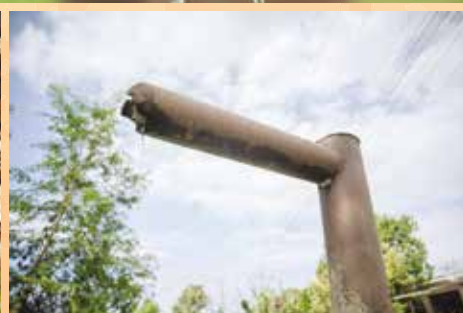


Piloting Loss & Damage Assessment and Systems for Climate-induced Hazards

Learning Report 2024



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OVERVIEW

DanChurchAid in Nepal (DCA Nepal) has conducted a research study titled “Piloting Loss & Damage Assessment and Systems for Climate-induced Hazards” with its partners Social Service Centre (SOSEC), Kamaiya Mahila Jagaran Samaj (KMJS) and technical partner Youth Innovation Lab (YI-Lab) from March 2024 to December 2024. The research pilot has the following three major objectives:

- **Conduct qualitative and quantitative assessments for loss and damage (L&D) for extreme events (flood) and slow-onset events (drought)** based on the National Assessment Framework developed by the Government of Nepal and provide feedback to the framework and the process.
- **Collaborate with Youth Innovation Lab and National Disaster Risk Reduction and Management Authority (NDRRMA) to study the integration of Loss and Damage (L&D) datasets into the government-owned Disaster Information Management System (DIMS)- the Bipad Portal**, enabling comprehensive reporting of Economic Loss and Damage (ELD) and Non-Economic Loss and Damage (NELD) for both extreme and slow-onset hazards.
- **Collaborate with local governments to initiate discussions on loss and damage and co-design draft Standard Operating Procedures (SOP) for the L&D compensation mechanisms** at the local government level, for climate-induced hazards

For the first research component of L&D assessment - based on the National Assessment Framework for Climate-Induced Disasters (2021), the study team and CRR Lab developed a methodology and collected both quantitative and qualitative data. For the second component of the Bipad L&D data integration demonstration manual - the study team has incorporated a literature review, policy review and key informant interviews. The third research component on SOPs codesigning- the study team has closely collaborated with respective local governments, organised policy reviews, focus consultations at municipalities and key informant interviews.

This learning paper synthesises the learnings and recommendations in the above research objectives and gives a way forward for L&D research and database management. In terms of piloting L&D assessment framework for flood and drought hazard, this learning report however hasn't put forth all the findings here but has only synthesised key ELD and NELD findings from both the flood and drought hazard assessments.

Regarding the economic impacts of flood and drought hazards- agriculture productivity loss was seen across both hazards. This impact on livelihood has triggered many other non-economic impacts such as changes in livelihood options, increase in costs related to health and agricultural inputs (health cost of livestock due to drought), communities being forced to opt for negative coping mechanisms, school children especially girls finding it harder to attend school, increasing mental health stress, cultural shocks and increasing gender-based violence.

The Bipad Portal study has recommended strategies aiming to enhance the portal's capacity to collect, integrate, and visualise comprehensive ELD and NELD data, supporting efficient disaster response, governance, and resilience planning.

The SOPs codesign exercise with respective local governments has initiated some key discussions at the local government level and will further support to development of understanding and institutionalisation of L&D both economic and non-economic to the local level.



[01]

PILOTING LOSS AND DAMAGE ASSESSMENT FOR FLOOD AND DROUGHT HAZARDS

The research team, in collaboration with Climate Risk and Resilience Lab (CRR Lab), piloted the assessment framework for two hazards: the flood hazard in Gulariya Municipality, Bardiya District, and the drought hazard in Dullu Municipality, Dailekh District. The study team also established a Technical Expert Committee, comprising representatives from relevant line ministries, experts, and provincial and local government officials, at various stages of methodology design and feedback collection during the assessment and report writing phases. The full list of the experts consulted as Technical Expert Committee members is shared in the annex.

