

Underfinanced. Underprepared.

Inadequate investment and
planning on climate adaptation
leaves world exposed





Chapter 5

Loss and damage

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Key messages

- ▶ In the United Nations Framework Convention on Climate Change (UNFCCC), loss and damage has emerged as a third key pillar of climate policy, alongside mitigation and adaptation, to address ever-increasing climate impacts in developing countries that are particularly vulnerable to the adverse effect of climate change.
- ▶ Losses and damages arise when efforts to avoid or minimize climate impacts through mitigation and adaptation fail. Given the slow progress of mitigating greenhouse gas (GHG) emissions and of adapting to climate risks, some losses and damages are occurring, and further loss and damage is unavoidable.
- ▶ There is a broad typology of responses available for both economic and non-economic losses and damages that must all respect country ownership and be equitable, inclusive, accessible and adequate, but the lack of conceptual clarity is a clear barrier to making progress on loss and damage.
- ▶ Many uncertainties remain regarding the financial needs to address loss and damage, but innovative funding sources and governance structures must be found to reach the necessary scale.

5.1 Introduction

5.1.1 What is loss and damage?

While there is no commonly agreed definition, loss and damage is most commonly understood as the adverse effects of climate change that are not or cannot be avoided by mitigation and adaptation efforts (van der Geest and Warner 2020). This definition implies that there are two types of loss and damage: those that exceed adaptation limits and those that can be minimized by ramping up adaptation efforts and finance. The limits to adaptation are the points at which adaptation fails to avert intolerable climate impacts. They are typically classified as being either hard or soft.

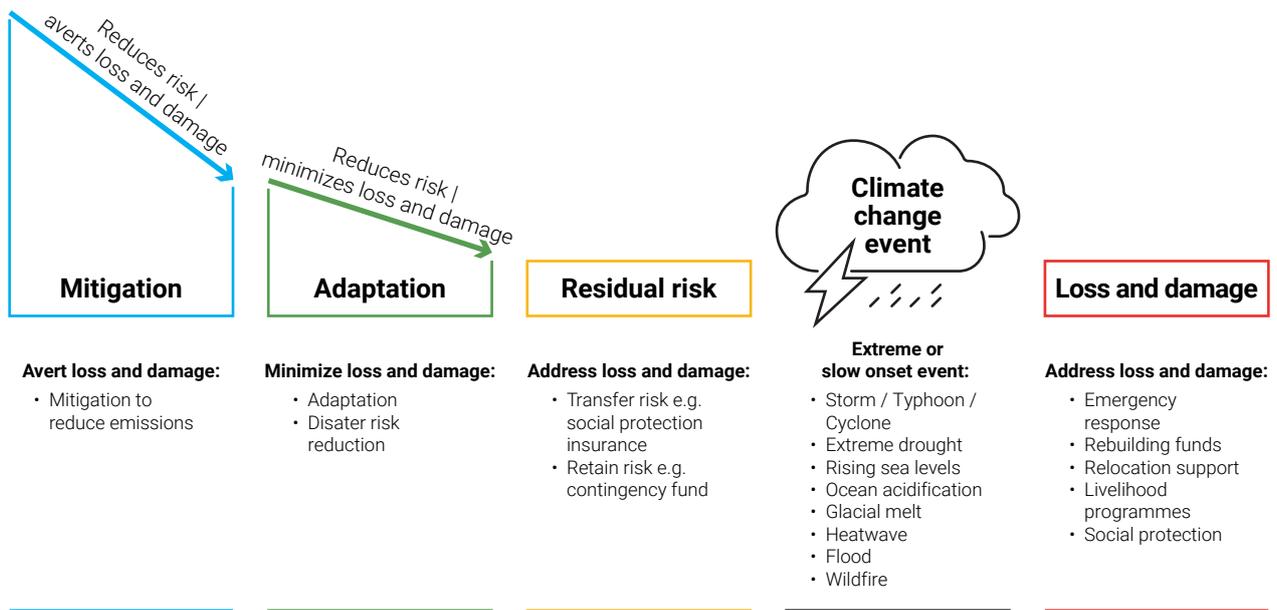
- Hard limits are typically those associated with physiological responses to changing climates, and other than reducing GHG emissions, there are few options available to humans to avoid the points at which climate-sensitive systems are fundamentally damaged.
- Soft limits are those that arise from failures to implement adaptation actions that could effectively reduce vulnerability. This failure can be for cultural, economic and/or political reasons.

As the previous chapters of this report have shown, there are significant gaps and challenges in the policies and actions that national governments and other actors implement to adapt to climate change. The wider these gaps and the longer it takes to overcome the challenges, the more severe the losses and damages will be, particularly in vulnerable countries. An important way to reduce losses and damages is to tackle adaptation constraints and boost national capacities to implement effective adaptation efforts.

Opportunities for averting, minimizing and addressing loss and damage can be found across a spectrum ranging from reducing GHG emissions to disaster risk management, climate change adaptation, and addressing residual loss and damage (figure 5.1). Reducing global warming can help to avert losses and damages while disaster risk management and climate change adaptation actions can help minimize them. Policies to address loss and damage are still scarce, but some are emerging (see section 5.4 for an overview).

It is important to recognize that options to avert, minimize or address loss and damage may work at various timescales. Reducing GHG emissions, for example, may avert loss and damage in the timescales of decades to centuries, while both disaster risk reduction and climate change adaptation actions can minimize loss and damage in the short to medium term.

Figure 5.1 Policy interventions to avert, minimize and address loss and damage



Source: Richards (2022)

5.1.2 Evolution of loss and damage in the climate negotiations

The issue of loss and damage has evolved over time, leading to the decisions achieved at the twenty-seventh session of the Conference of the Parties to the UNFCCC (COP 27) in Sharm El-Sheikh to establish a fund and funding arrangements for loss and damage (figure 5.2).

