hailstorms. Despite being geographically positioned in proximity to the rapidly flowing Karnali river, the likelihood of flooding as a possible climate-induced hazard is non-existent for both Municipalities.

Respondents indicated a noticeable increment in both the frequency and intensity of landslides in recent years. Each rainfall event was associated with a form of land-mass movement resulting in extremely frequent rain-induced landslides on a minor scale and some less frequent but more impactful landslide events. The socio-economic and environmental impacts hence brought about were reported to be severe and devastating.

Barbardiya Municipality, being located in the flatlands of the Terai and the floodplains of the perennial Babai river, is constantly susceptible to flood risks. For this reason, its residents ranked floods as the most frequently occurring hazard. Also identical to the previous Municipalities, the flooding is closely linked to the rainfall events. Each rainfall event is responsible for increasing the run-off, and the lack of proper run-off drainage has often damaged and destroyed the community's traditional mud houses and inundated their agricultural fields. The major concern has been upstream rainfall increasing the level of water in the river and thus bringing the flooding back downstream.

Figure 9: People's Perception on Climate-induced Hazards: Likelihood of Occurrence (In Past 20 Years)



3.4 Accounting of Economic and Non-Economic Loss and Damage Due to Climate-induced Disasters

This study documents both economic and non-economic loss and damage due to climate-induced disasters. There are several studies and reports providing a clear picture of the number of disaster events and their economic and non-economic implications. According to the report on post-flood recovery assessments by MoHA (2017), the constant rainfall severely affected 35 districts in Nepal and destroyed or partially damaged more than 190,000 houses, displacing thousands of people and causing 134 deaths. The government later estimated losses of around NPR 60,716 (USD 584.7) million, almost 3% of Nepal's GDP. The total recovery need was estimated at NPR 73,224.8 (USD 705.1) million. The government of Nepal made post-flood recovery need assessments in nine important sectors: housing, health, education, agriculture, livestock, irrigation, transport, water and sanitation, and energy (GoN, 2017). Continuous heavy rainfall triggered floods and landslides in the various districts of the Mid-West and Western regions after 16 June 2013 and caused economic and non-economic losses (UNFCO, 2013). Table 2 below gives examples of calculating economic and non-economic loss and damage corresponding to the three study areas of Aathbis (Dailekh), Panchadewal Binayak (Achham) and Barbardiya (Bardiya).

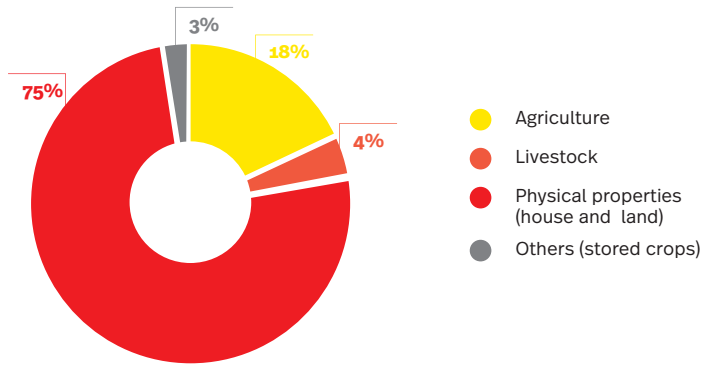
Table 2: Example of Calculating Economic and Non-economic Loss and Damage

Date	Type of Event	Place	Non-Economic Loss and Damage (Including displacement)	Economic Loss and Damage
2014	Flooding and flash floods	Kailali, Bardiya, Surkhet, Dang	222 dead and 84 injured and 6,859 households displaced	5,167 houses fully damaged, 14,913 partially damaged, total affected population:117,580
2017	Flooding	35 Terai Districts (including Bardiya)	134 people dead, 22 Injured and 10,000 households displaced	Affected a total of around 1.7 million people; more than 190,000 houses were destroyed (both partially and fully damaged), NPR 60,716.6 million was lost
2020	Landsides and flooding	58 Districts (including Dailekh and Achham)	297 dead 64 missing and 223 persons were injured.	NPR 51 million was lost

3.4.1 Economic Loss and Damage

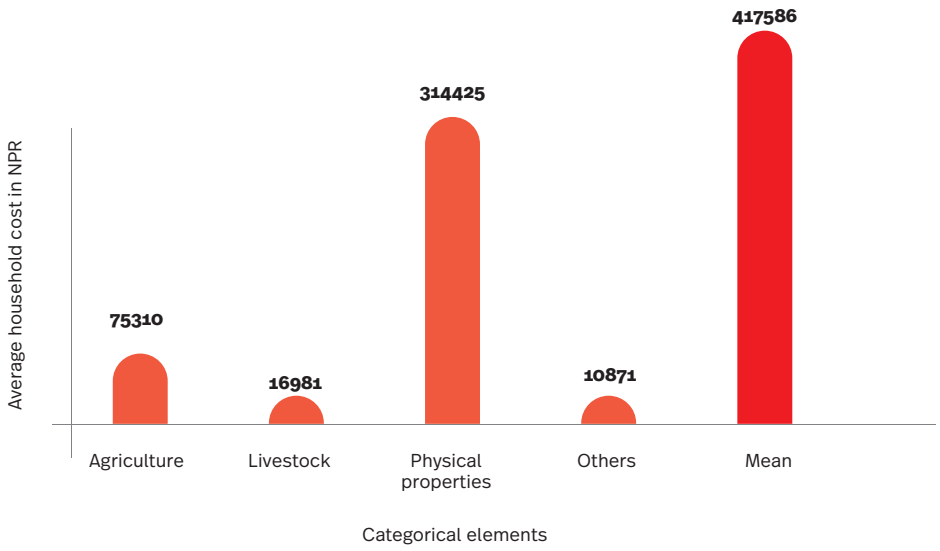
Economic losses are defined by the UNFCCC as "losses of resources, goods, and services that are commonly traded in markets" (UNFCCC, 2013b: 3). It groups economic loss and damage into five categories: business operations, agriculture production, tourism, infrastructure and property.