METHODOLOGY

A mixed-methods approach was adopted, incorporating both quantitative and qualitative data collection and analysis from primary and secondary sources to identify and address the local context of climate change and L&D issues. The geographical locations for the research were selected based on the Vulnerability and Risk Assessment report by the Ministry of Forests and Environment (MoFE) (2021a), which identified Dullu as highly vulnerable, while Gulariya was considered moderately vulnerable, albeit with a high recurrence of flood hazards.

For the drought hazard, the assessment focused on a period of 10 years, while the 2014 flood event was selected to facilitate the quantification of non-economic impacts over the past decade.

A total of 642 samples were taken for the household (HH) survey—297 for drought and 345 for floods. These were complemented by Focus Group Discussions (FGD) and

Key Informant Interviews (KII). For climate attribution, the Standardised Precipitation Index (SPI) was used with trend analysis (precipitation and temperature) for the drought hazard, while for the flood hazard, trend analysis (precipitation and temperature) was employed.

There are certain limitations to the study that should be noted. As the study focused on the 2014 flood event, data inconsistencies may arise due to respondents' fading memories over the 10-year period, making documentation challenging. The Standardised Precipitation Index (SPI) for drought was calculated using 24 years of precipitation data, although standard practice suggests a minimum of 50 years for greater reliability. This limitation could result in uncertainties when analysing drought conditions in Dullu Municipality. The study's short timeframe limited the scope and depth of data collection and analysis.

The drought analysis excluded data on soil quality, type, and moisture content, limiting a comprehensive understanding of its impacts on agriculture and the environment. The lack of consistent and comprehensive records from the municipalities (particularly for drought) led to reliance on community data and secondary sources, which introduced discrepancies and limited cross-verification.

While the study addressed the cumulative impacts of drought and floods, it may have underestimated long-term socio-economic effects due to the limited availability of longitudinal data. Although some non-economic impacts, such as psychological stress and cultural disruptions, were documented, cost of these indirect effects have not been fully captured due to methodological constraints.

