



Loss and damage financing for climate justice and transformation: local insights from the climate frontline

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Received: 16 July 2025 / Accepted: 20 February 2026
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Abstract

Loss and Damage (L&D) has emerged as a critical pillar of global climate action, supported by an emerging, dedicated financing stream. While the scale of L&D financing is far below what may be required, fundamental questions remain about how this financing can effectively minimise losses and damages at local climate frontlines. Recognising the limits of past and ongoing adaptation efforts, this paper examines the role of emerging L&D finance beyond risk management or reduction in transforming systems that predispose vulnerable groups to losses and damages. Drawing on empirical research from local cases in three climate frontline countries, Bangladesh, Nepal, and Vanuatu, we explore how L&D financing can go beyond risk reduction or compensation to address structural vulnerabilities and deliver climate justice. Findings reveal gaps, as current adaptation and disaster risk reduction efforts fail to build systems capacity and prevent escalating, irreversible, and unavoidable losses and damages. Given the systemic nature of climate impacts, increasing financial flows alone does not guarantee a reduction in losses and damages unless funds are directed toward dismantling systemic barriers that predispose communities to losses and damages. The paper argues that L&D finance must support more systemic or transformational responses, such as planned relocation, cultural restoration, and gender-responsive interventions, while ensuring local ownership and embedding equity and accountability in governing the finance. We call for a fundamental shift in thinking about how we design global-to-local finance architecture, emphasising the need for anticipatory, participatory, and justice-oriented approaches.

Keywords Climate finance · Climate justice · Loss and damage · System transformation · Transformative justice

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1 Introduction

Climate change losses and damages are increasing, especially in the climate frontline communities and countries, as mitigation and adaptation efforts struggle to keep pace. Between 1970 and 2021, 2 million lives were lost in some 12,000 extreme weather, climate and water-related disasters, with economic losses reported at USD 4.3 trillion and rising (WMO 2023). Similarly, the most recent Climate Risk Index report details that from 1995 to 2024, more than 832,000 lives were lost due to over 9,700 extreme weather events, causing direct economic losses of nearly USD 4.5 trillion (inflation-adjusted) (Adil et al. 2025). Notably, the majority of the most affected countries were low- or lower-middle-income economies that contribute minimally to global emissions (WMO 2023; Adil et al. 2025). Losses and damages are complex and diverse, encompassing both economic and non-economic impacts, spanning cultural and social aspects of resilience, and often experiencing irreversible impacts (McNamara and Jackson 2019; van Schie et al. 2024). Growing evidence and rising demands from vulnerable communities for justice-based climate finance have led to the creation of the Fund for responding to Loss and Damage (FRLD). This represents an important milestone; yet, uncertainties remain regarding how this financing will be mobilised, allocated, and distinguished from existing streams of climate financing sourced from the Global North.

At a more operational level, questions arise about which climate risks this new L&D financing should address and which solutions it should support (Serdeczny and Lissner 2023). These uncertainties become entrenched as climate financing negotiations are entangled in power imbalances and ideological divides between the Global North and Global South (Ciplet and Roberts 2017; Falzon et al. 2023; Jackson et al. 2023). There is also a mismatch between the scale of financing needs, particularly across regions, and the amount pledged or delivered (see, for example, Ciplet et al. 2022; Newell 2024). More importantly, while researchers and policymakers acknowledge the question of how L&D financing can address the justice concerns of vulnerable communities, it is not yet well articulated (Wallimann-Helmer 2015; Gewirtzman et al. 2018; Mechler et al. 2020), undermining the enthusiasm and subsequent effectiveness of the FRLD (Newell et al. 2021; Zamarioli et al. 2021).

Without a clear justice perspective that also articulates delivery effectiveness, there would be limited justification for adequate finance (beyond mitigation and adaptation). Evidence shows that climate finance mechanisms inadvertently reinforce existing power imbalances and fail to address the structural drivers of vulnerability (Gifford and Sauls 2024; Anantharajah and Setyowati 2022; see also Browne and Razafiarimanana 2022; whose study in Madagascar shows that households with higher political connectivity were more likely to receive adaptation project benefits, effectively excluding the most vulnerable). Moreover, current mechanisms often adopt technocratic approaches that overlook structural inequalities and the root causes of climate injustice (Gifford and Sauls 2024; Anantharajah and Setyowati 2022). In this context, scholars advocate for locally led, participatory, and equity-focused methods that prioritise local knowledge, rights, and needs (Colenbrander et al. 2018; Bracking and Leffel 2021). An increasing body of research emphasises that L&D financing must go beyond compensatory measures to counter systemic drivers of vulnerability and marginalisation, especially at the local level (Colenbrander et al. 2018; Heilinger and Kempt 2024; Uri et al. 2024). While the call for more funding continues to grow, there remains a lack of scientific investigation into how L&D actions can produce transformative,

justice-based outcomes, ensuring fair and equitable financing (Panda 2023; Browne 2022). The L&D financing architecture, in particular the FRLD, is now at a point where it requires further clarity on how financing can deliver justice in practice.

This paper addresses an urgent and unexplored question in the climate finance literature: how can L&D financing address immediate losses and damages while also triggering the transformation of underlying socio-economic systems that predispose communities to such losses and damages? While the climate justice principle holds that L&D finance should originate from those historically responsible for emissions, this paper focuses on how available financing can be deployed effectively to deliver transformative and equitable outcomes. Drawing on empirical research and lived experiences of vulnerable communities from diverse geographical contexts in three countries in the Global South (Bangladesh, Nepal, and Vanuatu) under the Strengthening Loss and Damage Response Capacity in the Global South (STRENGTH) [redacted for peer review] research project, this paper aims to deepen understanding of L&D financing as a mechanism for justice and transformation.

While the institutional design of L&D financing mechanisms, including fund sourcing, pooling, and instrument selection, remains a critical area for climate justice and effective governance (see, for example, Uri et al. 2024), this paper focuses on the local deployment of such finance. Our emphasis is on investigating opportunities to manage residual risks and catalyse transformation (see, for example, Pelling 2010; Pelling et al. 2015; Roberts and Pelling 2021). We examine how L&D resources can be channelled to support transformative actions that address systemic vulnerabilities and advance justice in frontline contexts. Our emphasis is thus on the priorities, flows, and transformative potential of L&D finance at the local level. Drawing on analysis of diverse local contexts and needs in the case study contexts, this paper builds evidence for delivering L&D financing from a climate justice lens, targeting systems transformation beyond hazard reduction or risk management, and leveraging this new stream of finance alongside existing climate change adaptation (CCA) and disaster risk reduction (DRR) efforts.

2 Justice and transformation: the analytical approach

The conceptual foundation of L&D financing rests on addressing the residual risks of climate change, or those that persist despite adaptation measures (Mechler and Deubelli 2021; Markandya and González-Eguino 2019; Mechler and Schinko 2016). This entails identifying a residual domain in which L&D financing is necessary. While defining hard and soft adaptation limits has been central to scientific debates on loss and damage, the residual boundary of L&D financing is difficult to define clearly and is not easily distinguishable from other ongoing streams of climate finance. Several socio-ecological factors, such as thresholds, tipping points, cultural values related to tolerable limits, and risk mindsets, provide clues for defining residual risks in specific contexts. Critically, risk management alone is insufficient; L&D financing requires a deeper understanding of how to integrate residual risk, system transformation, and development goals to form a compelling rationale (Mechler and Deubelli 2021). More importantly, understanding how L&D financing can be directed to restore justice and foster transformative change to prevent losses and damages from recurring has become a critical focus (Huber and Murray 2023). We therefore adopt a transformative approach to climate justice (Newell et al. 2021) by integrating ideas of jus-

tice and transformation to explore areas of L&D financing, maintaining a systems perspective beyond compensation and procedural fairness, so that the resulting L&D investment can help address the underlying structural drivers of vulnerability, losses, and damages.