Figure 10: Overall Economic loss (%) of Aathbis and Panchadewal Binayak and Barbardiya



The overall estimated economic loss in Aathbis, Panchadewal Binayak and Barbardiya Municipalities was USD 388,355 (NPR 38,835,496), the average per household loss being around USD 4,176 (NPR 417,586), including losses in agriculture (18%), livestock (4%), physical properties (house and land) (75%) and others, i.e. storage of food grains and lentils (3%). It can be shown that the loss of physical properties (land and house) constitutes major loss due to climate-induced disasters like the landslides in Aathbis and Panchadewal Binayak and the flooding in Barbardiya.

Figure 11: Categorical Economic Loss (Mean) of Aathbis, Panchadewal Binayak and Barbardiya



The economic loss calculated on the physical properties due to landslides is highest, with 88% in Aathbis and Panchadewal Binayak, and 68% in the flood-affected Barbardiya Municipality. Physical properties like land and houses seem mostly affected irrespective of the type of hazard or geographical area. Secondly, as agriculture has been affected, the loss of stored grains, crops and lentils also represents an economic loss, but only in the flood-affected community of Barbardiya (Table 3).

Table 3: Economic Loss and Damage in Study Area

Municipality	Events	Economic Loss (NPR)			
		Agriculture	Livestock	Physical Properties (House and Land)	Others (grain and lentil storage)
Aathbis and Panchadewal Binayak	Landslides	1,842,296 (12%)	8,000 (0.05%)	12,923,500 (88%)	0
Barbardiya	Flood	5,161,500 (21%)	1,571,200 (7%)	16,318,000 (68%)	1,011,000 (4%)
Total		7,003,796 (USD 70,038)	1,579,200 (USD 15,792)	29,241,500 (USD 292,415)	1,011,000 (USD 10,110)

a. Agriculture

Agriculture is the major profession of the residents in the selected Municipalities. Most of the people rely on sustenance-based agriculture. The agricultural arrangement in both Aathbis and Panchadewal Binayak reflect a rather typical form of step farming on the steep hill slopes, which are highly susceptible to landslides. In addition to the general loss of various cash crops, the most recent problems have been the loss of productive land due to debris deposition. In Aathbis much of the damaged agricultural land exceeded one hectare, followed by lands smaller than half a hectare, with a total loss of 12% in agriculture in both Municipalities (Aathbis and Panchadewal Binayak).

Being located in the lowlands of the Terai region, Barbardiya Municipality is clearly strongly marked by agriculture practice in the community. Therefore, owing to its large-scale presence, agricultural lands become one of the primarily flood-affected economic assets. The residents are settled in their farmland near the floodplains of the Babai river, meaning that they are ultimately located in flood-prone areas, where most people have suffered agricultural damage of less than half a hectare of land, with a 21% loss of agriculture from flooding.

b. Livestock

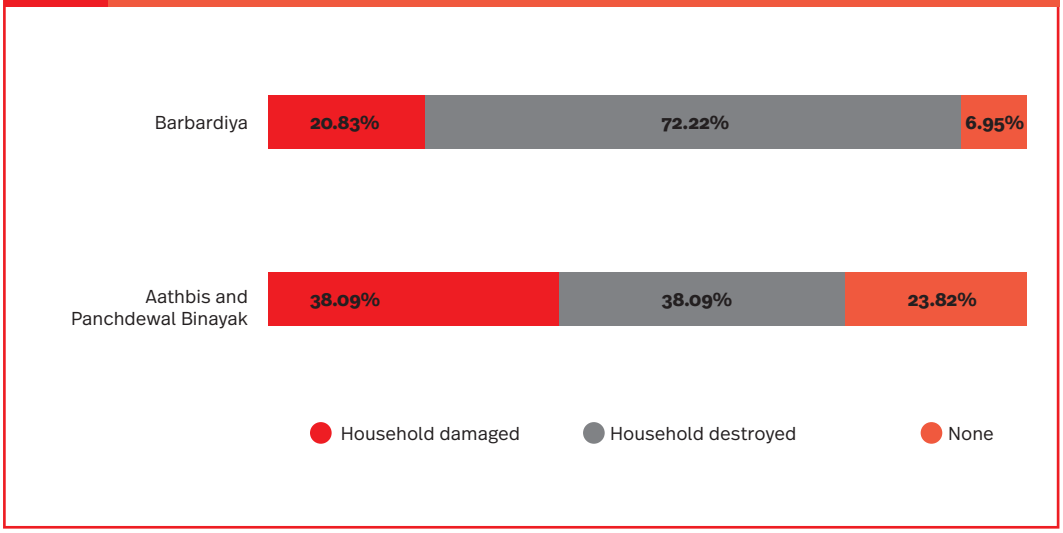
A combination of the absence of large herds of livestock and the potential safeguarding or quick relocation of domestic animals in the selected Municipalities has resulted in comparatively lower figures for livestock losses caused by landslides. Not a single respondent from Aathbis Municipality reported losing their livestock, whereas 11% of the respondents from Panchadewal Binayak reported losing their livestock due to landslides.

In contrast to the landslide-affected area, the livestock loss was high in Barbardiya, with 75% reporting losing their farm animals due to flood. The geographical area (flat terrain) is mostly affected by the flooding, simply inundations potentially resulting in the greatest loss of livestock. Landslides, conversely, have less of a buffer area connected with a lower impact. The livestock lost included chickens, ducks and goats, and in some cases also pigs, cows and oxen.

c. Physical properties

Physical properties here include houses and the surrounding lands. Land is an indispensable asset for the people in Aathbis and Panchadewal Binayak Municipalities. It is not only used for shelter but is widely used for sheds and other storage. Damage to infrastructure is inevitable during disasters such as landslides and flooding. The respondents from Aathbis and Panchadewal Binayak reported infrastructural damage, especially to the roads, which caused severe restrictions ranging from difficulties in just moving around to obstructions to the transport of essential food, non-food and medical items. 38.09% of the respondents in both Aathbis and Panchadewal Binayak reported of complete destruction of their houses, while 38.09% reported of structural damage to their houses and 23.82% no effect at all. Damage to physical properties and housing was the highest in respect of flood-induced damage in Barbardiya. 72.22% and 20.83% of respondents reported destroyed and damaged property respectively 6.95% inundated by flooding, but no damage or destruction at all.