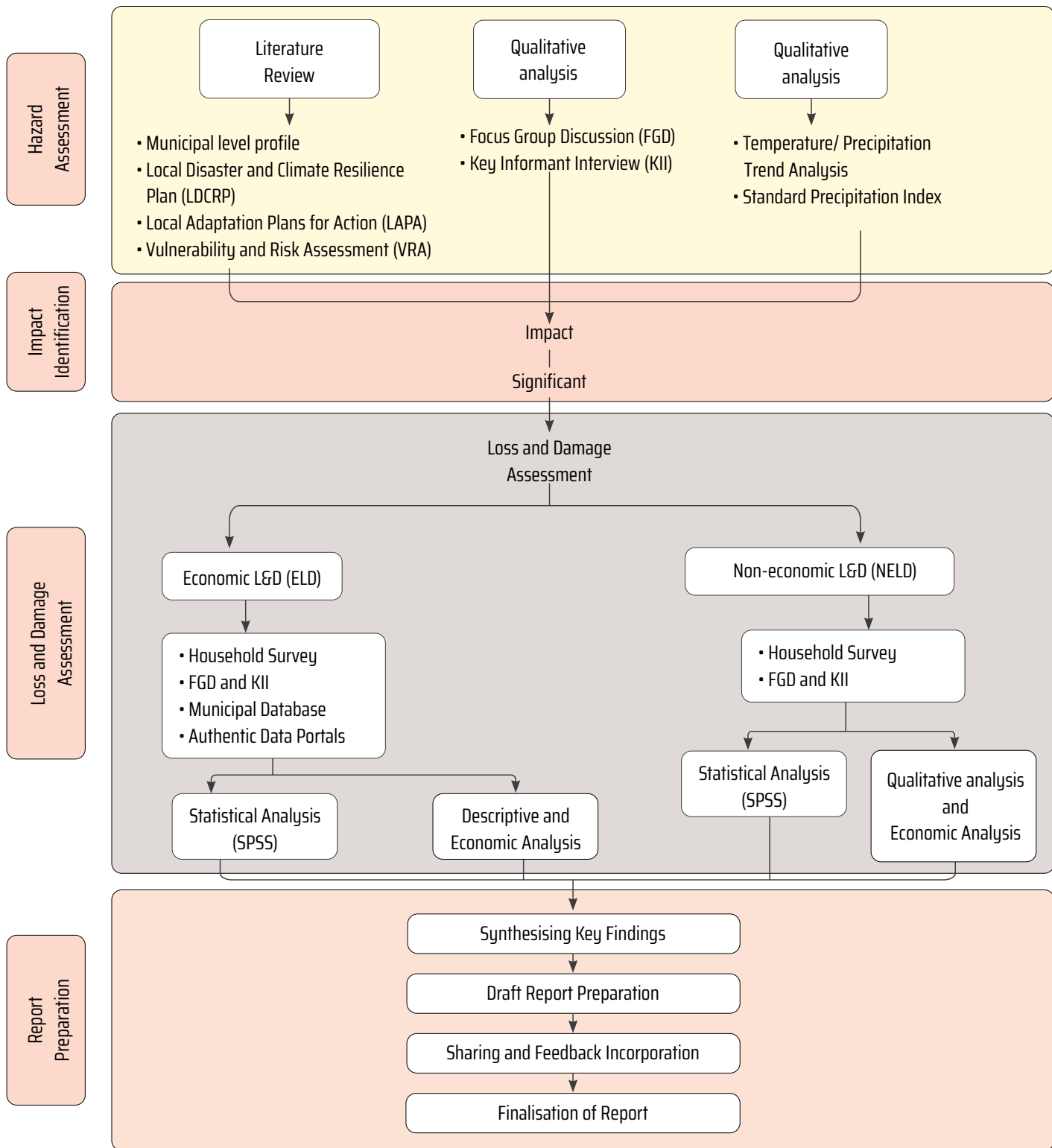


Figure 1: Detailed methodology for loss and damage assessment

ECONOMIC AND NON-ECONOMIC IMPACTS DUE TO DROUGHT HAZARD IN DULLU (WARDS 2 AND 9)

Most respondents reported annual losses ranging from NPR 50,000 (USD 446.4) to NPR 100,000 (USD 892.85). This represents a 43.54% reduction in income (USD 10,706) – in the last ten years, due to drought, primarily caused by a decrease in agricultural productivity and other associated losses.

Among the 297 sampled households, 56.23% had implemented some form of adaptation strategy in the past to cope with drought in their community which implies that adaptation practices are in place but highly projectised and not enough for all vulnerable households. Additionally, 31.31% of respondents reported having changed their occupation due to drought. Around 39.06% of school-going children had to drop out of school because of the increased time required for water collection.

The most common coping strategy was taking loans or debt (78.36%), followed by using savings (17.54%) and selling land (7.60%). A portion of their savings has been allocated to repaying these loans.

A significant 81.14% of respondents reported experiencing increased mental stress due to the drought and its impacts. Furthermore, 37.04% of respondents mentioned an increase in gender-based violence, which is linked to drought hazards, water scarcity, and a decline in agricultural productivity.

ECONOMIC AND NON-ECONOMIC IMPACTS DUE TO FLOOD EVENT IN GULARIYA (WARDS 4 AND 5)

The flood event of 2014 had a drastic impact on the communities. A total of 92.75% of houses were damaged, with 1,681 houses destroyed post flood event. Survey respondents (n=345) in Ward 4 and Ward 5 of Gulariya Municipality also reported significant crop losses, with approximately 97% of respondents affected, followed by house loss (92.75%), land loss (73.91%), and livestock loss (67.25%), among others. Furthermore, 73.91% of respondents reported losing land due to flooding, which led to impacts such as crop loss.