Its relevance is grounded in four key premises. First, climate injustice is deeply embedded in social, political, and economic systems, perpetuating interconnected processes of social inequality and environmental degradation that constrain the adaptive capacities of vulnerable communities (Kates et al. 2012; Deubelli and Mechler 2021). The transformative approach calls for interventions that challenge and change these systems, rather than merely managing risks or compensating for losses. This approach seeks to dismantle the root causes of vulnerability in the cross-sectoral domains of governance.

Second, drawing on the concept of restorative justice (see, for example, Robinson and Carlson 2021), transformative justice in the climate action domain emphasises the restoration of rights, livelihoods, and cultures, and prioritises healing, reconciliation, and the empowerment of groups disproportionately affected by climate change, including women, Indigenous Peoples, and other marginalised communities (Robinson and Carlson 2021; Agyeman et al. 2016; Peters 2020). The aim is to repair harm caused by climate impacts and systemic inequalities and injustices, while ensuring that existing inequities are not perpetuated (Hobson 2020; Newell et al. 2021).

Third, transformative justice insists that climate finance must ensure fair access to resources, including financial, technological, and capacity-building resources. It also calls for the recognition and protection of the rights, identities, and traditional knowledge of marginalised and Indigenous communities, ensuring their meaningful participation in climate action and decision-making (Agyeman et al. 2016; Uri et al. 2024).

This approach envisions a pathway to address the structural issues of climate vulnerability, while acknowledging the need to confront the forces that perpetuate exclusion and disadvantage (Kates et al. 2012; Deubelli and Mechler 2021; Hobson 2020; Newell et al. 2021).

Through a transformational justice lens, L&D action must shift from hazard reduction and comprehensive risk management to system transformation. Figure 1 above presents a simplified spectrum of these approaches, highlighting system transformation as central to understanding the scope of L&D action. It conceptualises L&D action as an active process that shifts from managing immediate hazards towards enabling systemic change in socio-ecological systems, which require increasing levels of finance, time, and institutional effort. Hazard reduction minimises exposure to immediate risks, comprehensive risk management broadens strategies without altering systemic structures, and system transformation addresses the root causes of vulnerability through structural changes. System transformation, which embeds both hazard reduction and comprehensive risk management, emphasises addressing the structural drivers of vulnerability and inequality to ensure L&D finance not only reduces immediate risks and manages vulnerabilities but also addresses residual risks and their underlying drivers.

While hazard reduction and comprehensive risk management are supported through adaptation, development, and humanitarian finance, we envision that L&D finance has the potential to engage directly with the system-change space, where adaptation limits are crossed and structural responses become necessary. This space arises when systems fail to adapt, necessitating more transformative responses. As shown in Fig. 1, this transition is marked by rising vulnerability, constrained adaptive capacity, and escalating climate impacts, which

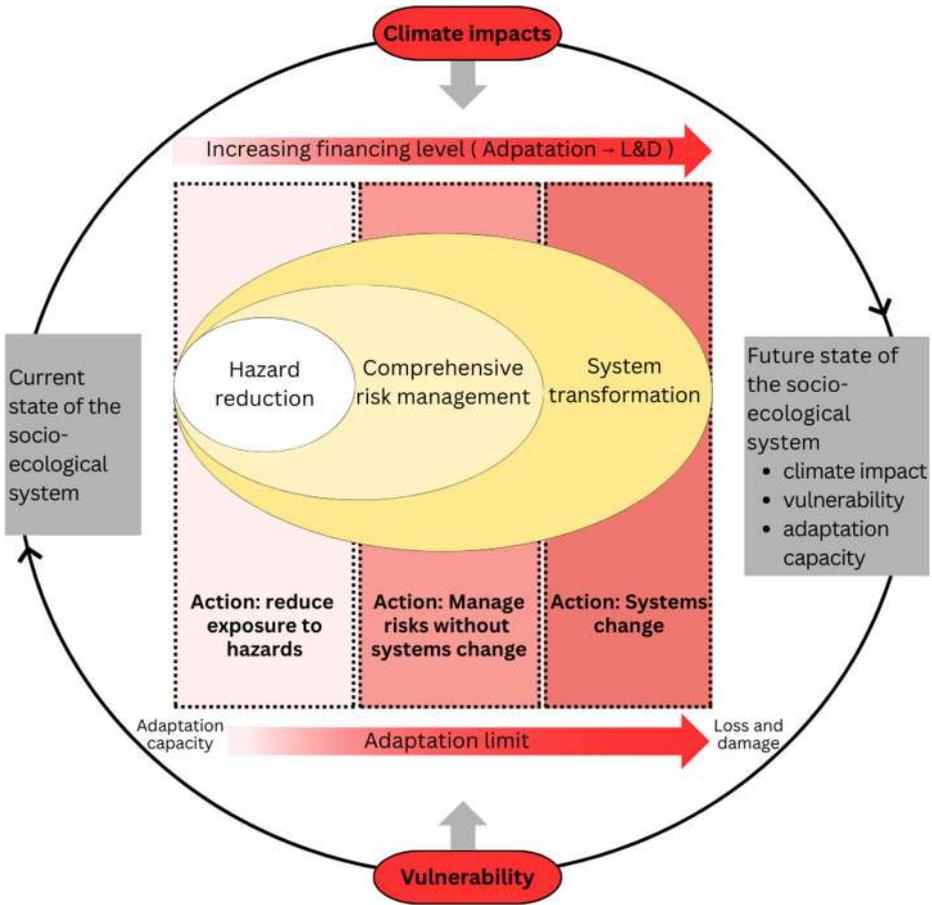


Fig. 1 Climate risks, responses, and the potential of L&D action for transformation. (Source: Authors)

together signal the need to scale up finance beyond incremental risk management, as actions focused on systems transformation require greater effort and longer time frames. In this approach, L&D financing can be leveraged as a catalyst for transforming the conditions of vulnerability and injustice (Gifford and Sauls 2024; Huber and Murray 2023), especially if we are to address intolerable and unavoidable risks as the impacts of climate change worsen (Schinko et al. 2018; Roberts and Pelling 2021).