Figure 12: Nature of Flood Impacts on Physical Properties (House & Land) in Barbardiya, and Landslide Impact in Aathbis and Panchadewal Binayak



Case Study 1

The community faces frequent small flood every year. The floods of 2014 and 2017 marked the biggest flood as it made many people homeless with many damages in infrastructures and farmlands. People lost their cattle and houses were completely or partially damaged. Communal tap made at the elevation to provide drinking water during flood was inundated. It not only washed away the road and agricultural lands but washed away the Early Warning System installed to aware community about the flood. Productive land (700-800m land away from river) was inundated with flood. Agricultural land along with paddy and maize were completely covered by flood deposits.

Amid of these, Tharu community have the indigenous practice of storing their crops and lentils (90 quintals and more, rice wheat, maize, mustard, etc.) to ensure food security for one and half year, depending on their family size. This indigenous practice of stored crops and grains in mud made storage structure were damaged by flood ruining their food security not only in the present but also for upcoming two to three years. Loss and damage have always been able to address the present losses of houses and property but has unseen the loss of these storage and their self-assurance to food security for future. Those who believed/thought flood would never come again were affected much with its consequences whereas those who believed and were aware of the flood have the minimum effect of it.

- KII, Ward 4- Barbardiya Municipality

d. Other (grain and lentil storage)

Indigenous practices of food and grain storage for purposes of future food security have been commonly practiced by the Tharu community of Barbardiya. Besides the visible loss of physical properties and livestock, the loss of stored grains and lentils for more than five years contributed to a 4% loss from flooding calculated for the community of Barbardiya. This is further supported by case study 1.

3.4.2 Non-Economic Loss and Damage

According to the UNFCCC, "Non-economic losses occur in three distinct areas: private individuals, society, and the environment. More specifically, non-economic losses can be understood as losses of, inter alia, life, health, displacement and human mobility, territory, cultural heritage, indigenous/local knowledge, biodiversity, and ecosystem services" (UNFCCC, 2013). However, evaluation of non-economic losses from climate-induced loss and damage has been constrained. There had been no recent deaths or injuries related to landslides or flooding in the study area, but the tremor and post-disaster psychological distress was very apparent, whether from the effects of flooding or landslides. At the same time, respondents in Barbardiya reported difficulties on visiting hospitals for regular check-ups due to road obstructions from flooding. Likewise, women who suffer

from poverty and inequality even in normal situations were those who suffered the most from the effects of climate change. It was revealed that women in the study area were not aware of their rights and did not have access to information or knowledge about response mechanisms or whom to ask for support. It is therefore imperative to respond to their specific needs, challenges, experiences, and opportunities, which require serious attention if we want climate-change policies and actions to be effective, gender-sensitive and responsive.

"Every monsoon we face many landslides. Life has become more complicated when it rains. Our whole village stays awake the entire night when it rains. Sometimes we cannot sleep for 2-3 days to protect our lives and livestock from this unpredictable landslide. We know this area is not suitable for residential purposes, but we cannot help ourselves, as we inherited these lands from our forefathers, and we have nowhere to go. Every time we pray with 'rays of hope' to pass this monsoon safely so that government can come up with solution for the next monsoon to save us."- **Krishna Prashad Jaisi, Aathbis Municipality, Dailekh.**

Because of the past two major flooding events and the increasing frequency of small floods every year, the people of Barbardiya are still coping with the trauma they have faced. It was revealed that property damage and the fear of reoccurrence were causing psychological distress to the affected people, undermining their capacity to adapt to future disasters.

"When it rains, my eight-year-old son starts praying, 'God, please don't let it flood when it rains.' Many people have been through psychological stress and fear from the consequences of the floods of 2017, which was seen as the biggest flood in Barbardiya by the communities." **– Sakaram Tharu, Barbardiya Municipality, Bardiya.**

The cases of permanent migration from ancestral land due to the landslides in Aathbis, Panchadewal Binayak and Barbardiya have already been noted. In total 9% of all respondents have been permanently displaced to other locations. However, seeking temporary shelter in the houses of friends, families and neighbours was something that almost all the respondents had endured during the immediate post-disaster scenario.

"I was born and raised here. At the age of forty, I am compelled to leave my place because of the landslide. I permanently migrated from the hills to the Tarai. The emotions attached to my land drag me here, so I always visit three to four times a year to see my cousins, neighbours and my agricultural land. Every time I visit, my eyes become tearful because of how I had to leave the place where my forefathers spent their precious time". **- Harka Dhakal, Panchadewal Binayak Municipality, Achham.**

Landslide-affected people were not financially compensated or supported. The poor suffered greatly from such climate-induced disaster, having to struggle hard to recover. A complete absence of loss of life and socio-cultural conflicts, and significantly low physical health impacts and cases of forced migration suggest minimal non-economic impacts on the flood-affected community of Barbardiya. In addition, there were no reportable instances of social conflicts due to the disaster in the community.