The average household-level loss was NPR 1,139,039.44 (USD 10,132), which is 6.43 times higher than the average household income of NPR 176,836.66 (USD 1,573). A significant 69.28% of respondents reported taking on debt due to the damages caused by the flood. Many households are still repaying their debt, ten years after the flood event. Additionally, 16% of respondents have changed their occupation from farming to daily-wage labour, primarily due to the loss of agricultural land.

In terms of non-economic impacts from the 2014 floods, many respondents reported an increase in diseases such as fever, malaria, and dengue, followed by waterborne diseases and skin-related ailments. The average health recovery cost was NPR 8,094.24 (USD 72), with the maximum cost reaching NPR 125,573.14 (USD 1,117).

Around 27% of respondents mentioned an increase in conflict within the community and among family members. Approximately, 1.16% of respondents reported instances of gender-based violence. Only 16% of respondents stated that they had been relocated due to the flood's impacts.

RECOMMENDATIONS FROM THE LOSS AND DAMAGE ASSESSMENT

Key recommendations of the study for the Loss and Damage Assessment Framework 2021 are as follows:

1. For drought hazards, the indicators provided in the framework are insufficient. The Standard Precipitation Index should be considered as a key indicator.
2. As drought hazards are rising slowly but steadily, there is a critical need for an integrated drought information mechanism and enhanced multi-stakeholder collaboration.

Key Policy Recommendation on loss and damage are as follows:

1. Slow onset disaster like drought has profound impacts on the communities. The L&D Assessment Framework needs to develop methods and tools to understand slow onset disasters and their impacts.
2. NELD is prominent in both disasters. There is a need to enhance our understanding of NELD and develop methods and frameworks to document and address them.

Overall broad recommendations of the assessment study are as follows:

- Strengthen local institutional capacity to understand, document, and address L&D, while empowering local communities through locally-led adaptation initiatives, leveraging the capacities of local government, communities, and civil society organisations.
 - Integrate immediate L&D responses with long-term resilience strategies, ensuring alignment with the local needs of the community.
 - Facilitate community dialogues to reduce resource-based conflicts and strengthen social cohesion, particularly in resource-scarce areas.
 - Improve the accuracy of local climate data and integrate environmental monitoring for evidence-based adaptation planning.
 - Promote gender-responsive adaptation actions, with a focus on women and marginalised groups, ensuring their participation in planning and implementation.
- Promote sustainable agricultural practices, including flood- and drought-tolerant crop varieties, agroforestry, afforestation, and pest management, to improve crop resilience.
 - Create a database system and ensure it is regularly updated at the local level to track the record of L&D from drought, flood and other climate-induced hazards.
 - Ensure farmers have access to crop insurance, financial support, and risk transfer mechanisms for effective recovery.
 - Ensure access to health services to address the impacts of waterborne, transmissible diseases and psychological and physical stress caused by climate-induced hazards.
 - Promote sustainable water management plans, such as rainwater harvesting, efficient irrigation facilities like drip irrigation and soil management techniques.
 - Develop an effective watershed management plan to protect and restore degraded watershed areas.
 - Improve drainage systems, construct and maintain flood barriers, and relocate vulnerable communities to safer areas during flood events.

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[02]

EXPERIENCE OF SCOPING TO INTEGRATE LOSS AND DAMAGE DATASETS INTO THE BIPAD PORTAL

The Bipad Portal is Nepal's flagship Disaster Risk Reduction (DRR) platform. Designed as a dynamic visualisation and information-sharing tool, it connects various stakeholders involved in disaster risk management across federal, provincial, and local governments. Operated under the authority of the National Disaster Risk Reduction and Management Authority (NDRRMA), the Bipad Portal facilitates disaster governance by providing real-time, geospatial, and integrated data on disaster incidents through its set of modules. However, the current data collection processes are outdated, lacking critical elements such as geo-tagged hazard locations, detailed demographic impacts (age, gender, disability, poverty status), and comprehensive data on both economic and non-economic losses. This inefficiency highlights the need for modernised tools and methods to capture the broader impacts of disasters, in alignment with legislative frameworks such as the Disaster Risk Reduction and Management Act 2017 and the National Disaster Response Framework 2019 (MoHA, 2017; MoHA, 2019).