3 Methodology and case studies

3.1 Methodology

This paper draws on tracking L&D discourses at national, regional, and international levels, in-country fieldwork, and interactive policy dialogues via Loss and Damage Policy Labs (LDPLs). The LDPL approach was developed within the Strengthening Loss and Damage

Response Capacity in the Global South (STRENGTH) research project [redacted for peer review] as a participatory, semi-structured methodology and piloted in three case study countries to facilitate structured dialogue among local governments, community representatives, and national actors. Emphasising co-production and co-learning around L&D discourse, policy, and action across governance levels, the LDPLs supported the bottom-up identification of locally informed priorities and helped translate community experiences into policy-relevant insights. Through this process, LDPLs facilitated the localisation of the L&D agenda by articulating context-specific L&D financing rationales and providing a holistic understanding of the challenges and opportunities in designing and delivering L&D response capacity in the Global South. Alongside this, the research team synthesised insights from literature, including reports from the Intergovernmental Panel on Climate Change (IPCC) and national and local government policies/strategies. Literature sources were identified through targeted searches, jointly screened by the research team for thematic relevance and analysed thematically, focusing on how key concepts related to L&D, adaptation limits, justice, and transformation are framed across academic and policy sources. This analysis informed the development of the conceptual framework and guided the interpretation of the empirical findings. In parallel, the research team engaged with global L&D processes through active participation in international events, including Conference of the Parties (COPs) and Adaptation Futures, by co-organising side events and contributing to panel discussions. Additionally, key L&D discourses, such as the Transitional Committee meetings and Board meetings of the FRLD, were closely followed, analysed, and incorporated into the project's discussions and knowledge products.

A mixed-methods qualitative approach was used to gather data across three countries from 2023 to 2025. Primary methods included Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), and participatory field visits to understand community experiences and institutional views on climate-related loss and damage. FGDs were held during field visits in Bangladesh (September 2023, September 2024), Nepal (March 2024), and Vanuatu (August 2024, October 2024, March 2025), engaging diverse groups such as women, youth, and marginalised populations within local communities. In parallel, 20 to 30 KIIs were conducted in each country with representatives from local governments, civil society, and national agencies involved in climate adaptation and disaster risk management. These interviews examined institutional knowledge, policy gaps, coordination issues, and views on operationalising L&D financing. Participatory field visits complemented both FGDs and KIIs, enabling direct observation of climate-affected landscapes, assessment of local vulnerabilities, and validation of community testimonies. These immersive activities built trust with participants, helped verify reported loss and damage, and uncovered context-specific expressions of non-economic loss and damage, such as damaged sacred spaces, abandoned farmlands, and new patterns of displacement.

During stakeholder engagements, the research team developed, tested, and applied a shared framework of guiding questions for interviews and discussions. These questions covered economic and non-economic loss and damage at the case study sites; loss and damage that could be addressed through adaptation measures and that lay beyond adaptive capacity; examples and evidence of limits to adaptation; potential financial solutions and delivery mechanisms; and the roles and capacities of local governments and communities in the study areas.

Data analysis was conducted using three iterative methods. First, collating and cross-linking the country case studies to identify residual climate risks beyond CCA and DRR for each nation. Second, using tabulated comparisons to highlight similarities and differences in key findings across case studies, focusing on variables such as the types and severity of residual risks, adaptation limits, and the potential for just financing. Third, grounding interpretations in the socio-cultural, economic, and political contexts of each case study country to offer insights that may not be evident through cross-case analysis alone.

3.2 Case studies and the local contexts of climate risks

This paper draws on research conducted in three climate-vulnerable countries: Bangladesh, Nepal, and Vanuatu. These countries were selected because they: (1) exhibit high vulnerability to climate impacts, as recognised in global indices such as the ND-GAIN Index; (2) encompass diverse geographic settings facing distinct climate hazards; and (3) possess varying social, economic, and governance capacities to respond to climate impacts. Within each country, vulnerable communities were identified using intersecting factors of geographic exposure, climate-sensitive livelihoods, and pre-existing social marginalisation (such as gender, ethnicity, poverty, and displacement status). We recognise that these communities are not homogeneous, and that internal power dynamics, wealth disparities, and identity-based inequalities shape how climate impacts are experienced and how losses are distributed. Our analysis attends to these intra-community differences, particularly as they emerged in gendered and equity-focused lenses.

Bangladesh's low-lying geography, located in the Ganges-Brahmaputra-Meghna delta, makes it susceptible to sea-level rise, coastal flooding, salinity intrusion, and river erosion. The southern coastal belt, including the case study areas of Barishal and Khulna, is projected to lose 18 cent of its cropland by 2040 (Kazi et al. 2022). Communities face multiple overlapping hazards, including cyclones, saline water intrusion, and storm surges, which significantly affect agriculture and fisheries, vital to local economies (Islam et al. 2025; Sultana et al. 2023). The most vulnerable groups are climate-induced migrants, fishing communities, and char farming communities.

Nepal, considered one of the most climate-vulnerable countries globally, exemplifies Himalayan vulnerability and mountain livelihoods in South Asia (Nepal and Kadayat 2024). Its diverse geography exposes it to risks such as exacerbated water-related hazards, accelerated snow and ice melt, and intensified monsoon rainfall (Nepal and Kadayat 2024). The case study sites of Melamchi and Helambu municipalities are vulnerable to various climate hazards due to unstable terrain intense rainfall, trigger flash floods, river surges, and major flooding. These hazards significantly disrupt local livelihoods, disproportionately impacting women and communities.

The Republic of Vanuatu, an archipelago in the South Pacific with over 80 islands and distinct island cultures, is ranked as the most vulnerable country to climate and disaster risks by the World Risk Index (RUB-IFHV 2021). Both rapid and slow-onset events, including sea level rise and storm surges, changes in seasonal rainfall patterns leading to droughts and flooding, ocean acidification, marine and terrestrial heatwaves, and tropical cyclones, impact all major economic sectors, overwhelming the adaptive capacities of local communities and the government. The case study site, Emau Island in Shefa Province, faces

increasing challenges to freshwater access, food security, and coastal stability, with women, children, and the elderly are especially vulnerable.

4 Results

The findings from our case studies highlight the growing scale of residual risks despite existing efforts to mitigate and adapt to climate impacts. Unprecedented climatic events are causing substantial loss and damage, disproportionately borne by the most vulnerable communities, with local context factors further exacerbating their vulnerability. The climate hazards, risks, and loss and damage presented in Table 1 were identified through thematic analysis of qualitative data from FGDs, KIIs, and field notes. Transcripts were coded for recurring themes related to climate impacts, vulnerabilities, and reported losses. Findings

Table 1 An overview of climate hazards, climate risks, and L&D in the three case studies

Case Location (Local Level, Each Country)	Projected Climatic Hazards	Climate Risks	Loss and Damage
Khulna, Barishal (Bangladesh)	Increased flooding, cyclones, increasing levels of salinity, riverbank erosion	Threats to livelihood, ecosystem degradation, and loss of soil fertility, increased risks of water scarcity, reduced farm productivity, recurring loss and damage to homes and basic services like schools and hospitals	Permanent salinity damage to land, mangrove loss (Sundarbans), loss of valuable farmland, repeated permanent displacement (climate refugees)
Helambu, Melamchi (Nepal)	Increasing intensity and fluctuations in rainfall causing flood (flash flood, debris flow) landslides	Disruption of local economy, risks of isolation due to infrastructure damages, mental health issues due to disaster trauma	Traditional livelihoods destroyed (e.g., fishing shifted to alcohol-making), permanent outmigration, cultural practices disrupted
Emau Island (Vanuatu)	Sea level rise, severe cyclones and storm surge, prolonged drought, ocean acidification	Risks of coral ecosystem collapse, increasing food insecurity, increasing vulnerability of low-lying settlements	Loss of coral reefs, erosion of coastal land and villages, permanent displacement, loss of ceremonial plants and traditional agricultural practices, salinisation of groundwater