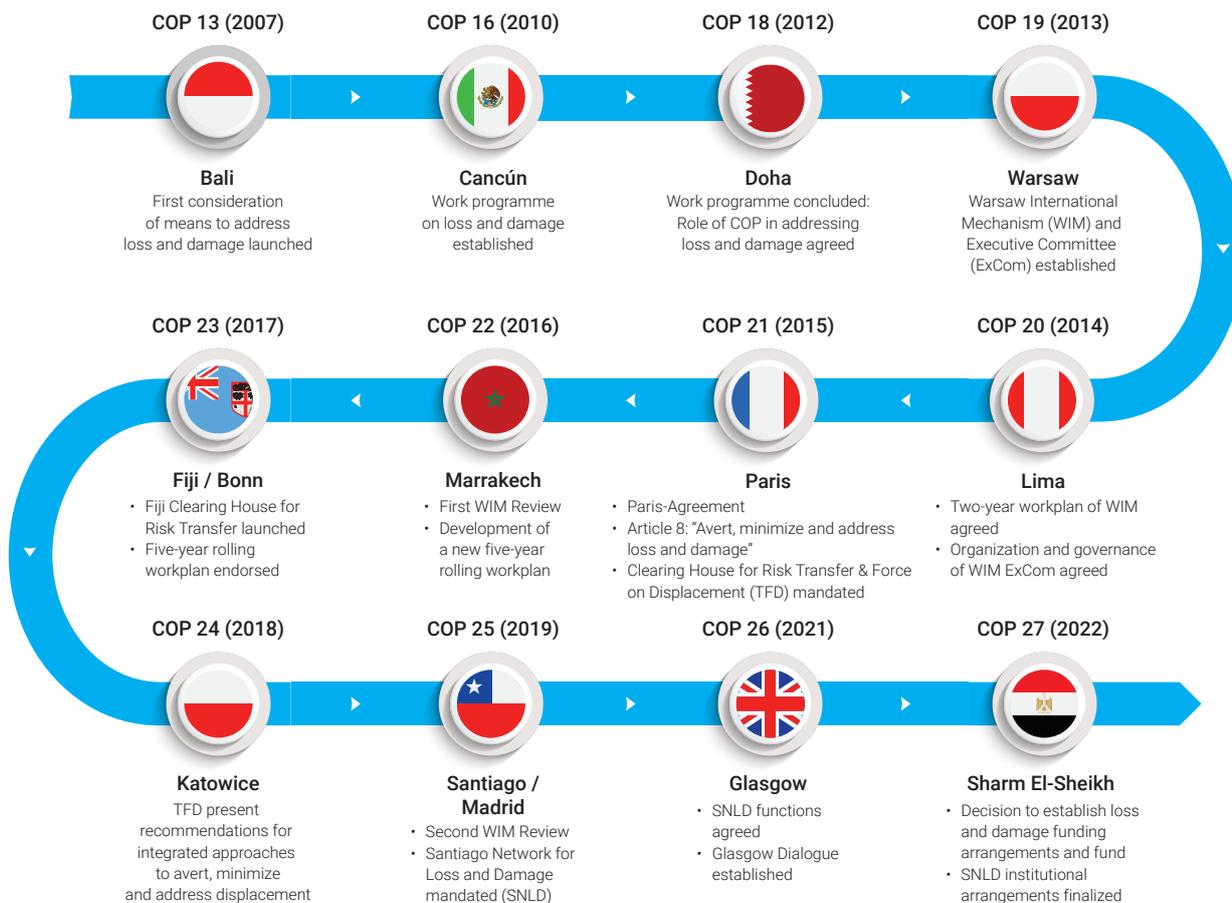
Loss and damage was first raised as an issue in climate change negotiations in 1991, four years before COP 1 took place. That year, Vanuatu, on behalf of the Alliance of Small Island States, submitted a proposal for an international insurance pool to address loss and damage from sea level rise in small island developing States. The attempt was unsuccessful, and it took almost two decades for the issue to reappear in the climate negotiations. In 2010, a work programme on loss and damage was created, which eventually led to the establishment of the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM) in 2013. WIM was mandated to 1) enhance knowledge and understanding on loss and damage; 2) strengthen dialogue, coordination,

coherence and synergies among relevant stakeholders; and 3) enhance action and support, including finance, technology and capacity-building.

Despite slow progress since the establishment of WIM, particularly on enhancing action and support (Johansson *et al.* 2022), several milestones have since been achieved. In 2015 the Paris Agreement dedicated article 8 to loss and damage, emphasizing the importance of averting, minimizing and addressing loss and damage, including the irreversible impacts that have already occurred and those that are expected to happen in the future. Article 8 acknowledges the reality that some climate impacts are beyond adaptation efforts and may result in loss and damage to vulnerable countries and communities. The decision text notes that article 8 does not provide a basis for liability and compensation. Proponents of this text say that this is necessary to make progress on addressing loss and damage politically feasible, while critics say it weakens the treaty and removes the pressure on polluters to ramp up action to avert climate change, and on developed countries to intensify their support for adaptation.¹

¹ For a careful interpretation of liability and compensation under article 8, see Mace and Verheyen (2016).

Figure 5.2 The emergence of loss and damage in the climate negotiations



Source: Adapted from Mirwald (2023).

Between 2016 and 2021, there was a gradual move towards more concrete plans for action on loss and damage. Noteworthy is the establishment of the Santiago Network for Loss and Damage in 2019. The objective of the network is to catalyse technical assistance for approaches to avert, minimize and address loss and damage at the local, national and regional level. The technical assistance is particularly geared towards climate vulnerable countries.

At COP 27 in 2022, an important new milestone was achieved with the agreement to establish financial arrangements, including a fund, for addressing loss and damage in developing countries particularly vulnerable to the adverse effects of climate change (UNFCCC 2022a). The COP decision calls for the mobilization of new and additional resources to address loss and damage. While previous decisions since 2015 used the phrasing "avert, minimize and address", the 2022 text emphasizes that the new fund's mandate should focus on *addressing* loss and damage. The idea behind this is that action to avert and minimize loss and damage is already covered by finance for mitigation and adaptation.