To address these gaps, a robust L&D Assessment guideline (MoFE, 2021) and a mobile incident reporting app are proposed. This app will incorporate advanced features such as geo-tagging, photo and video uploads, and real-time data submission, significantly enhancing the speed and accuracy of data collection. The app will be linked to the DRR and Bipad Portal, enabling the visualisation and integration of hazard data into a centralised database. Role-specific permissions will be assigned to various stakeholders, including the Nepal Police, Ministry of Home Affairs (MoHA), the National Emergency Operations Centre (NEOC), and local and provincial authorities. By facilitating the immediate recording of hazard event data in a geo-tagged format,

supported by photographic and video evidence, the platform will empower disaster responders at all levels to act swiftly and ensure data quality for informed decision-making.

Key components of the solution include developing a bilingual (Nepali and English) mobile app with an offline-first approach for disaster data collection, featuring the ability to record images and videos. Additionally, a well-defined role matrix will guide user access and responsibilities across federal, provincial, and local authorities. This integrated approach will streamline data flow, ensuring that vital information is accessible immediately after an incident, thereby enabling prompt rescue and relief operations as well as long-term disaster management planning.

The effective implementation of this approach also needs advancements, capacity-building programmes to the Nepal Police officials, particularly those in the Disaster Management Division and NEOC. Equipping the Nepal Police with cutting-edge tools and skills, this initiative will enhance the quality and timeliness of disaster data, ultimately contributing to a more effective disaster response system in Nepal and opens an avenue to prepare a robust and comprehensive database of loss and damage.

KEY RECOMMENDATIONS FOR THE BIPAD INTEGRATION PROCESS

- 1. Adopt Citizen Science for Disaster Data Collection:** Leverage community-driven approaches for gathering accurate and timely disaster data. By engaging local communities and training them to use modern tools and platforms, real-time reporting of hazards and damages can be achieved. Citizen science ensures inclusivity, mobilises local knowledge, and bridges gaps in existing data collection systems.

2. **Strengthen Hazard Classification:** Nepal must align its hazard classification system with the global standards set by the UNDRR's Hazard Classification Framework. This alignment will ensure consistency and enhance the ability to effectively address climate-induced hazards. Regular updates and revisions to the classification system are essential to reflect Nepal's unique geographical and climatic vulnerabilities.
3. **Enhance Meteorological Capacity:** Investing in the Department of Hydrology and Meteorology (DHM) is crucial for strengthening Nepal's forecasting systems and improving infrastructure. Enhancing micro-level weather prediction and localised early warning systems will ensure the timely and accurate dissemination of information to vulnerable communities. Building technical capacity and providing advanced training for DHM personnel are key steps in this direction.
4. **Prioritise Geotagged Data for Disaster Events:** The use of geotagged data for disaster events can revolutionise the way Nepal maps and analyses hazards. By integrating geotagging into data collection processes, policymakers can gain a better understanding of spatial vulnerabilities and plan accordingly. Geographic Information Systems (GIS) should be utilised to link this data with broader risk assessment frameworks, enabling more informed decision-making.
5. **Conduct Household-Level Risk Assessments:** Household-level risk assessments are essential for understanding vulnerabilities at the micro level. These assessments should be standardised and linked to weather triggers, using Impact-Based Forecasting to provide actionable insights. Such granular evaluations will enable communities to prepare for specific hazards and take preventive measures.
6. **Integrate Weather Attribution Science:** Weather attribution models, such as those developed by Otto (2023), can provide valuable insights into the causes and impacts of climate-induced disasters in Nepal. By localising these methodologies and integrating them with existing systems, Nepal can enhance its ability to contextualise and respond to extreme weather events. This scientific approach will also support evidence-based policymaking.
7. **Improve the Capacity of NDRRMA:** Strengthening NDRRMA is essential for better hazard assessment and mitigation. Providing technical training, resources, and infrastructure upgrades will enable NDRRMA to perform its functions more effectively. Improved coordination protocols among agencies will further enhance disaster response capabilities.
8. **Develop a Clear, Step-by-Step Data Collection Protocol:** Establishing standardised guidelines for collecting data on large-scale disasters, such as floods and landslides, is essential for consistency and reliability. These protocols should involve all stakeholders, including local governments, DHM, and NDRRMA, to ensure a unified approach that will create a robust database for future planning and response.
9. **Invest in Impact-Based Weather Forecasting:** Expanding the use of Impact-Based Forecasting will enable Nepal to predict not only weather conditions but also their potential impacts on vulnerable communities. Linking forecasts to practical mitigation measures will empower households to take timely action, minimising L&D during extreme events.
10. **Foster Multi-Stakeholder Collaboration:** Effective collaboration among government agencies, local communities, academic institutions, and international organisations is essential for addressing climate change-induced L&D. These partnerships can facilitate the sharing of technical expertise, mobilisation of funds, and the implementation of innovative solutions. By fostering such cooperation, Nepal can build a more resilient system to mitigate climate-related risks.