Source: The STRENGTH Project (2024) (redacted for review)

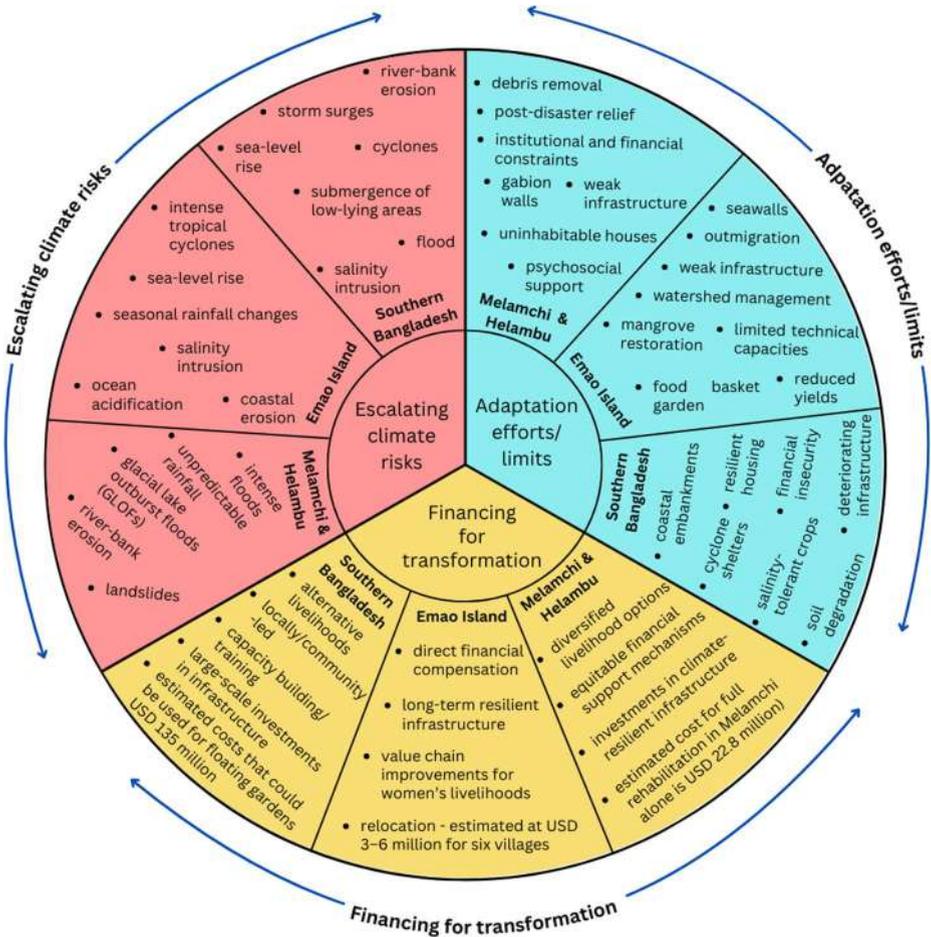


Fig. 2 Escalating risks, adaptation limits, and financing needed for transformation – a synthesis of insights from three local cases. (Source: Authors)

were triangulated with local government reports and climate literature to ensure contextual accuracy. The table highlights the most frequently reported and severe issues across the case sites.

While the forms of climate hazards and risks vary across the region, the impacts of climate change are exceeding the adaptive capacity of countries and communities. Figure 2 synthesises escalating risks, adaptation limits, and the need for financing transformative actions to address loss and damage across three local case study sites. It presents cross-cutting analytical insights, illustrating how escalating climate risks interact with existing adaptation efforts, their limits, and the transformative responses that L&D finance could support. The red segments capture the range of climate hazards and risks, which are increasing in intensity and recurrence over time. The blue segments reflect current adaptation responses, along with the institutional, financial, and technical constraints that limit their effectiveness. In contrast, the yellow segments represent context-specific transformational solutions,

indicating areas where L&D finance could support longer-term structural interventions. Overall, the figure conceptualises how escalating climate risks and adaptation limits create conditions for directing L&D finance towards residual risks and the underlying drivers of vulnerability. The details of how escalating climate risks are leading to unavoidable loss and damage to life, livelihoods, infrastructure, and culture in each case study country are elaborated in the following subsections. These cases highlight the urgent need for justice-centred funding that can support transformative solutions for climate-induced loss and damage.

4.1 Southern bangladesh

4.1.1 Escalating climate risk

Communities in southern Bangladesh face multifaceted climate risks, including flooding, riverbank erosion, cyclones, and increasing salinity intrusion (Ahsan et al. 2024; Mojid 2020). Projections indicate worsening impacts: around 53% of the coastal area is affected by salinity, with this figure expected to reach 68%, and sea levels are likely to rise by approximately 50 cm by 2050 (Islam et al. 2023). These escalating risks are causing irreversible loss and damage to livelihoods, infrastructure, culture, place attachment, and social cohesion. Farmers and fishers report significant declines in agricultural and aquaculture productivity due to increasing salinity, erratic rainfall, and climate-induced disasters (Rabani et al. 2015). The collapse of traditional livelihoods and destruction of homes have triggered rural-to-urban migration, forcing many into informal settlements characterised by poor sanitation, financial stress, and disconnection from ancestral roots (STRENGTH 2024). A coastal migrant's testimonial highlights how vulnerable groups experience these realities in their daily lives:

My cousin's family left for Khulna city after the river ate their land. Now her husband pulls a rickshaw, and she stitches clothes in a factory. They live in a slum where rain-water mixes with sewage, and their children don't go to school. Back here, we share fish and rice when someone's hungry; there, they're alone. [Interview with a local community member, June 2024].

Similarly, a key informant from Barishal claimed that damage to infrastructure, such as homes and roads, has become increasingly common, with many without repair due to the lack of resources, and thus exposed to security and accessibility issues (see also Rahman et al. 2015):

After each storm or flood, the destruction is worse than before—but we don't have the resources to rebuild everything. Besides, it's pointless since the hazards are recurring. Many families are still living under makeshift roofs or have been forced to move in with relatives. Some roads are completely impassable, cutting people off from schools, markets, and even healthcare. [Interview with a local community member, June 2024].

Health impacts are worsening, with flood-related water contamination leading to outbreaks of diarrhoea and skin diseases. Mental distress, trauma, and stress, as well as cardiovascular

diseases, are also rising, particularly among climate migrants. In remote, waterlocked places like Mehediganj local actors report a marked increase in aggression and harshness among residents compared with those from other areas where they previously worked. They attribute this behaviour to accumulated frustration stemming from years of neglect and exclusion from basic facilities and state support in the face of intensifying climate shocks.

For women, salinity-related skin conditions particularly affect marriage prospects and, in some cases, can increase dowry demands or even child marriage (see also Khanam et al. 2023). Key informants in Khulna have also noted reproductive health concerns, including fertility issues and menstrual hygiene challenges. These gendered impacts are intensified by caregiving burdens and constrained mobility. Pregnant, disabled, or elderly women face heightened barriers to care and resources, while many girls are forced to drop out of school.