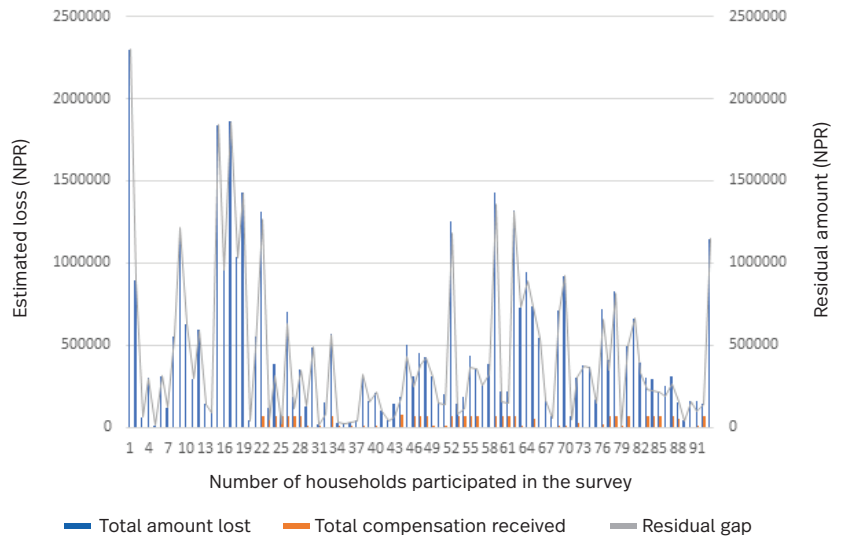
3.5 Residual Gap

The residual gap is the gap that emerges after financial support has been received from the local government and other non-state actors. In all three Municipalities the local government is the first agency to give financial support to those who have lost their physical properties. The loss and damage to property owned by the community was higher than the financial compensation they received from the local government for full and partial destruction and damage to their houses, there being no compensation for lost livestock or foods stored to provide two or three years of food security. There are cases of community people migrating towards safe areas after taking out a loan to buy new plots of land on which to construct new houses, whereas others changed their mud houses to cement houses with roof-bearing loans they are struggling to pay back. The affected communities from Aathbis and Panchadewal Binayak Municipality did not receive any financial aid to cope with the post-disaster consequences. In these cases, given the complete absence of any financial support to the landslide victims, the residual gap is directly equal to the total financial loss. Figure 13 below illustrates the residual gap of all respondents from the three Municipalities. The identified residual gap in the case of the landslide-affected ranged from a minimum of USD 1,000 to 2,300 (NPR 100,000 – 230,000).

Loss and damage to property owned by the community was higher than the financial compensation they received from the local government for full and partial destruction and damage to their houses, there being no compensation for lost livestock or foods stored to provide two or three years of food security.

In the case of the flood-affected community of Barbardiya, the maximum identified per-household residual gap ranged between USD 70 to USD 13,580 (NPR 7,000 to NPR 1,358,000). Financial support for compensation was limited within the local government area, whereas the affected people were helped with temporary settlement and food in the post-disaster period by the different non-state actors. In some households, the financial support seemed to exceed the amount lost, creating a negative residual gap, and indicating that the household received enough financial support to cover their losses and damage. However, in these cases the houses that were destroyed by the floods had a market value that was less than the financial support provided. Therefore, as the financial support was not sufficient, the house was built of non-expensive materials and belonged to extremely poor families.

Figure 13: Residual Gap in Financial Compensation for Loss and Damage



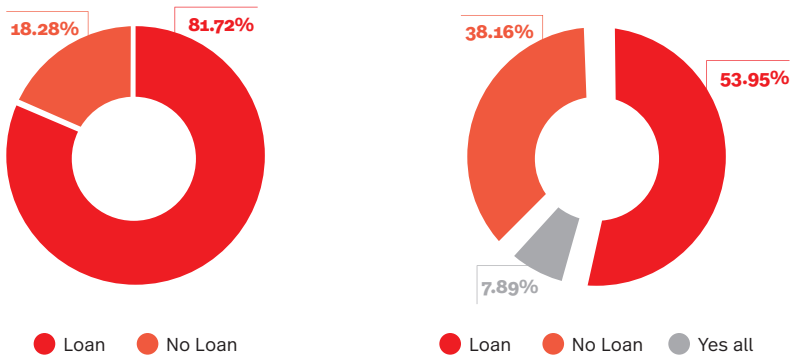
However, the temporary shelter support and limited financial compensation after the disaster has not helped the affected community to cope with these events. The respondents also indicated that insurance coverage in the communities was weak. Collectively, only around 33% of households had access to life insurance in the landslide-affected communities of Aathbis and Panchadewal Binayak. Insurance is not common or easily accessible, and only 13% of all respondents indicated having access to life insurance in Barbardiya. The selling of personal assets was also uncommon among the residents, most likely because they already lack disposable personal assets. Strong infrastructure and technical knowledge of disaster management need regular refreshers on managing climate-induced disasters.

The idea of loss and damage has gained traction with the growing scientific evidence of anthropogenic climate change increasing the frequency, intensity and duration of climate-related hazards, as well as observed increases in climate-related impacts and risks in many regions of the world (IPCC, 2014). In this case, where climate-induced disasters (landslide and floods) have shown their maximum effect, with both economic and non-economic losses in the small communities of Dailekh, Achham and Bardiya, there is the further probability of the effect on the human society being increased spatially on a large scale in the long run. Given the current global climate-change trends, the extent of loss and damage is likely to increase, making adaptation more challenging. Already developing countries are being proved incapable of coping with the level of loss and damage even when adaptation measures are applied. Although it is very difficult to attribute such disasters solely to climate change, the analysis shows that climate change is responsible for the changes in the frequency, magnitude and impact of the disasters.

3.6 Local Government and Non-government Support

The support to landslide-affected respondents extended by the local government and non-government actors was limited to immediate temporary shelters tents and food items, but with no financial support. Conversely, 63% of respondents in Barbardiya received financial support from the local government depending on the level of destruction, i.e., whether fully damaged or only partially damaged households were involved. Both the local government and non-state actors extended their support for early response and recovery, but the support was not enough. Hence, around 82% of landslide- and flood-affected households were forced to take out loans from the local cooperatives, and only 38.16% had cleared their loans within four years (2017 to 2021), while 53.95% are still struggling to pay it back, and 7.89% have not yet started but plan to do so.

Figure 14: (a)Loan bearing respondents and (b) state of loan payment



The landslide- and flood-affected communities were supported by government and non-state actors to rebuild their lives. However, the reach of non-governmental agencies to support the landslide victims in Aathbis and Panchadewal Binayak was surprisingly less than the support from the local government. Collectively, only around 28% of the victims from Aathbis and Panchadewal Binayak received immediate support from non-governmental organisations. As in the case of the local government, the support items distributed consisted mostly of only temporary shelters and in some cases food items.