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[03] INTEGRATING LOSS AND DAMAGE AT THE LOCAL GOVERNMENT LEVEL

As decision-making and implementation bodies, local governments must have robust mechanisms in place to respond to and compensate for L&D effectively. Nepal's high vulnerability to climate change-induced impacts underscores the urgent need for a clear and comprehensive SoP to guide assessment, response, and compensation efforts at all levels. The National Framework on Climate Change-Induced Loss and Damage (2021) provides a foundation, but the effective implementation of this framework requires clearly defined roles, responsibilities, and coordination among federal institutions such as DHM, MoFE, and NDRRMA. An SoP ensures standardised processes, minimises redundancies, and streamlines the multi-stakeholder collaboration required for assessing losses, reducing risks, and developing actionable responses. It also formalises guidelines for federal, provincial, and local institutions to systematically evaluate both ELD and NELD, laying a clear pathway for effective decision-making. Furthermore, an SoP equips institutions like NDRRMA to fulfil their mandates under the Disaster Risk Reduction and Management Act (2017), enabling more coordinated and effective multi-hazard risk management and risk communication.

The absence of an SoP exacerbates challenges such as data limitations, difficulties in valuing non-economic losses, and institutional capacity constraints. Standardising procedures fosters consistency in data collection, making it easier to compare and analyse losses across different regions and timeframes.

To address these challenges, a comprehensive SoP for local government bodies was drafted and recommended as a pilot in the municipalities of Dullu and Gulariya, areas significantly affected by climate-induced disasters such as floods and droughts. This process involved consultations at

the municipal level to understand existing mechanisms for L&D compensation and to review current SoPs or guiding policies. By analysing this information and identifying gaps in the existing systems, the pilot SoP was designed to provide clear guidelines for assessing and addressing both economic and non-economic losses. The SoP incorporates essential aspects such as standardised data collection, inclusion of vulnerable groups, equity-focused decision-making, and integration of both tangible and intangible loss indicators. This comprehensive approach ensures that local governments are equipped to implement effective, inclusive, and responsive L&D compensation mechanisms, laying the groundwork for broader national application.

CHALLENGES FACED DURING THE PILOTING PROCESS

The process of piloting L&D compensation mechanism SoPs encountered several significant challenges:

- 1. Lack of Standardised Definitions and Terminologies:** While Nepal's National Framework on Climate Change-Induced Loss and Damage (2021) served as a foundational reference, the lack of detailed definitions, terminologies, and methodologies created inconsistencies and ambiguities during implementation.
- 2. Conflicting Priorities of Local Government Agencies:** The priorities of local government agencies posed challenges in endorsing the developed SoPs. With limited financial resources, local governments often prioritise fund collection and immediate disaster relief efforts over establishing long-term systems for L&D data collection and compensation mechanisms. Additionally, overlapping responsibilities and poor coordination between local and federal agencies further exacerbate these issues, reducing the efficiency of addressing L&D comprehensively.