4.1.2 Current efforts in risk management

Bangladesh has a long history of proactive climate adaptation and DRR efforts, often supported by international partners. Strategies include infrastructure development, climate-smart agriculture, gardening, business training, and salinity resilient crop seeds distribution (ICCCAD 2024). Additionally, investments have been made in coastal embankments, water management infrastructure, resilient housing systems, and cash transfers, with around USD 4 billion allocated within 25 climate-related ministries/divisions in 2024–2025 (Ministry of Finance 2024).

Nevertheless, adaptation efforts, primarily top-down and misaligned with local realities, remain inadequate to address both economic and non-economic losses (Paprocki 2018; Dewan 2021). Moreover, government officers often lack timely information, training, and guidance on evolving climate risks, resulting in gaps in delivery and long-term recovery. Local government officials we interviewed emphasised that even when infrastructure projects and agricultural innovations are implemented, they do not sufficiently address the residual impacts of climate change that exceed adaptation thresholds.

Ignorance of the emerging climate risks and a lack of a systemic approach have also led to maladaptation (Schipper 2020) in some instances. For example, shrimp aquaculture, once promoted as an adaptive strategy, is no longer a favoured option because farmers, particularly smallholders, are no longer able to recover their initial investments due to shifting global demands to alternative, cheaper shrimp species and repeated climate shocks. The practice now reflects enforced maladaptation, sustained by land inequality and elite capture (Haque et al. 2022).

The urgency of transformative justice is particularly evident in the coastal zones. Efforts to reduce salinity-driven infrastructure erosion are largely led by local government and NGOs. However, aid is often monopolised by wealthier groups, excluding poor and remote communities (Dewan 2021). Moreover, infrastructure, including roads, embankments, and housing, remains degraded, undermining community resilience. In Mehediganj, the slow reconstruction of flood-damaged schools has pushed families to send children into labour, permanently disrupting their education (STRENGTH 2024). Similarly, efforts to diversify livelihoods, such as training and seed distribution, remain underfunded and ill-equipped to meet local needs, particularly for fishing and farming communities. Therefore, interventions are often piecemeal, short-term, and insufficiently resourced rather than integrated and locally driven.

Communities anticipate worsening climate impacts, particularly in geographically disadvantaged areas where local governance remains weak. Current strategies offer only temporary relief and fail to address irreversible losses, including displacement, cultural erosion, and long-term health damage. From a humanitarian or adaptation lens, these measures are inadequate and increasingly irrelevant amid accelerating climate risks.

4.1.3 Transformation and the role of climate finance

Persistent adaptation gaps in southern Bangladesh reflect underlying constraints, including limited resources, weak institutions, and social inequalities. As highlighted by a key informant in Barishal, poor oversight and limited transparency have resulted in uneven aid distribution, excluding many at-risk households from critical support, reflecting not just an administrative issue but also a matter of social (in)justice. The disconnect between urgent needs and available services has left marginalised groups, especially women, displaced families, and smallholder farmers, in an increasingly precarious position.

To bridge this gap, communities and local officials emphasised the importance of community-led accountability frameworks that enable local residents to monitor how resources are allocated and used, such as participatory budgeting, grievance redress mechanisms, and regular social audits. Moreover, funding mechanisms should incorporate transparency requirements and equity safeguards, ensuring that frontline communities are not only recipients of aid but also active stakeholders in the design, delivery, and monitoring of climate responses. Strengthening governance and enhancing accountability is crucial to ensure funding reaches the most vulnerable, as reported by one of the key informants in Barishal. There is also a need for financing for locally led and scalable solutions that diversify or offer alternative and resilient livelihood options. This could include, for example, expanding floating gardens (*Dhap*) farming, which can allow local farmers, particularly women and landless individuals, to gain greater control over productive assets and livelihood options. A transformative justice approach, by mandating participatory and transparent governance structures as a condition for finance, could directly address the power imbalances and exclusion that currently marginalise women, displaced families, and smallholder farmers.

Bangladesh needs an estimated USD 12.5 billion annually to address the climate change impacts (World Bank 2022). The Ministry of Agriculture's 2024-25 budget includes USD 937.44 million for climate-related activities, 95% of which is earmarked for food security, social protection, and health, but the required budget is more than three times the current allocation (2.7 billion). Even a modest 5% allocation to floating gardens would require USD 135 million, highlighting the scale of resource needs. Similarly, resettlement costs for climate migrants are high. Based on a USD 7000 estimate per climate migrant (Clements 2024), relocating 10,000 individuals would cost USD 70 million, with costs to rise as climate risks escalate. Financing must therefore prioritise systemic solutions that prevent future displacement and marginalisation, and support communities to recover with dignity.

4.2 Nepal mountains

4.2.1 Escalating climate risk

In Nepal's mountainous Melamchi and Helambu regions, intensifying climate risks are primarily driven by erratic, heavy rainfall that triggers flooding and landslides, alongside rising temperatures and accelerated snow and ice melt. These dynamics have increased water-related disasters, including glacial lake outburst floods and debris flows. Climate projections indicate a continued escalation of these risks with the Melamchi catchment's average annual maximum temperature projected to rise by 2.6 °C, annual precipitation by 13%, and river discharge by 19% by 2051–2075 compared to the 1992–2021 baseline (Asian Development Bank [ADB] 2023). These projected changes pose serious threats to settlements and livelihoods in the region.

Major floods in 2021 and 2023 in the Melamchi Valley caused significant damage to infrastructure and livelihoods (Bhushal 2021; myRepublica 2023). The 2021 flood alone resulted in an estimated economic loss of USD 436 million for Melamchi Municipality and USD 62 million for Helambu Rural Municipality (Parajuli et al. 2023). Infrastructure destroyed included houses, water supply systems, roads, schools, and office buildings. Agriculture and fisheries, the primary sources of income, were extensively damaged or lost, affecting the day-to-day subsistence of the local community. Flood impacts led to business displacement, loss of market potential, and increased outmigration, as well as the destruction of cemeteries and places of worship, which are central to community identity and social cohesion (STRENGTH/PRC 2024).

Beyond economic loss and damage, the floods caused several non-economic losses and damage, particularly affecting mental health and well-being. Reported impacts include increased psychological distress, anxiety, depression, trauma, domestic violence, and suicide, linked to property damage, livelihood disruption, displacement, and fear of future flood events (Pokharel and Karki 2023; STRENGTH/PRC 2024). Children, the elderly, and people with disabilities suffered greatly in the aftermath of the flood. Women experienced compounding vulnerabilities, including increased risks of domestic violence, limited employment opportunities, and safety concerns. The Deputy Mayor of Helambu Rural Municipality, responsible for post-disaster response and social service coordination, noted:

I have noticed that many women in Helambu are facing safety concerns in their own homes. As part of our efforts, we are providing free medicine to individuals with chronic illnesses. However, following the floods, it has become evident that a significant number of women are experiencing depression. However, these women are afraid to speak up or seek the needed help for their struggles because of societal stigma that labels them as lunatic people. Additionally, these women also endure a lot of torture and abuse from their husbands within their households.