Critics note that the international response on loss and damage in the UNFCCC has insufficiently taken human rights into account. They have pursued the integration of loss and damage in relevant human rights bodies including the United Nations Human Rights Council and the Office of the High Commissioner for Human Rights. Further, the United Nations General Assembly has asked for an advisory opinion on climate change from the International Court of Justice at the behest of Vanuatu.

5.1.3 Outline of chapter

Section 5.2 of this chapter examines soft and hard limits to adaptation in natural and social systems, and their relevance for our thinking about ways to avoid and minimize loss and damage. Section 5.3 discusses different conceptualizations and perspectives on loss and damage, including a climate justice lens. Section 5.4 looks at the different policy options for addressing economic and non-economic losses and damages, and section 5.5 assesses the magnitude, sources and mechanisms for financing action to address loss and damage.

5.2 Adaptation limits and loss and damage

Loss and damage from climate change arises when efforts to avert or minimize climate impacts through mitigation and adaptation fail. The points at which adaptation fails to avert climate impacts are called the 'limits' to adaptation. Research on adaptation limits commonly refers to hard and soft limits. Hard limits are those that arise in physical systems, and which cannot be averted through adaptation action but rather only through mitigation of GHGs. Soft limits are those that can be avoided or minimized through more concerted adaptation efforts. Thus, the more the adaptation gap is reduced, the fewer soft limits will be crossed and the less loss and damage there will be.

5.2.1 Hard limits to adaptation

Even if the temperature goal of the Paris Agreement is achieved, there will still be between 1.5°C and 2°C of warming above pre-industrial levels (Meinshausen *et al.* 2022). At 1.5°C of warming, widespread changes in highly climate-sensitive ecosystems such as coral reefs and tropical glaciers are likely (Hughes *et al.* 2018; Stuart-Smith *et al.* 2021; McKay *et al.* 2022). It is in natural systems such as these where the limits to adaptation seem *hard* in the sense that there are few options available to humans to avoid the points at which they are fundamentally damaged and some or all their unique and valued characteristics are lost (Marshall *et al.* 2019; Stensrud 2020; Intergovernmental Panel on Climate Change [IPCC] 2022).

Case study: Mountains in silent thaw – Losses and damages from the disappearing “frozen heartbeat” of Earth

The mountain cryosphere – ice, snow and permafrost – is melting due to climate change, affecting billions of people worldwide with significant economic and social consequences.

As natural water storage continues to shrink, the timing and availability of fresh water change. This means increased flooding and erosion during melting periods and water scarcity during dry seasons, damaging infrastructure and disrupting water supplies for agriculture, drinking and energy generation.

Addressing loss and damage from a diminishing mountain cryosphere requires a comprehensive and

urgent response. More adaptation action is needed for resilient infrastructure, early warning systems and adaptive water management and agricultural practices.

While it is a global responsibility to safeguard the crucial ecosystem services mountains provide, success hinges on engaging and empowering local communities, particularly Indigenous Peoples, in collaborative adaptation action. Local and traditional knowledge is critical for tailored solutions, promoting resilience, equity and sustainability in the face of changing cryosphere conditions.

Note: This case study is not connected to the chapter. The full case study is available [online](#).

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Many studies indicate the risks of changes in ecosystems resulting from climate change (Zommers *et al.* 2016; van der Geest *et al.* 2018). For example, the coral reefs of the Indian Ocean are threatened with collapse due to marine heating (Obura *et al.* 2022); beaches and wetlands in California may be lost due to rising sea levels (Barnard *et al.* 2021); the West Antarctic ice sheet may progressively melt due to warming (Pattyn and Morlighem 2020); many mountain glaciers may tip into irreversible melting beyond 2°C of warming (see box on the mountain cryosphere; Hock *et al.* 2019); parts of the Amazon rainforest are at risk of turning into savannahs because of drying, heat and fire; and changes in the West African monsoon may lead to shifts in vegetation cover in the Sahel (McKay *et al.* 2022).

Climate-sensitive ecosystems facing hard limits have both intrinsic and extrinsic value to people. Extrinsic (or instrumental) values are those that arise from the goods and services provided by ecosystems to peoples whose livelihoods depend on them. The loss of the goods and services provided by ecosystems that exceed their limits to adaptation often flows on to loss and damage in social systems. For example, migration and mobility in response to water insecurity can enhance conflict and disrupt the cohesion of families and communities (see box on transboundary water management in [chapter 2](#); Heslin *et al.* 2019); the loss of reefs undermines the livelihoods of fishers, human health, and in extreme cases the sovereignty of whole countries (Martyr-Koller *et al.* 2021); and changes in vegetation cover can increase hunger and malnutrition (Kogo, Kumar and Koech 2021).

Climate-sensitive ecosystems that face hard limits also have intrinsic value in that people value them for their existence. Intrinsic values are revealed, for example, in World Heritage listings, and people's attachments to places and landscapes (Adger *et al.* 2013; Barnett *et al.* 2016). There are no commensurable substitutes for the loss or damage of things that are intrinsically valued, and so these can be catastrophic to people's identity and well-being (Adger *et al.* 2022). Hard limits can only be avoided by deep cuts in GHG emissions that allow ecosystems to slowly adapt in ways that retain their instrumental and intrinsic values (IPCC 2022).

5.2.2 Soft limits to adaptation

In some cases, loss and damage to climate-sensitive ecosystems can be avoided or at least greatly delayed through reductions in non-climate stressors. For example, human diversions of water are often a larger driver of change in wetlands than climate; poorly sited and designed structures can have a bigger impact on coastal erosion than sea level rise; and logging and habitat fragmentation can have a bigger impact on biodiversity losses in forests than climate drivers. In these cases, there are actions that humans can take to avert and minimize loss and damage, and so the limits to adaptation may be called *soft* in the sense that known practices and technologies can be effective, even if they are not immediately available and their application seems unlikely (Barnett *et al.* 2015; Klein *et al.* 2015; Mechler *et al.* 2020; IPCC 2022).