In the case of the flood victims in Barbardiya, the reach of the non-governmental agencies was comparatively better, with 83% of households receiving some form of support from such agencies. Respondents receiving such post-disaster support reported receiving different food items and materials for temporary shelters. However, financial support and building materials were seldom received.

Case Study 2

The river used to flow away from the village and forest used to be in between the village and Babai River. But we witnessed how the 2013 flood washed away the forest and the river has also shifted flowing towards the village. Nowadays the distance between our village and the Babai River is only around 600m. Out of the total 19 households residing here, 10 households have been permanently shifted to safe areas by themselves. It was like bone in the neck while shifting to new place, buying the land and constructing the house then after. It made most of us "Debtors". We were hardly able to pay back the loan. We always wanted to move to a safer place with insured life, but due to financial limitations we could not. Moreover, we do not have gabion wall near our residential areas. They are below our villages. We have been practicing the earth material damn construction to protect our houses and agricultural land, and manually removing the flood sediments deposited after the flood. We have seen and heard about early warning system, but it is installed near our village, and we can hardly hear it. Further, when it starts raining the sounds of rain and alarm coincides as a result, we are unable hear it. Not only this, sometimes the flood warning messages are sent to us in English which is not accessible to most of us. We prepare food and keep on *Tandi* (Roof) when level of water rises in river. We have to routinely check the water level one by one when it rains.

- KII, (60 yrs old man) Ward 3- Barbardiya Municipality

3.7 Risk-management Programme, Including Early Warning Systems and their Effectiveness

Most people in the community are illiterate (54%), have less knowledge about preventive measures and have opted for simple preventive measures that are not sufficient to allow one to cope. The local government has only provided financial compensation for damaged houses (partially and fully) in flood-affected areas. The consequential residual gap has been a big constraint on the affected community when it comes to their coping with loss and damage. Landslide-affected people from Aathbis and Barbardiya Municipality have used wire-mesh gabion walls, earth material dams and plantations as common preventive measures to protect themselves from future landslides.

Wire-mesh gabion walls, plantations and earth material dams near residential areas and agricultural fields, which simply divert flood waters into residential areas, have been practiced as preventive measures in Barbardiya. People in the community have learnt from their own experiences of previous disasters (i.e. flooding and landslides) and have practiced converting their highly susceptible mud houses into cement ones. Given that climate-induced disasters like landslides and flooding have the potential to turn an individual homeless overnight, and given that the affected people have lived through such dire experiences, the main relief they sought was obviously food and temporary shelters, followed by medicine, financial help and water in landslide-affected areas, though water has been granted only a position as the third preference in flood-affected communities.

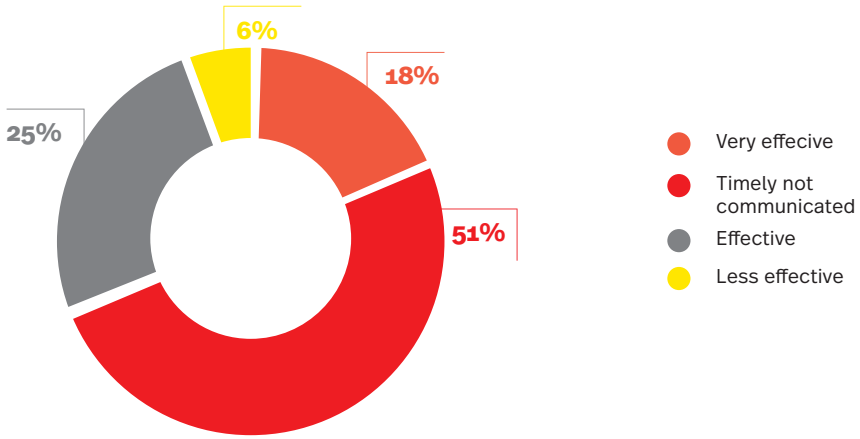
Case Study 3

The flood affected community has chosen the shifting pattern in structural component of houses. Houses made from mud with thatched roofs previously have been slowly turning into the cemented with one or two storied building. More than 40 out of 200 households in ward 3 have constructed cemented houses along with roofs to prevent/mitigate the impacts of floods in coming days. The cemented roofs have been used to keep the important documents (citizenship, land holding papers), medicine, children's clothes when water level rises in the river and some prepared foods with water to relief themselves during the time of flood.

Community has even prioritised and made shelter homes to protect themselves during flood. The shelter is equipped with life jackets and rafts in time of need. SMS services from the district office regarding the probability of flood has been effective as early warning to prevent community form maximum damages. Flood from 2014 and its harsh consequences has become biggest lesson to get aware to flood of 2017 for the affected community. The community is also slowly practicing many preventive measures like construction of wire meshed gabion walls on riverbanks, earth materials diversion dams to divert flood water entering the residential areas and most importantly plantation of different species of plants to support and reinforce the soil and prevent from flood.

- KII, Ward 3- Barbardiya Municipality.

Figure 15: Effectiveness of EWS in Barbardiya



Aathbis and Panchadewal Binayak, both landslide-affected Municipalities, do not have any form of early warning system. Conversely, a majority of respondents were familiar with early warning systems in flood-prone and affected areas of Barbardiya. In some communities, the manual early warning system had the significant problem of not being able to send an early warning signal in a timely manner, as indicated by the response of most of the respondents (51%) who experienced this, while only 18% felt such systems were effective as a risk-management tool in flood-prone communities in Barbardiya.