4.2.2 Current efforts in risk management

Melamchi and Helambu face structural constraints in managing climate risks, including weak infrastructure, harsh topography, and limited availability of real-time hydrometeorological data for forecasting and early warning (Parajuli et al. 2023). Additionally, high

dependence on agriculture and limited financing capacity further exacerbate vulnerability, particularly for households living near the riverbanks. In response, the local government, with support from NGOs and INGOs have implemented several adaptation measures, including the construction of check dams and embankments, the establishment of early warning systems, and the provision of financial assistance (STRENGTH/PRC 2024). However, these efforts have limited effectiveness and are unable to provide the support the communities need. This is largely because interventions remain short-term and are insufficient in scale relative to the magnitude of losses incurred, and are constrained by weak coordination across local, provincial, and national institutions, resulting in a focus on immediate response rather than addressing long term exposure and residual loss and damage.

During the monsoon season, the roads in Melamchi are frequently inundated, disrupting mobility and quick access to necessary assistance services. Current municipal strategies involve temporarily raising the height of the road surfaces, which provides short-term relief but fails to address recurring flood exposure. Structural flood control measures, such as gabion walls, check dams, and embankments, have limited capacity to withstand extreme floods, often requiring annual post-monsoon rebuilding, affecting the security and mobility of the community. Following disaster events, municipalities, NGOs or INGOs typically distribute emergency relief packages or cash assistance to the communities. After the 2021 flood, financial assistance was provided for housing reconstruction, with affected families receiving USD 3,800 in installments (STRENGTH/PRC 2024). However, delays in disbursement, bureaucratic inefficiencies, and technical difficulties in fund transfer systems have still left many people without full support. The Deputy Mayor of Helambu rural municipality explained regarding a trout farmer:

She had invested between NPR 50 to 70 million (~USD 380,000 to 532,000) in trout farming, which used to be their primary source of livelihood. We are only able to provide NPR 500,000 (~USD 3,800) as relief, which barely scratches the surface for support (STRENGTH/PRC 2024).

Broadly, persistent gaps in financial resources, infrastructure, and intergovernmental coordination constrain recovery efforts. Although Melamchi municipality has developed detailed plans for long-term flood management, these plans are often unimplemented due to insufficient funding from the provincial and central governments (STRENGTH/PRC 2024). Similarly, while some financial assistance exists to support the economic recovery of affected businesses (such as trout farming in Helambu), it remains largely insufficient compared to the losses incurred.

4.2.3 Transformation and the role of climate finance

The repeated flooding in Melamchi and Helambu has exposed the geographic vulnerability and the fragile socio-economic conditions within which communities live, revealing the limits of incremental adaptation and short-term disaster response. Climate projections indicating increased glacial melt, rainfall, and monsoon unpredictability suggest that many river valley settlements may not be resilient in the long run (Immerzeel et al. 2012). Under these conditions, existing efforts are unlikely to restore the scale of loss and damage experienced by vulnerable households, necessitating more transformative and forward-looking planning

approaches, such as facilitating the transition to alternative livelihoods and strengthening psychosocial support systems, which were identified as critically lacking in the post-disaster response.

However, financial needs for such interventions far exceed current contributions or pledges made. Following the 2021 flood, average household losses were estimated at USD 52,113, while the average financial support received per household was only USD 380, creating a residual financing gap of USD 51,733 per household (Parajuli et al. 2023). For about 4000 affected households, this gap translates into an estimated USD 207 million in unmet financing needs, excluding non-economic losses. Likewise, livelihood recovery presents a similar financing challenge. Trout farming incurred losses estimated between USD 530,000 and 740,000. Considering the average annual inflation rate of about 6% for the four years since the flood, the estimated cost to establish a trout farm in 2025 would range from approximately USD 669,113 to USD 934,233, without the consideration of relocation and resilient materials. In Melamchi and Helambu, transformative L&D finance would prioritise long-term livelihood reconstruction, planned relocation from high-risk river corridors, and sustained psychosocial and social protection support, going beyond one-off housing reconstruction grants and short-term relief.

4.3 Emau island, Vanuatu

4.3.1 Escalating climate risk

Offshore to the north of the principal island of Efate, Emau Island is increasingly exposed to residual risks from climate change impacts, including sea-level rise, tropical cyclones, changes in seasonal rainfall, and ocean acidification (Ruehr 2022). In 2023 alone, Vanuatu experienced multiple cyclones that affected 80% of the population, requiring USD 773.6 million for recovery needs (Government of Vanuatu 2023). Similarly, the rate of sea-level rise was approximately 10–15 cm between 1993 and 2020, and is expected to rise by 23–28 cm by 2050 (Hoeke et al. 2023; Bernier et al 2024; Hague et al 2024). As a result, coastal erosion has destroyed graveyards, farmland, and homes, disrupting deep cultural ties and social safety nets, leading to a decision to relocate away from ancestral coastal villages. The findings below prioritise the perspectives of groups identified as most vulnerable during preliminary scoping and community validation, particularly women weavers, coastal households facing displacement, and traditional knowledge-holders.

The loss and destruction of natural systems, including land, biodiversity, water sources, and agriculture, are affecting community livelihoods and ecosystem services. For example, coral bleaching and ocean acidification on Emau Island endanger vital marine ecosystems and fishing resources. The island is also exposed to prolonged drought and groundwater salinisation, reducing freshwater availability for household use and agriculture. Similarly, many residents reported that excess rainfall has waterlogged gardens, and increased salt-water intrusion has rendered farmlands unproductive, leading to food insecurity. Out-of-season rainfall is causing pests and diseases in staple crops such as pandanus plants used for weaving mats and traditional handicrafts, and laplap leaves used for cooking, especially for women who are largely dependent on these resources (STRENGTH Vanuatu 2024). For example, a member of the Marou Village Council of Chiefs recalled:

I used to be able to plant all kinds of Kumala in my garden to feed my family, but now out-of-season rainfall makes the plants produce only leaves with no tuber to eat. If we must move away from the coast because of worsening inundation and into this upland agricultural area, we will have even less local food available to us.

Widespread and repeated damage to infrastructure, including homes, seawalls, and roads, has made reconstruction efforts nearly impossible. The total value of homes and assets in the Marou community is approximately 340,000 USD. Cyclone Pam in 2015 caused a 20% loss to these homes and assets, and Cyclones Kevin and Judy in 2023 caused an additional 36% loss to homes, furniture, and belongings. With increasing economic strain, out-migration has risen, both permanent to the capital island and temporary for jobs. A chairlady of a village women's weaving group lamented:

We saved for more than 10 years to build our house. My fingers were raw to the bone, weaving to save money for the roof, the doors, our kitchen. But the last 3 cyclones have each completely flooded our home, washing everything away. I don't want to move, but I have to protect my family, and so we are forced to run away for good.

Young men often leave for seasonal work in Australia and New Zealand, leaving women to manage households amid worsening climate conditions (STRENGTH Vanuatu 2024). Restoring livelihoods in the place of settlement has been an arduous challenge, at times sparking conflicts in the new community.

As climate-induced disasters intensify, the need to support household survival has often led to girls dropping out of school, either temporarily or permanently, depriving them of educational opportunities. Economic stress can increase the risk of early marriages or exploitation as families struggle to cope with financial pressures. In Marou village, residents reported that poor water quality and reduced access to healthcare services during and after disasters have severely impacted women's reproductive health, including increased risks of pregnancy complications (STRENGTH/Vanuatu 2024).