The soft limits to adaptation arise from development processes that expose some groups to climate change risks, constrain their adaptive capacities or impede adaptation responses. A range of adaptations exist that can be made to avert and minimize loss and damage to resource dependent livelihoods, most often through a combination of technologies, ecosystem management, changes in livelihoods

and improvements in social and economic opportunities (see Valdivia *et al.* 2012; Cinner *et al.* 2018; Janzen *et al.* 2021; United Nations Environment Programme 2022). These include practices that reduce people's dependence on climate-sensitive resources or enhance their freedoms to adapt, such as social protections and income guarantees in times of crisis, industrial restructuring programmes, improvements in infrastructure and improvements in social opportunities. They also include technologies and practices that reduce vulnerability and exposure to climate hazards, such as coastal defences, irrigation, risk-sensitive land-use management, and improved designs for infrastructure. While these adaptations are theoretically possible, some carry the risk of maladaptation, all entail trade-offs among competing values, and most face barriers due to costs, governance systems or social norms (Boyd *et al.* 2021; Henrique *et al.* 2022; Thomas *et al.* 2021; IPCC 2022).

Therefore, identifying the limits of adaptation is important to help avert, minimize and address loss and damage (Barnett and Sinha Roy forthcoming). People's sense of 'intolerable losses' can be ascertained using diverse social science methods, including those associated with the elicitation of values (Barnett *et al.* 2016). Doing so in the context of climate risks brings to the fore benchmarks of loss whose avoidance and minimization can serve as the goals of adaptation. Careful and committed co-production of knowledge and strategies to identify, avert, minimize and, if necessary, address loss and damage can remove feelings of powerlessness and injustice, build relationships of care and responsibility, help affected populations come to terms with loss, stimulate collective action and responsibility, and change expectations of the future in ways that transform perceived losses to something less existentially troubling over time (Barnett *et al.* 2016). Averting, minimizing and addressing loss and damage therefore involves foresight to identify adaptation limits and their consequences.

Case study: Health-related loss and damage – Lessons from the Caribbean

Climate-related health risks are escalating rapidly worldwide. Without effective adaptation, health-care infrastructure will continue to be overwhelmed by demand and damaged during climate disasters such as heatwaves, floods and wildfires.

Adaptation solutions to avert, minimize and address loss and damage in health require scaled-up efforts on all levels. Governments must also address the lack of clear definitions and quantifiable data on the economic and non-economic impacts of loss and damage on health.

A regional approach in the Caribbean has strengthened climate resilience through national food and water safety plans, climate-related health bulletins and the development of climate-integrated early warning systems for health.

The approach combines capacity-building and risk awareness, targeted investments, combined political intent, scientific know-how and local participation, underscoring the importance of coordinated adaptation planning.

Note: This case study is not connected to the chapter. The full case study is available [online](#).

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This can be done at any sectoral or spatial scale using established methods for investigating future conditions (Cook *et al.* 2014).

The risk that adaptation fails increases with GHG emissions. The more warming there is, the less time there will be for adaptation to take effect. Slowing the rate of warming allows more time for soft limits to adaptation to be overcome. Given enough time, adaptation action may indeed overcome some soft adaptation limits in ways that avoid and minimize some loss and damage. Nevertheless, climate extremes are already causing significant loss and damage, and this trend will continue despite even the most effective adaptation and well before anticipated limits to adaptation have been reached.

5.3 Conceptualizing loss and damage

There are a myriad of conceptualizations of loss and damage and no universally agreed definition exists in either policy, practitioner or research arenas. The lack of conceptual clarity on a definition of loss and damage has challenged both theoretical advancements in loss and damage research while also making it difficult to develop comprehensive action to address it in practice (Boda *et al.* 2021; Jackson *et al.* 2023). The lack of clarity of what constitutes loss and damage also poses challenges for how to address it. Still, the vague understanding of loss and damage in the UNFCCC has also been identified as beneficial to allow progress in political negotiations, despite different perspectives of stakeholders (Vanhala and Hestbaek 2016; Calliari, Serdeczny and Vanhala 2020).

Research on the varying conceptualizations of loss and damage shows that perspectives range from:

- considering all anthropogenic climate change impacts as loss and damage, to
- understanding loss and damage as impacts that occur after limits to adaptation have been reached, to
- defining loss and damage as irreversible and inevitable harms from climate change (Boyd *et al.* 2017; Mechler *et al.* 2020).

The relationships between mitigation, adaptation and loss and damage have been conceptualized differently and have led to several theoretical strands of research and varying approaches on suitable responses to loss and damage (New *et al.* 2022), as detailed in section 5.4.

Despite different conceptualizations, justice is a major theme underpinning many understandings of loss and damage, and has been a key component of discussions of the issue in the UNFCCC (Roberts and Pelling 2020; Boyd *et al.* 2021; Jackson *et al.* 2023). Distributional, procedural and

recognition (in)justice as they relate to loss and damage are experienced at multiple scales, from the global level where historically low-emitting countries face disproportionate impacts of climate change, to the local level where more vulnerable members of society are frequently most affected by impacts (Thomas and Benjamin 2022). A justice lens underscores that loss and damage is not the product of climate hazards alone but is influenced by differential vulnerabilities to climate change, which are often driven by a range of sociopolitical processes, including racism and histories of colonialism and exploitation (Falzon and Batur 2018; Abimbola *et al.* 2021; Kashwan and Ribot 2021).

5.3.1 Categorizing loss and damage

Although many conceptualizations of loss and damage exist, there is general agreement that it can be categorized as being economic or non-economic, an understanding which is also shared by the UNFCCC's overview of the issue (Boyd *et al.* 2017; UNFCCC undated).

Economic loss and damage includes impacts that can be assigned a monetary value, such as damage to infrastructure or loss of earnings or productivity. Non-economic loss and damage encompasses a spectrum of outcomes that are not easily assigned a monetary value and are not typically subject to market transactions. They include the loss of life, health, rights, territory, cultural heritage, Indigenous or local knowledge, biodiversity loss and loss of ecosystem services (see figure 5.3).