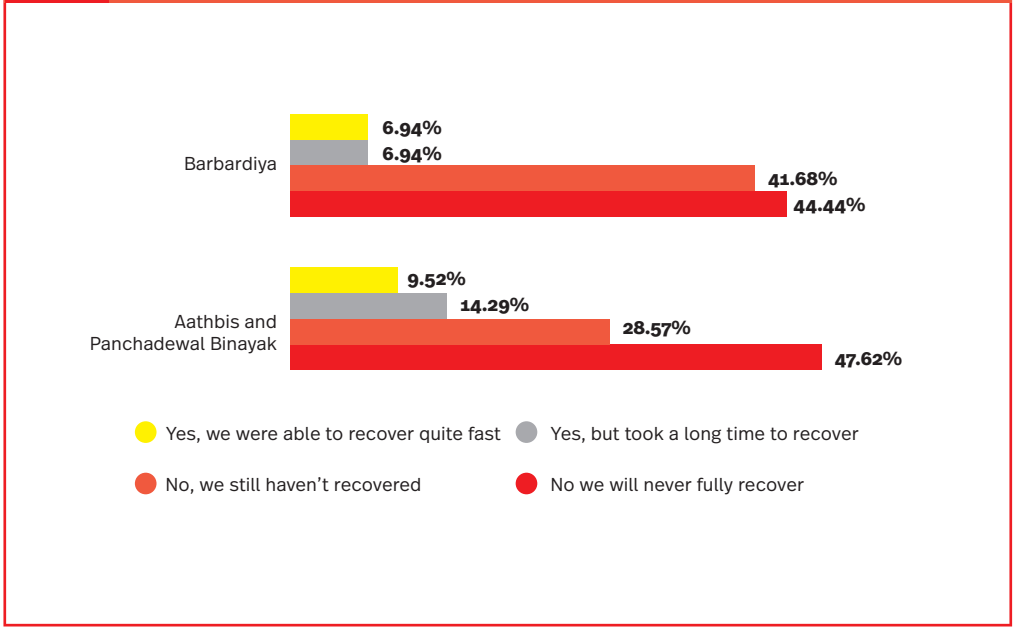
The government should focus on establishing climate-resilient infrastructure, developing better knowledge and institutional mechanisms, and ensuring the inclusive participation of community residents in climate change and DRR planning processes.

3.8 Recovery Status

Recovery is a significant issue for the landslide-affected communities of Aathbis and Panchadewal Binayak Municipalities. Only 9.52% of respondents were able to recover fast, another 14.29% took time to recover, and 47.62% said they would never recover.

In Barbardiya only 6.94% of respondents have been able to recover, while 44.44% of the respondents believe that they will never fully recover, and 41.68% stated that they have not yet recovered but show signs of hope that they will someday. Effective loss and damage responses can facilitate better recoveries, but there are multiple challenges that disrupt the proper functioning of such responses. In the perspective of the residents, the major challenges lie in limited knowledge and limited institutional mechanisms, followed by a lack of adequate infrastructure in all three Municipalities to deal with climate-induced loss and damage.

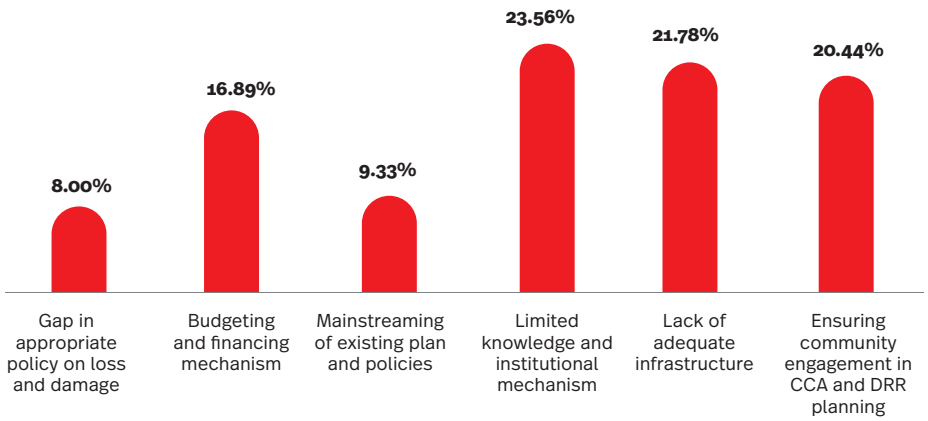
Figure 16: Recovery status of Aathbis, Panchadewal Binayak and Barbardiya Municipality



3.9 Challenges in Responding to Loss and Damage

In the landslide- and flood-affected communities, the respondents believed that the major challenges impeding proper loss and damage responses were limited knowledge of climate change adaptation and institutional mechanisms (23.56%), a lack of climate-resilient infrastructure (21.78%) and a lack of community engagement in climate change adaptation and DRR planning processes. Thus, the government should focus on establishing climate-resilient infrastructure, developing better knowledge and institutional mechanisms, and ensuring the inclusive participation of community residents in climate change and DRR planning processes to cope with climate-induced disasters and its effect.

Figure 17: Challenges impeding loss and damage responses



CHAPTER IV

CONCLUSION AND RECOMMENDATIONS FOR THE WAY FORWARD

4.1 Conclusion

Climate change is causing increasing loss and damage in Nepal. The global debate on loss and damage has its roots in national contexts and is specific to climate-change impacts that go beyond adaptation and mitigation. Adaptation and mitigation actions often leave residual gaps as a result of recognising the limitations of the actions taken in response to negative impacts and as adaptation to them. In addition, Nepal has committed to preparing a National Strategy and Action Plan on Loss and Damage, as stated in its second NDC. It has conducted a loss and damage study specific to Nepal and drawn up a future plan of action. This includes defining loss and damage in the Nepalese context, as well as a framework for assessing loss and damage resulting from climate-change impacts. Nevertheless, Nepal still needs enhanced technical, financial and capacity-building support to conduct needs assessments and implement actions to avert, minimise and address loss and damage.

The study documents the case studies and evidence of loss and damage incurred by climate-extreme events such as landslides and floods. Additionally, it also assessed the adaptive and preventive measures (ranging from the indigenous to the scientific) adopted by communities to cope with extreme events. These practices, from indigenous methods of food storage to self-built dams and flood diversion, show that the residents are both seekers and providers of solutions. In spite of two different disasters in two different places, the economic and non-economic losses were similar, with the maximum effects on physical property, followed by agriculture. Most importantly, the desire of people to live in a safe environment was the same.