3. Lack of Guiding Documents

The absence of a comprehensive policy document—whether at the global or national level—has resulted in confusion and inconsistency in the development of these SoPs. Without an equivalent guiding framework or clear references, it is challenging to align with international best practices or adequately address Nepal’s unique socio-economic and geographic vulnerabilities. This gap has hindered progress toward a cohesive and effective response to L&D.

KEY LEARNINGS AND RECOMMENDATIONS

To address the challenges identified and support the development and integration of SoPs for L&D compensation mechanisms, several critical steps must be undertaken:

1. Enhance Policy and Framework Development: It is essential to strengthen national-level policy and framework development. These frameworks should align with international best practices while ensuring that sector-specific guidelines comprehensively address both economic and non-economic losses.

2. Strengthen Local Government Capacity: The capacity of the local governments must be strengthened for the successful implementation of L&D systems, including SoPs for compensation mechanisms. This can be achieved by providing them with accessible tools, resources, and tailored training, ensuring that their actions align with national priorities and effectively address specific local community needs.

3. Facilitate Learning and Feedback Mechanisms: Establishing learning and feedback mechanisms is vital for refining and improving L&D systems. The pilot SoPs in municipalities like Dullu and Gulariya offer valuable insights into existing gaps. By implementing regular monitoring, evaluation, and feedback systems, lessons learned can be incorporated into future iterations of the SoPs. This continuous learning process will ensure that L&D mechanisms remain adaptive, inclusive, and responsive to emerging challenges and opportunities.

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Annex : Name list of technical Expert Committee

TECHNICAL ADVISORY COMMITTEE STRUCTURE (FOR LUMBINI PROVINCE)

S. N	Committee Designation	Representative
1	Coordinator	Biruni Tharu, Chairperson of KMJS Board and Emergency Management Committee
2	Member Secretary	Anupam Nyaupane, KMJS Nepal
3	Member	Rekha Kandel, Secretary, Ministry of Interim Affairs and Law Gangadhar Pandey, DRR Focal Point, Ministry of Interim Affairs and Law
4	Member	Nirmal Chaudhary, Ministry of Forest and Environment Mahendra Chaudhary, Ministry of Forest and Environment
5	Member	Subodh Guragain, Ministry of Energy, Water Resources, and Irrigation
6	Member	Ghanshyam Chaudhary, Ministry of Agriculture, land Reform and Cooperatives Anup Tiwari, Agriculture Economist- Ministry of Agriculture, land Reform and Cooperatives
7	Member	Disaster Focal Person from Gulariya Municipality

TECHNICAL ADVISORY COMMITTEE STRUCTURE (FOR KARNALI PROVINCE)

S. N	Committee Designation	Representative
1	Coordinator	Ramesh Kumar Giri, Ministry of Industry, Forest, Environment, and Tourism
2	Member Secretary	Puskar Pd. Sharma - SOSEC Nepal
3	Member	Shamsher Bahadur Shahi - Dullu Municipality, Dailekh
4	Member ('s)	Dhan Bahadur Kathayat, Ministry of Land Management, Agriculture & Co-operative Krishna Kokaya, Ministry of Internal Affairs and Law Kamala Khan , Ministry of Water Resources and Energy Development
5	Member	Representative from the Mid-West University Agriculture Campus

TECHNICAL ADVISORY COMMITTEE, NATIONAL LEVEL

S.N	Committee Designation	Organisation/ Individual
1.	Member	NDRRMA
2.	Member	Ministry of Forests and Environment
3.	Member	Department of Hydrology and Meteorology
4	Member	Ajaya Dixit, Institute for Social and Environmental Transition (ISET - Nepal)
5	Member	Gaurab Sagar Dawadi, Researcher in Transboundary Early Warning Systems
6	Member	Prabin Man Singh, Prakriti Resources Centre



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