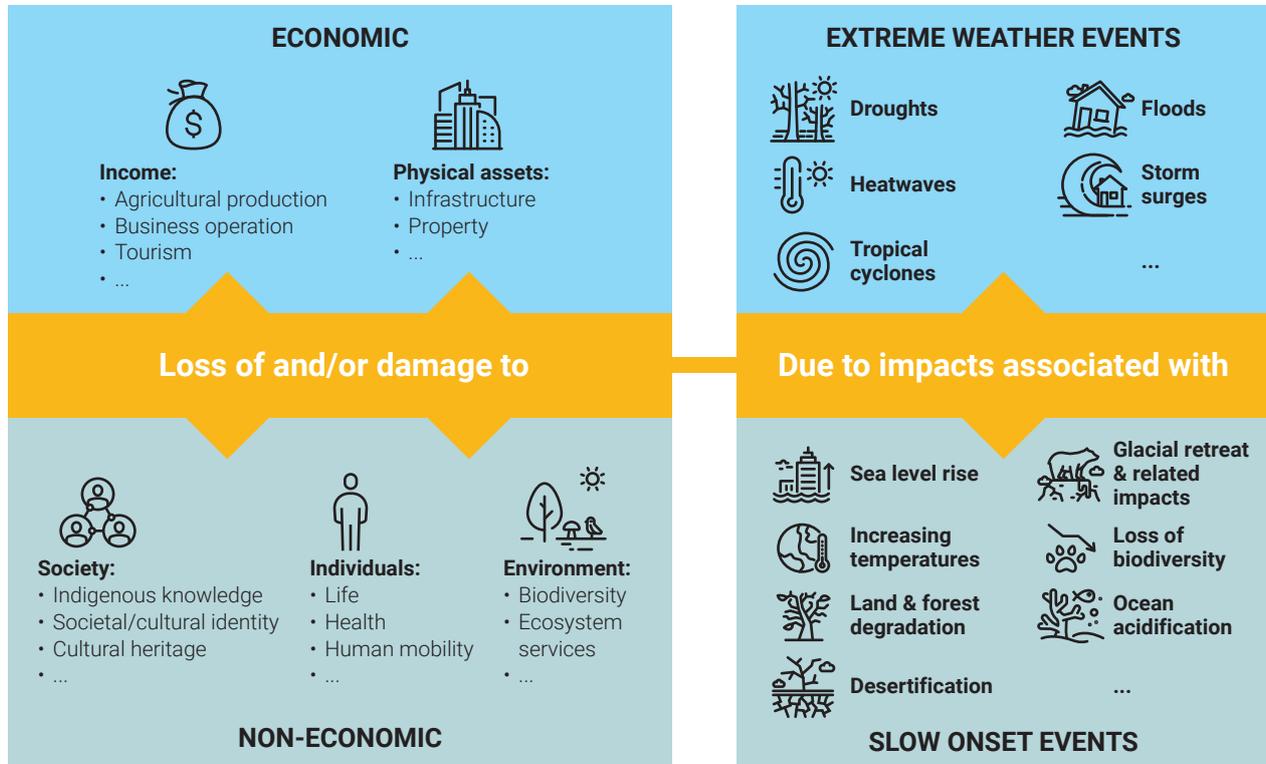
While there are methodologies that attempt to quantify economic loss and damage, non-economic losses and damages are more difficult to assess and thus are often disregarded or undervalued (Boyd *et al.* 2021). However, failure to consider non-economic losses and damages means that quantitative estimates of loss and damage underestimate the extent of climate impacts, particularly for low-income regions where there is a lack of systematic monitoring or reporting of non-economic losses and damages (Thomas and Benjamin 2020; Chandra *et al.* 2023).

Another approach is to categorize loss and damage as avoidable or unavoidable – a way of differentiating between loss and damage that may or may not be prevented by adaptation and mitigation (Verheyen 2012; van der Geest and Warner 2015). Avoidable loss and damage can theoretically be prevented through implementing mitigation and/or adaptation measures and can be further categorized as unavoided if such measures were not implemented. Unavoidable loss and damage refers to impacts that occur despite mitigation and adaptation, such as loss and damage resulting from extreme events where no adaptation efforts would have been able to prevent impacts. Unavoidable loss and damage is closely linked to understandings of adaptation limits and thresholds, as detailed in section 5.2. Categorizing loss and damage as avoidable or unavoidable allows for identifying different approaches to respond to

loss and damage, including the need for transformative approaches to address the inevitable impacts of climate change, such as loss of territory due to long-term sea level

rise (Mechler and Schinko 2016; Heslin 2019; Mechler and Deubelli 2021).

Figure 5.3 Examples of economic and non-economic loss and damage from extreme and slow onset events



Source: UNFCCC (2019).

5.3.2 Relating loss and damage to cascading and compound risks

While most conceptualizations of loss and damage posit that loss and damage is a result of both slow onset and extreme events, recent findings by the IPCC highlight that these events do not happen in isolation. Rather, multiple climate hazards (both slow onset and extreme events) may coincide and interact with non-climatic risks, resulting in higher overall levels of risk that affect multiple sectors and regions (IPCC 2022). The devastating 2022 floods in Pakistan 2022 (Nanditha *et al.* 2023) (see box on Pakistan) brought complex, compound and cascading risks that made it difficult to attribute loss and damage solely to a particular event, highlighting that loss and damage encompasses more than direct negative impacts in a particular place and may cascade across sectors and regions.

5.3.3 Assessing loss and damage

The absence of an agreed definition of loss and damage hinders its assessment. Given that it is common to measure the costs of disasters in economic terms, economic assessments of damage tend to dominate, whereas estimates and measures of non-economic losses rarely

consider metrics other than the loss of life (Scown *et al.* 2022). Moreover, the social values underpinning non-economic loss and damage are rarely universal, so as well as being difficult to quantify there can also be disagreement about which to prioritize and how to address them. Nevertheless, the number of studies explicitly focusing on non-economic loss and damage is growing, including proposals for a loss and damage assessment methodology based on locally identified values (van Schie *et al.* 2023). For example, when ancestral knowledge about travel routes and weather conditions is lost there is a risk of impairing the ability of Inuit communities to travel, hunt and fish, thus threatening their traditional ways of life (Cunsolo and Ellis 2018).