The study found that most respondents reported experiencing heavy rainfall as extreme climate events. Based on the likelihood of such occurrences, landslides at Aathbis and Panchadewal Binayak and flooding at Barbardiya ranked first for increased frequency and intensity in recent years. The findings revealed that the financial gap remains quite significant in both the flooding- and landslide-affected communities, as the landslide- and flooding-affected respondents (63%) received limited financial support from local government that was insufficient to recover their stability, whereas the support from non-state actors was limited to food and temporary shelter (like tents). These areas (Aathbis, Panchadewal Binayak and Barbardiya) do not have access to any international aid. The overall economic loss in the selected sites of the three Municipalities was USD 388,355 (NPR 38,835,496) with an average cost USD 4,176 (NPR 417,586) that includes losses in agriculture (18%), livestock (4%), physical properties in the form of houses and land (75%) and other, i.e., the storage of food grains and lentils (3%). Since the financial support received from the local governments was not enough, there was a residual gap in all three Municipalities. The residual gap in the case of the landslide-affected ranged from USD 1,000 to 2,300 (NPR 100,000 – 230,000) and from USD 70 to 13,580 (NPR 7,000 to 1,358,000) in the flood-affected community of Barbardiya. To recover, around 82% of landslide- and flood-affected households were forced to take out loans from local cooperatives, only 38.16% having cleared the loan within four years (2017 to 2021) while 53.95% are still struggling to pay it back and 7.89% have not started yet but plan to do so. The respondents indicated that insurance coverage in the affected communities is weak, around 33% of households having access to life insurance in the landslide-affected communities of Aathbis and

Panchadewal Binayak and only 13% in Barbardiya Municipality. Through community interaction, and by referring to the trend in and scenario of climate change in Nepal, it can be said that the combined impacts of slow-onset processes and extreme climate events are the key factors driving the huge amounts of loss and damage.

The efficacy of mitigation and adaptation activities clearly influences the extent of loss and damage. The community has very limited knowledge about measures to prevent disasters. Despite substantial investment in early warning systems, due to the limited human resources, technological knowledge and in some cases the manual early warning system, there were significant problems in not being able to communicate early warning signals in a timely manner. The study has also recorded forced displacement of 9% as a result of the climate-induced disaster. With the past two major flood incidents and the increasing frequency of small-scale floods every year, the people of Barbardia are still coping with the trauma they have faced. It was revealed that property damage and the fear of a reoccurrence were causing psychological distress to the affected people, undermining their capacity to adapt to future disasters.

The findings reveal that communities like Barbardiya, Aathbis and Panchadewal Binayak will continue to experience loss and damage due to a lack of adequate infrastructure, limited knowledge and institutional mechanisms, as well as a lack of technical and financial assistance and support. As a result, both economic and non-economic loss and damage is very evident in Nepal and is a common concern, as well as an issue of climate justice.

4.2 Recommendations

Discussions over loss and damage under the UNFCCC have emerged as a distinct theme that is making progress with new mechanisms and frameworks, like the Santiago Network on loss and damage.[2] This is intended to connect vulnerable developing nations with providers of the technical assistance, expertise and resources required to address climate risks comprehensively in the context of averting, minimizing and addressing loss and damage (UNFCCC, 2020). However, given the findings of this study, the question for policy-makers is how such discussions and new mechanisms can provide the leadership and support to communities affected by the impact of climate change, as well as inclusive community participation in the planning process. One way to answer this question could be to internalise community participation, including women, in all climate decisions that have the ability to bring changes at the local level by ensuring community engagement in climate change adaptation (CCA) and disaster risk reduction (DRR) planning. In the meantime, however, locally led and viable activities and the mobilisation and allocation of more funding to the local level are very crucial at the current moment. More specifically, the following recommendations are proposed:

- **Support to Local Actors:** Based on the perceptions of local populations and local governments during interviews, they believe that the local response is the first response and that in many cases the local response is also important for the

[2]The vision of the Santiago Network is to catalyze the technical assistance of relevant organisations, bodies, networks and experts for the implementation of relevant approaches to averting, minimise and addressing loss and damage at the local, national and regional levels of developing countries that are particularly vulnerable to the adverse effects of climate change (Decision 2/CMA.2, para 43).

post-disaster response in respect of rehabilitation and reconstruction. Therefore, technical and financial support to local government and organisations is very important, and the issue of climate-change adaptation and climate-induced loss and damage should be aligned with the political call for localisation. Similarly, there is a need of support in formulating encouraging disaster-preparedness plans and comprehensive loss and damage action plans to minimise and address the loss and damage from climate change.

- **Action Research on Loss and Damage:** Cross-sectoral and geographical research is required to provide additional scientific data on climate-induced loss and damage. Likewise, it is also recommended to start creating and documenting climate data, threshold levels and their correlations with natural ecosystems and socio-economic conditions to confirm that climate-induced loss and damage is more evident in Nepal.

- **Loss and Damage Finance:** The loss and damage issue has remained highly contentious in UN climate negotiations, and the financial mechanism has yet to be agreed, but Nepal can take an exemplary initiative in allocating budget to local government so they can respond to climate-induced loss and damage, and it should continuously push for dedicated loss and damage finance, in addition to increased overall climate finance.

- **Information and Technology Transfers:** Several good initiatives on early warning systems were observed during the field studies. However, due to the limited reach and mechanisms of information flows, many people are still far behind this information technology. Therefore, more investment should be made in flood, landslide and heavy rainfall warning systems that help minimise possible losses and damage. Similarly, appropriate investments should be made in enhancing the institutional and community capacity to cope with climate-induced disasters.

- **Coordination Among Stakeholders:** In light of the findings, there is a need for synergies between state and non-state actors, especially in respect of climate change adaptation and mitigation actions, response mechanisms and information collection mechanisms, to develop a comprehensive plan with strong evidence for addressing climate-induced loss and damage. Thus, coordination mechanisms should be created to strengthen and build synergies between DRR and climate-change institutions across all three tiers of governments.