4.3.2 Current efforts in risk management

Vanuatu has been at the forefront of discourse and advocacy for L&D and climate justice. A range of CCA and DRR initiatives have been designed and implemented, including the Green Climate Fund-supported adaptation program, parametric insurance, and early warning systems. Policies have also been developed that integrate CCA and responsive DRR mechanisms, including social protection and blockchain cash transfers, providing targeted financial assistance to disaster-affected communities. Despite this, loss and damage to communities and ecosystems is exacerbated by existing challenges, such as weak infrastructure design, harsh topography, and limited financial, technical, and institutional capacities. For instance, Emau Island receives limited support to address climate-induced impacts due to its remote location. A key informant reported that support from the National Disaster Committee and the National Disaster Management Office has been minimal, leaving affected communities to recover on their own. Aid is largely limited to food and non-food items, while the burden of reconstruction and recovery falls on the villages, with individual fami-

lies sourcing financial input through local livelihood activities (fishing and mat weaving) as well as remittance.

Various government departments, NGOs, and local communities have implemented climate adaptation projects. For example, efforts have been made to establish Marine Protected Areas and reseed coral reefs to restore fish populations. Yet climate stressors such as ocean acidification degrade marine ecosystems. Similarly, mangrove restoration and watershed management techniques have been unable to withstand the severe and repeated cyclone damage. The Department of Agriculture has implemented a food basket garden, where local and climate-resilient crop varieties are grown. However, even newly improved crop varieties, such as the short-harvest sweet potato, are unable to grow under changing climate conditions due to excess rainfall and soil moisture, resulting in vegetative growth without proper root formation. Additionally, newly built evacuation centres constructed for communities to find safe shelter, were destroyed by recent cyclones. While these efforts have been made, they do not adequately address loss and damage, as most climate models operate at national or regional levels, making it difficult to develop targeted interventions for small islands like Emau, thereby reinforcing structural injustice.

4.3.3 Transformation and the role of climate finance

It has been repeatedly demonstrated that Small Island Developing States (SIDs) receive significantly less climate finance than least-developed countries, lower-middle-income countries, and upper-middle-income countries (Wilkinson et al. 2023), and that these funds are explicitly for adaptation and mitigation. Communities on Emau Island continue to experience irreversible loss and damage that go beyond the limits of adaptation and mitigation, which they cannot address. The lack of appropriate institutional, financial, and technical support has resulted in existing climate responses failing to prevent permanent loss and damage, emphasising the need for a fundamental shift from adaptation and mitigation to system transformation through restorative justice.

In community dialogues, relocation, localised financial mechanisms, and memorialisation emerged as essential responses to intensifying residual risks that current adaptation cannot address. Given the clear limits to adaptation, relocating homes and infrastructure requires significant financial support. Without external assistance, residents must self-finance their migration, deepening poverty and inequality. In Marou Village, the total loss and damage from twin Category 4 cyclone storm surges in 2023 was USD 130,300, while rebuilding one village is projected to cost around USD 500,000. With a population of just under 200 people in 28 households and with an annual per household income of less than USD 100 per week, repair and reconstruction costs, which fall on local populations without external or government support, are prohibitively high. The Village's leaders have begun relocation planning, which is estimated to cost between USD 500,000 and USD 1,000,000. Vanuatu's Revised and Enhanced Nationally Determined Contribution to the UNFCCC estimated the costs of meeting its L&D targets at USD 177.7 million through 2030 (Government of Vanuatu 2022), excluding any expenses related to post-event recovery and accounting only for the most urgent institutional, procedural, and preparatory activities related to addressing loss and damage. Based on estimates from Marou Village alone, one of the six villages in Emau, relocation will cost USD 3 million to USD 6 million. Additionally, compensation for loss and rebuilding could be estimated at around USD 6.5 million. This illustrates the clear

need for L&D financing not only to address residual risks but also to create an opportunity to transform broader socio-ecological systems to build inclusive climate resilience.

Women who rely on pandanus weaving for their livelihoods are among the most vulnerable groups in Emau. Pandanus cultivation is being disrupted by sea-level rise, changing rainfall patterns, and increasing fungal infections. They report that traditional harvesting cycles are no longer predictable, and altered soil properties are changing plant characteristics. The loss of pandanus leaves threatens both livelihoods and intergenerational knowledge systems, which have traditionally supported adaptation to environmental changes. However, as climate impacts accelerate beyond historical experience, these adaptation strategies are no longer effective. Existing climate finance mechanisms barely recognise these women-led initiatives, despite their significant role in the community. During community consultations, specific needs for targeted investment emerged, including compensation for lost income, technology transfer for improved processing, knowledge preservation, and value chain improvements to enhance market access and ensure better compensation for traditional crafts. These measures would help them regain control over a livelihood increasingly threatened by climate change, thereby sustaining both their economic autonomy and cultural heritage.

5 Discussion

Somewhat unsurprisingly, the result presented above reinforces the scientific understanding that current adaptation and DRR efforts focused on hazard and disaster reduction, along with incremental climate actions, are increasingly inadequate in the face of escalating climate risks (Newell 2024; Mechler et al. 2020). While earnest responses, such as early warning systems, flood barriers, cash transfers, subsidies for rebuilding houses, and climate-resilient agricultural practices, offer essential short-term relief, they are insufficient to address the systemic nature of climate-induced loss and damage. In Nepal's Melamchi, for instance, embankments, flood area zoning, and land use planning were established, but implementation of protocols, timely alerts, and evacuation plans remains deficient due to institutional and resource constraints. Similarly, in Southern Bangladesh and Emau Island, investments in infrastructure and hazard monitoring have reduced short-term damage but fail to address intensifying residual loss and damage or underlying socio-economic drivers of vulnerability, such as land tenure insecurity or gender inequality. Maladaptation is also inadvertently embodied in the unrestricted operation of shrimp and crab aquaculture for profit by elites who control agricultural land in Southern Bangladesh, causing smallholders to lose not only fertile land but also their traditional livelihoods, forcing many to turn to the burgeoning industry.

A troubling finding is that current risk management approaches often overlook opportunities to build systemic resilience, inadvertently perpetuating vulnerabilities to climate impacts. Preparedness, forecasting, and temporary relief efforts frequently neglect underlying vulnerabilities and power imbalances (Gifford and Sauls 2024). As a result, such interventions remain reactive, short-term, and technocratic, failing to address the systemic roots of vulnerability and injustice. In coastal Bangladesh, for example, existing infrastructure and response systems, such as coastal embankments, community-based early warning systems, cyclone shelters, and rehabilitation efforts, have become essential for managing risks

but fail to address deeper challenges such as landlessness and elite capture of development aid (STRENGTH/ICCCAD 2024).

Given unavoidable losses and damages, current adaptation investments and disaster relief funds are demonstrably inadequate and often inaccessible to those most in need. On Emau Island, for instance, the total loss and damage from twin Category 4 cyclone storm surges in 2023 cost around USD 130,300 (*XXX Fieldnotes 2024*), far exceeding available humanitarian relief and leaving families reliant on self-recovery, deepening cycles of poverty. Compounding this, institutional arrangements (such as externally derived criteria to trigger finance) were overly complicated, limiting access to initial international funding and reflecting a fundamental injustice in the burden of proof placed on victims. These examples reveal what may be referred to as a triple deficit: inadequate financing, incremental lock-in preventing systems change, and maladaptive practices that exacerbate losses and damages. This underscores the urgency of a transformative approach to L&D finance.