Assessments of loss and damage therefore need to consider a spectrum of outcomes, including all those that do not have market values. Assessments of the risk of loss and damage also need to consider which can be averted, minimized and addressed, and likely residual risks after implementing all known and feasible adaptation solutions, while recognizing the potential for maladaptation and adaptation failure. Understanding and operationalizing concepts such as adaptation limits (see section 5.2) is also important in order to assess loss and damage, but is still in

Case study: Transformative adaptation and human mobility – Planned relocation in Fiji

The climate crisis and the resulting rising sea levels and extreme weather events is threatening the existence of many coastal communities. The result is unavoidable loss and damage to way of life, culture, biodiversity, land, livelihoods, agency, assets and social cohesion.

In Fiji, Planned Relocation Guidelines provide a detailed blueprint to guide the implementation of relocations, which is grounded in analysis and community consent. These guidelines unlock the potential for continuing a traditional way of life, economic growth, infrastructure development and enhanced resilience.

Note: This case study is not connected to the chapter. The full case study is available [online](#).

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The accompanying Climate Relocation of Communities Trust Fund Act provides an example of possible adaptation funding arrangements at the national level, to address relocation due to the climate crisis.

The lessons from Fiji underscore the importance of proactive, community-centred, culturally-relevant and holistic approaches to ensure the resilience and well-being of affected populations in the face of the increasingly unavoidable impacts of the climate crisis.

the nascent stages (Qi, Dazé and Hammill 2023). The lack of methodologies means it is difficult to assess adaptation limits and associated losses and damages resulting from those limits. However, there is emerging evidence on residual risks and soft and hard adaptation limits that is relevant for practitioners and policymakers (Mechler *et al.* 2020; Thomas *et al.* 2021; Berkhout and Dow 2022).

Yet at present there is often strong emphasis on the hazard aspect of the risk and less emphasis on the socioeconomic drivers of vulnerability. Because of this gap, the currently developed adaptation plans may largely be insufficient as they are based on an underestimation of risks without considering all possible non-economic losses and damages.

5.4 Addressing loss and damage

5.4.1 Actions to address loss and damage

There are a growing number of actions to address loss and damage. Actions commonly identified in national adaptation plans (NAPs) include disaster risk management, research, risk assessment, information and data collection, capacity-building, knowledge management, early warning systems (EWS), insurance, social protection measures, humanitarian response and forecast-based finance (Bharadwaj *et al.* 2022).

In practice, a grey zone exists between adaptation and loss and damage actions. There is a typology of instruments for addressing economic loss and damage, including support for rebuilding livelihoods, risk insurance, EWS, social and financial protection, compensation, and humanitarian assistance. Measures for addressing non-economic loss and damage include support for communities to preserve their culture, recognition of loss and repair of damage, official apologies, active remembrance, counselling, and the conservation and restoration of ecosystems (see table 5.1 and [Annex 5.A](#) for further details).

There is no global inventory of non-economic assets (e.g. built cultural heritage) at risk from climate change. When it comes to natural heritage, especially immaterial heritage, awareness among policymakers – let alone the preparation of inventories or the implementation of response measures – ranges from rare to nil (Barnett *et al.* 2016). However, there are significant data on non-economic loss and damage that can be synthesized.

Proposals to facilitate mobility and migration to avoid loss and damage are controversial, and not universally supported by people, communities and governments. Migration almost always has costs, and these rise the more migration is forced and rapid (see Wiegel *et al.* 2021; Yee *et al.* 2022; Mombauer, Link and van der Geest 2023).

Table 5.1 A selection of actions associated with economic and non-economic loss and damage

	Extreme events	Slow onset processes
Economic loss and damage		
Ahead of event impact	<p>Social protection measures, including pre-disaster financial support</p> <p>Risk layering, risk retention, risk transfer (e.g. climate insurance)</p> <p>Early warning and impact-based forecasting</p> <p>Loss and damage databases to support decision-making and risk assessments</p>	<p>Livelihood diversification with reskilling and support for alternative livelihoods</p> <p>Planned relocation/assisted migration</p> <p>Social protection measures (e.g. social assistance and safety net programmes)</p>
During/following event	<p>Humanitarian assistance</p> <p>Short- and long-term recovery and rehabilitation</p> <p>Support for rebuilding livelihoods</p> <p>Rebuilding damaged infrastructure</p> <p>Compensation</p>	<p>Support for rebuilding livelihood</p> <p>Rebuilding damaged infrastructure</p> <p>Compensation</p>
Non-economic loss and damage		
Ahead of event impact	<p>Early warning and impact-based forecasting (e.g. to enable timely evacuation)</p> <p>Through assisted migration, support to people in areas at high risk of extreme events to relocate to safer areas and avoid disaster displacement</p>	<p>Investment to safeguard cultural heritage (e.g. restoring or rehousing artefacts); support for intangible cultural heritage (e.g. documentation)</p> <p>Developing culturally sensitive and people-centred planned relocation guidelines and processes</p>
During/following event	<p>Reparations to help ensure future well-being following loss</p> <p>Recognition of loss and repair of damage; official apologies</p> <p>Active remembrance (e.g. through museum exhibitions, school curricula)</p> <p>Counselling</p> <p>Support for communities to preserve their unique culture and social ties outside their traditional/former place of residence (particularly for displaced/relocated populations)</p> <p>Enabling access/safe visits to abandoned sites</p> <p>Conservation and restoration of ecosystems and biodiversity</p>	<p>Recognition of loss and repair of damage; official apologies</p> <p>Active remembrance (e.g. through memorial sites, monuments and museum exhibitions, ongoing awareness and education programmes, school curricula)</p> <p>Counselling</p> <p>Support for communities to preserve their unique culture and social ties outside their traditional/former place of residence (particularly for displaced/relocated populations)</p> <p>Enabling access / safe visits to abandoned sites</p> <p>Conservation and restoration of ecosystems and biodiversity</p>

Source: Adapted from Shawoo *et al.* (2021) and Richards *et al.* (2023).