- **Response Mechanisms:** Strong infrastructure with technical knowledge in mapping the risks of climatic hazards and the desire to move to a safe place, as well as financial constraints, are the current needs that the affected communities are looking to have met. Therefore, the immediate next step for both state and non-state actors should be to identify potential climate risks and analyse whether they are acceptable, tolerable or unacceptable within the limits of existing adaptation interventions. Similarly, household loans seem to be important for those affected by landslides and flooding to avoid the risk of debt crises. Grant promotion and encouraging insurance schemes for properties, agriculture and livestock, as well as communications, should be initiated to minimise and address the losses and damage from climate change.

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ANNEXES

Annex 1. Summary of Focus Group Discussions

Date	Time	Venue	Findings
12th August, 2021	12.30pm	Aathbis Municipality (Ward no.)	**Climate-induced disaster-** Landslide triggered and occurred by heavy rainfall, which increased the discharge of local streams **Effects-** The landslide washed away two households near the foot of the hill area, compelling them to move permanently from that area. The head of the landslide area was maximumly affected, as it swept away the farms with planted crops and the cowsheds of many residents. The fertile agricultural land was affected by debris deposits. **Preventive Measures-** Afforestation has been practiced by very few people, whereas some have temporarily diverted streams and constructed stone walls on their land-holdings. Some even moved permanently to safe areas. **Compensation-** No compensation received by landslide-affected people from local government, nor any other organisations, for their loss of property. **Residual Gap-** No financial support from government, nor any organisations, so residual gap of 100%.
13th August, 2021	11.32am	Lampata Panchadewal Binayak Municipality (Ward no.5)	**Climate-induced disaster -** Landslide (July 11, 7:00 am) triggered by heavy rainfall continuously for five days. **Effects-** Three houses have been destroyed by landslides, but no human loss. Two houses have moved entirely to safe places, and one migrated permanently to the Terai. **Preventive Measures-** Wire-mesh gabion and cascade wall on the head of landslide area have been constructed by GIZ, and an earth dam has been constructed on the base by Municipality near the residential areas. **Compensation-** Temporary tents have been distributed by Municipality to victims. Those affected asked for help with the district's disaster risk reduction department in assessing the risk zone of the landslide but received no response. **Residual Gap-** No financial support from government, nor any organisations, so residual gap 100%.

16th August, 2021	1.05pm	Rajapur Barbardiya Municipality (Ward no. 2)	**Climate-induced disaster -** Flood (major flooding in 2014 and 2017 and frequent minor floods in monsoon season). **Effects –** Washed away EWS. 700-800m of land away from river was inundated with floods, washing away much livestock (cattle, hens, goats, pigs), and damaging the houses permanently and partially. Agricultural land, along with paddy and maize, were completely covered by flood deposits. **Preventive Measures –** Wire-mesh gabion walls have been constructed, but below the settlement areas. Macchan has been built 2 km away from the river as temporary settlement (it proved useful and saved eight people's lives, including a pregnant woman, in 2017. People have started building cement houses to replace the old, thatched-roof mud houses. **Compensation –** A total of NPR 67,000 was paid as financial compensation for the full damage to houses and 500 per family member (depending on the size of family) for partial damage. Red Cross supported with food, tent and cooking utensils. **Residual Gap –** The financial support provided was not enough to compensate for the losses.
17th August, 2021	12.15pm	Jhakkipur Barbardiya Municipality (Ward no.4)	**Climate-induced disaster –** Major flooding in 2014 and 2017 **Effects –** Communal tap, especially constructed with elevation to provide drinking water during flooding, was totally inundated with flood water. Washed away EWS, 700-800m land away from river was inundated with flooding, much livestock washed away (cattle, hens, goats, pigs), houses damaged permanently and partially. Agricultural land along with paddy and maize were completely covered by flood deposits after flooding. **Preventive Measures -** Shifting pattern in house construction from mud to concrete and cement (40 houses out of 200 households) to prevent them from being washed away and damaged by floods. Community has successfully used SMS and EWS services and built a community shelter building for rescue purposes and a communal tap in an elevated place as preventive measures. **Compensation –** A total of NPR 67,000 was paid as financial compensation for full damage to houses and 500 per family member (depending on size of family) for partial damage. Red Cross supported with food, tent and cooking utensils. **Residual Gap -** The financial support provided was not enough to compensate for the losses.

18th August, 2021	11:14am	Bepattapur Barbardiya Municipality (Ward no.3)	**Climate-induced disaster –** Major floods on 2014 and 2017, minor floods in 1987, 1994 and frequent small floods. **Effects –** Traditional houses were completely damaged by the flooding. Livestock (cattle, pigs, ducks, hens, goats) was also lost during the floods. Out of total 18 households, ten have been forced to migrate to a safe area away from the riverbank. Many affected people have been living on rented land for more than five months due to the floods. The river has changed its path and even washed away the nearby forest. **Preventive Measures –** The community is practicing SMS services to make people aware of flood and emergency bag packs of food, children's clothes, and the keeping of important documents, including citizenship and land ownership papers, in the roof, used for storage during flooding. **Compensation –** Tents and food supplied during the disaster and supply of kitchen equipment by Nepal Red Cross. This area is mostly affected by flooding, but received no financial compensation. **Residual Gap –** No financial compensation.

Annex 2. Base for Economic and Non-economic Calculations

Category	Economic Calculation	
	Unit	Cost (NPR)
Agriculture (land used for agriculture)	Hec	In accordance with the market value of the particular area at the time of the disaster
Livestock (cows, buffaloes, pigs, goats, chicken, duck)	Number	In accordance with the market value of particular area at the time of the disaster
Physical properties (house and land)	Houses -Number Land- hec	Amount incurred when houses were built; land prices based on market value
Other (grains and lentils)	Quintals	Market value-based
Debris/ Sediments Removal	Hec/individual/day	Daily wages of labour

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