Thus, our findings demonstrate that L&D financing holds unique potential to advance transformation and justice if designed and implemented accordingly. Given the inadequacy of existing financing mechanisms for basic hazard reduction and risk management to cope with residual risks, the undeniable requirement for transformative approaches necessitates adequate, equitable, and just financing with highly responsive and locally appropriate delivery mechanisms. Unlike risk reduction and adaptation financing, L&D finance must explicitly target system-wide transformations, to address emerging forms of L&D, such as permanent displacement, restoration of cultural loss, and livelihood transformation (Roberts and Pelling 2019; Mechler and Deubelli 2021).

At the same time, how L&D finance is governed locally is inextricably linked to broader questions of climate justice, including funding sources and the design of financial institutions. While the equitable mobilisation of funds from historical emitters and the avoidance of debt-creating instruments are essential for justice at the global scale, our cases reveal that without local agency, participatory governance, and transformative intent, even well-structured funds risk perpetuating existing inequalities. Thus, while we do not prescribe the specifics of supra-local institutional design, our analysis affirms that any L&D financing architecture must be built to enable the locally led, systemic transformation, reflecting community priorities rather than top-down interventions that often failed to consider local priorities, leading to mistrust, maladaptive outcomes, and exclusion from recovery processes. Alongside enabling policy instruments, the transformative approach must emphasise building the capacity of local communities and institutions to explore and pursue transformative action to minimise and recover from climate-induced injustices in their specific contexts and needs (Colenbrander et al. 2018).

Critically, climate loss and damage are not only amplified by, but also exacerbate social exclusion. Women, Indigenous peoples, informal workers, people with disabilities, and other marginalised groups face disproportionate exposure, reduced recovery capacity, and exclusion from decision-making processes at all levels. For instance, in Helambu, women experienced increased domestic violence and mental health issues following the floods, yet had limited access to targeted support. On Emau Island, women face an increased workload as men out-migrate for work and bear the brunt of caring for families amidst diminishing resources. In Southern Bangladesh, high salinity affects women's reproductive health and wellbeing in the absence of adequate healthcare access or water security. Although gender and equity rhetoric is well noted in climate finance, our research has identified persistent

challenges, including limited direct and equitable access to climate financing, and minimal investment in gender-responsive and socially inclusive solutions that address the specific needs and rights of marginalised groups (Agyeman et al. 2016). These patterns underscore the urgent need for a separate L&D financing mechanism that explicitly supports social inclusion through dedicated targets, safeguards, and participatory governance.

Given the limited insight current risk experience offers into future L&D, integrating anticipatory approaches, particularly those that build local capabilities to foresee and respond to emerging challenges (Tschakert and Dietrich 2010), into L&D finance is essential. However, future planning remains scarce at the local and national levels, underscoring the need for financing mechanisms that enhance anticipatory decision-making, planning, and policy development essential for proactively minimising and addressing losses and damages. L&D finance mechanisms, including the FRLD, must therefore evolve from reactive, post-crisis models to ones that proactively minimise avoidable and unavoidable losses and damages, supporting transformative resilience through anticipatory investment and planned transformation. The case study insights suggest that L&D finance must not be confined to risk management but must support transformative approaches, embracing principles of justice, local ownership, responsiveness, and forward-looking resilience from the outset (Serdeczny and Lissner 2023).

Finally, access to and control over finance can be an even critical aspect in efforts to build inclusive transformation, given the hierarchical nature of local decision-making systems and entrenched power dynamics. Despite some policy initiatives, rural communities struggle to access climate finance information, particularly among local development stakeholders and governments, often due to complex procedures and a lack of transparency. Achieving transformative justice requires shifting decision-making power and financial control to affected communities through mechanisms such as direct access and community-led grant-making. Without safeguards, financial flows risk increased elite capture and perpetuation of climate injustice by reinforcing existing power structures (Ciplet et al. 2022). Transformative L&D finance mechanisms should embed participatory governance structures, such as community oversight committees, transparent social audits, and public grievance redress systems, to ensure accountability. Furthermore, eligibility and allocation criteria must be co-developed, clear, and publicly verifiable, prioritising those most vulnerable. Without such safeguards, even locally directed funds risk perpetuating the very inequalities they aim to dismantle.

6 Conclusion

Through case studies of three frontline communities in Nepal, Bangladesh, and Vanuatu, this paper establishes that L&D financing must be fundamentally reimagined to support transformative climate justice beyond residual risk management, philanthropic donations, or post-disaster cash support. L&D finance must explicitly support systems transformation grounded in the rights to development and wellbeing. Evidence from three cases shows that even the most optimistic adaptation efforts are unlikely to offset losses and damages, while DRR financing remains extremely limited relative to the need. Moreover, existing efforts pay little attention to the systemic changes that cause vulnerability and injustice.

These diverse frontline experiences underscore that L&D finance must serve two intertwined goals: building genuine resilience and delivering climate justice. Both require facili-

tating transformative transitions, such as planned relocation, cultural heritage preservation, and livelihood reconfiguration, while centring the needs of disproportionately affected groups, including women, the poor, and Indigenous Peoples. As the case studies reveal, this demands a fundamental power shift, prioritising frontline community voices and knowledge in decision-making and resource control.

While this paper did not focus specifically on designing L&D finance architecture, the findings points to a crucial need for a paradigm shift from fragmented, reactive interventions to anticipatory, justice-oriented, and locally led systems change. The consistent failure of one-size-fits-all approaches across case studies leads to the conclusion that context-specific modalities must dynamically prioritise equity, participation, and long-term transformation, integrating L&D actions into broader development strategies through equitable governance, especially of the FRLD.

Acknowledgements We would like to extend our sincere gratitude to Prof. Saleemul Huq, the late Principal Investigator of the STRENGTH project, for his invaluable contributions towards achieving climate justice and leading the research project on which this work is based. We also want to thank Mr. Mike Waiwai and Ms. Florence Iautu from Vanuatu, Mr. Raju Pandit Chhetri from Prakriti Resources Centre in Nepal, and Prof. Jeff Camkin from University of Western Australia, Australia for their feedback, comments and cooperation in the research process. We would like to thank IDRC, Canada for funding the STRENGTH research project on which this article is based.

Author Contributions All authors contributed to the study conception and design. Hemant Ojha conceptualized the paper. Material preparation, data collection and analysis were performed by Hemant Ojha, Nazifa Rafa, Basundhara Bhattarai, Purnima Banjade, Christopher Bartlett, Kishor Aryal, Kenisha Shrestha, Priyanka Gurung, Nusrat Naushin, Towrin Zaman, Bhim Adhikari, Nani Sujakhu, Prabin Man Singh. The first draft of the manuscript was written by Hemant Ojha, Nazifa Rafa, Basundhara Bhattarai, Purnima Banjade, Priyanka Gurung, Christopher Bartlett, and all authors commented on and validated previous versions of the manuscript. All authors read and approved the final manuscript.

Funding Open Access funding enabled and organized by CAUL and its Member Institutions. This research has been supported by the International Development Research Centre (IDRC), Canada.

Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing Interests The authors have no relevant financial or non-financial interests to disclose.

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