5.4.2 Coordinating actions for loss and damage

The compounding and transboundary nature of climate risk requires implementing solutions in coordination across scales from the global to the local. Global frameworks such as the Sendai Framework for Disaster Risk Reduction, Paris Agreement, Convention on Biological Diversity and the Sustainable Development Goals contribute to strengthening risk management. Loss and damage has brought about new actor constellations under the UNFCCC with different roles, capacities and knowledges and includes:

- The **Warsaw International Mechanism for Loss and Damage**, which focuses on research and dialogue and enhancing action and support, including finance (established at COP 19 in November 2013).
- The **Santiago Network for Loss and Damage**, which was established at COP 25 (December 2019) to provide technical assistance in averting, minimizing and addressing loss and damage. The Santiago Network’s aim is to catalyse the technical assistance of organizations, bodies, networks and experts for the implementation of actions at the local, national and

regional levels in developing countries particularly vulnerable to the adverse effects of climate change.

- The **Expert Group on Non-Economic Losses**, which prepares guidelines on “averting, minimizing and addressing non-economic losses in the context of human mobility”. Two of the guidelines focus on “addressing losses associated with the loss of territory–ecosystem services–cultural heritage nexus”, and the impact that climate change-driven mobility has on “Indigenous or local knowledge, societal identity and cultural heritage” (UNFCCC 2021).
- The **Transitional Committee**, whose objective is to operationalize the new funding arrangements and loss and damage fund (established at COP 27 in November 2022).

There are gaps in understanding how to most effectively govern and coordinate action to address losses and damages already occurring and at what scale (Jackson *et al.* 2022).

Case study: The Pacific heat dome – Heatwave lessons from the United States of America

With climate change comes increasing exposure to extreme heat for people all over the planet. This has significant impacts on morbidity and mortality. However, deaths related to extreme heatwaves are all potentially preventable. Adaptation is needed urgently to protect human health and well-being.

In 2021, an extreme heatwave in Seattle, in the United States of America, caught the city off guard, leading to severe health consequences. The region had never experienced a heatwave of this magnitude

and was unprepared, even though almost everything experienced during the event, from patterns of morbidity and mortality to stress on front-line health-care providers, was highly predictable.

Understanding projected increases in the frequency, intensity and duration of heat events must be translated into actions that protect vulnerable populations, with adaptation occurring at the individual, community, building and urban levels to protect human health and well-being in future heatwaves.

Note: This case study is not connected to the chapter. The full case study is available [online](#).

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Regional, national and subnational level

At the national level, national policies and programmes provide the enabling environment for the proliferation of options for averting, minimizing and addressing loss and damage. With growing concern for cascading, compounding and transboundary climate risks, there is more need for regional cooperation in implementing regional-level measures for addressing loss and damages. To date, only regional catastrophic insurance mechanisms are clearly visible options available and there is a need to explore more regional cooperation measures that have the synergistic impact of addressing losses and damages at the regional to local level. Such measures should take into consideration the ecosystems, sharing regional early warnings, trade and supply chains and financial markets.

An analysis of NAPs provides deeper insights into the extent to which loss and damage policy and related interventions received attention as well as their progress. Of the 41 NAPs submitted to the UNFCCC as at 1 March 2023, 49 per cent of them have direct references to loss and damage (Qi, Dazé and Hammill 2023). Some countries have dedicated sections for observed loss and damage, including Saint Lucia. However, the NAPs do not provide the details on how much future loss and damage is anticipated in certain climate change scenarios, and what kinds of loss and damage are expected at the national, regional and local levels. Further research is needed on how institutions deal with loss and damage policy and decision-making at the national, regional and subnational levels (Nand, Bardsley and Suh 2023).

5.5 Finance to address loss and damage

The decision to establish a dedicated fund to assist developing countries in responding to economic and non-economic loss and damage associated with climate change was a historic move agreed at COP 27 in 2022. The decision acknowledged “the urgent and immediate need for new, additional, predictable and adequate financial resources to assist developing countries that are particularly vulnerable to the adverse effects of climate change in responding to economic and non-economic loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events.” (UNFCCC 2022b).

At COP 27, it was agreed for a Transitional Committee to be responsible for operationalizing both the new funding arrangements and the fund for consideration and adoption at COP 28 in Dubai; a process that is ongoing.

Key considerations raised during the discussions include questions related to the sources of funding, access to funding, the types of activities and options to be funded and the structure and governance of the fund and the funding arrangements. Another key question is how to prioritize countries that are highly vulnerable and have low capacity to finance climate action. Different understandings of vulnerability and interpretations in climate negotiations mean these discussions are complex (Chhetri, Schaefer and Watson 2021).

The loss and damage fund is at the forefront of this chapter but consideration of the implications of other funding arrangements for addressing loss and damage is also critical as there will be overlaps with the activities and roles of the broader risk management, development and humanitarian communities. Providers of bilateral and multilateral development finance increasingly realize the importance of explicitly taking the risk of loss and damage into account in their strategic and programming approaches (Organisation for Economic Co-operation and Development 2021).

The funding for loss and damage will be wide-ranging and the needs of countries, as informed by national assessments, will vary across space and over time. Countries will experience different conditions for similar climatic events, non-economic and economic needs will also differ, and there will be varying financial requirements for addressing loss and damage from extreme weather events and slow onset events. Adequate climate information services and needs assessments are crucial for informed planning and addressing loss and damage. Similarly, support to develop appropriate financial tools, including social protection, insurance and measures to assist those displaced by loss and damage, is crucial.

5.5.1 Identifying climate finance needs for loss and damage

Varying studies have identified different broad-scale financial estimates based on different models, methods and scientific contexts. The focus to date has been on economic dimensions. The approximated cost of addressing loss and damage, incorporating both economic and non-economic dimensions, will be enormous given the current temperature path the world is heading for. The actions taken on mitigation and adaptation will significantly determine the future cost of loss and damage. Table 5.2 summarizes the key findings of some of the economic studies.

Table 5.2 Studies identifying climate finance needs for loss and damage

Source	Methodology	Findings
Fanning and Hickel (2023)	The authors develop a procedure to quantify the level of compensation owed in a net-zero scenario where all countries decarbonize by 2050, using carbon prices from IPCC scenarios that limit global warming to 1.5°C and tracking cumulative emissions from 1960 across 168 countries.	US\$192 trillion would be owed to the undershooting countries of the Global South for the appropriation of their atmospheric fair shares by 2050.
Baarsh, Schaeffer and Awal (2022)	This analysis provides the first ever estimate of the economic losses attributable to anthropogenic climate change only. The study leverages a data set that provides a counterfactual climate for observations over the last 40 years. Building on a macroeconometric model, the analysis then compares the effect on gross domestic product (GDP) per capita growth in real climate observations against the effect in the counterfactual climate estimates.	It is estimated that US\$525 billion have been lost because of climate change in the last two decades and economic losses cut GDP growth by one full percentage each year on an average in the most vulnerable countries.
Markandya and González-Eguino (2019)	Economic integrated assessment models.	Total residual damages for the following regions, where the countries belong mainly to the non-Annex I group (Middle East and North Africa, sub-Saharan Africa, South Asia, China, East Asia and Latin America and the Caribbean): From US\$116–435 billion in 2020, rising to US\$290–580 billion in 2030, US\$551–1,016 billion in 2040 and US\$1,132–1,741 billion in 2050.
Baarsch <i>et al.</i> (2015)	Based on the methodology of the IPCC <i>Fifth Assessment Report</i> .	Suggest loss and damage costs (not needs) for developing countries of around US\$400 billion in 2030, rising to US\$1–2 trillion by 2050.
DARA and the Climate Vulnerable Forum (2012)	A conceptual framework that assessed vulnerability at the national level through desk research fieldwork; national-level workshops and peer review.	Estimates loss and damage costs to be US\$4 trillion in 2030.

Further research on the methodologies and processes for estimating loss and damage and associated finance needs, as well as non-economic loss, is needed. Key issues include (i) the relationship between adaptation expenditures and loss and damage, (ii) the time-horizon under consideration and (iii) associated uncertainties (Markandya and González-Eguino 2019).

5.5.2 Building an evidence base

Unlike in the areas of mitigation and adaptation, where countries have identified and communicated to the UNFCCC about their national commitments, proposed actions and

costs through nationally determined contributions (NDCs) and NAPs, most developing countries are yet to identify and assess their loss and damage risks and financial needs.

Currently, limited processes exist for collecting, recording and reporting information on the activities and associated costs of addressing loss and damage. This is a significant undertaking for many countries as it is a technical, costly and time-consuming process. Countries will have to assess both the economic and non-economic costs of the different options for addressing loss and damage based on their population, economy, sociocultural context and natural capital.

5.5.3 Sources and utilization of finance

A broad range of funding options exists for financing loss and damage internationally and domestically. These include public, private and innovative sources of finances with a wide variety of instruments – grants, concessional financing, insurance and more. Since the financial need for addressing loss and damage could escalate in the future, exploring sustainable innovative sources through, among others, maritime shipping levies, aviation levies, taxation, debt relief, debt swaps and special drawing rights will be essential. International public finance will play a key role in addressing loss and damage to assist developing countries particularly vulnerable to climate change's adverse effects. Understanding the roles of different sources of finance and how they may interact is crucial.

The provision of finance will need to be allocated based on needs and the ability to effectively deploy the funding. Funding will also be critical for capacity-building, institutional strengthening, promoting Indigenous knowledge and technology, data collection and analysis.

The conventional project-based model currently employed in much of climate finance is likely unsuitable for a significant portion of loss and damage finance provision. It is unsuitable for extreme weather events given the unpredictability of these types of events and unsuitable for slow onset hazards given their incremental nature (the lack of start and end dates) and given the cascading and compounding nature of climate risks. Alternative models of finance disbursement should be developed that ensure finance reaches affected communities with urgency and purpose, with its utilization being locally driven, people-centred and gender-responsive.

Loss and damage finance must be just, gender equitable, accessible and adequate for vulnerable communities and countries. Country ownership, inclusiveness

and incorporation of gender equality considerations must be respected.

5.5.4 Mechanisms for financing loss and damage

Diverse international institutions exist inside and outside the UNFCCC's finance mechanism that could support the financing for addressing loss and damage. This includes parts of the humanitarian financing system, disaster risk reduction and management financing, development finance and climate finance (Richard and Schalatek 2017).

These sets of international institutions are already playing an important role but not all are equipped with the needed mechanisms, expertise and ability to meet the needs of the developing countries.

The loss and damage fund, the design of which is being discussed by the Transitional Committee under the UNFCCC, can be one of the principal vehicles. It could also act as a catalyst in ensuring coherence, and complementarity and can identify and realize collaboration among the existing institutions, platforms and mechanisms to better coordinate and provide necessary support to strengthen financing for loss and damage in the developing countries. The Santiago Network for Loss and Damage could provide technical support while the fund helps developing countries take concrete actions, hence working in tandem is necessary.

To better serve the communities' needs, the international mechanism must be linked with the national system and institutions. Expertise may be drawn from various organizations and experiences to support capacity-building of the subnational and national institutions. Therefore, mapping the overlaps and identifying gaps in existing domestic and international architectures form a critical next step in the mosaic of loss and damage financing.

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In the Dolakha region of Nepal, specially built ponds allow farmers to grow food in the dry seasons.

More information at: <https://www.unep.org/news-and-stories/story/nepals-slopes-villages-brace-worsening-monsoon>

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