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Primer

Loss and damage from climate change: A new climate justice agenda

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SUMMARY

The effects of climate change, whether they be via slow- or rapid-onset events such as extreme events, are inflicting devastating losses and damage on communities around the world, with the most vulnerable affected the most. Although the negative impacts of climate change and the concept of loss and damage are included in international conventions, such as the United Nations Warsaw International Mechanism for Loss and Damage and Article 8 of the Paris Agreement, these stop short of providing clear compensation mechanisms. The science of loss and damage has evolved with the development of extreme event attribution science, which assesses the probability of an extreme event being influenced by anthropogenic greenhouse gas emissions, but loss and damage still suffers from the lack of a clear definition and measurability and is further complicated by debates on climate justice and shared but differentiated responsibilities. This primer presents an overview of loss and damage, discusses the complexities and knowledge gaps, and proposes next steps for an interdisciplinary research agenda.

INTRODUCTION

Scientists in the Intergovernmental Panel on Climate Change (IPCC) have predicted the impacts of climate change for decades. Increasingly the effects of climate change are manifesting as heat waves, floods, wildfires, and droughts. Climate change is unequivocally human induced and also indisputably an issue of (in)justice, associated with development failures and lack of sufficient mitigation and adaptation. The Paris Agreement in 2015 set out a goal of limiting global temperature rise to 1.5°C. Still, today we see many extreme events causing destruction and affecting people's lives in very challenging ways. Most recently, the wildfires in California in the summer of 2021, which are linked to prolonged drought resulting from climate change, have resulted in losses of lives and livelihoods and have damaged properties and homes. The losses are often considered the most difficult to bear, as these are potentially irreversible.

Loss and damage (L&D) is both a policy mechanism and the sum of impacts inflicted by climate change and extreme events. They can be both financial and physical, and include the loss of property, assets, infrastructure, agricultural production and/or revenue, but also extend beyond this and can be difficult to quantify in economic terms. Degraded health, losses induced by human mobility, loss of cultural heritage, and loss of Indigenous and local knowledge are such examples. The L&Ds inflicted by climate change have only relatively recently been incorporated into the discussions and workstreams of the United Nations Framework Convention on Climate change (UNFCCC) (see Box 1). However, after pressure from small-island developing states (SIDS) and least-developed countries (LDCs), efforts related to averting, minimizing, and addressing L&D will be considered in the first global evaluation of the implementation of the Paris Agreement and its progress toward achieving its long-term goals in 2023, known as the Global Stocktake.

L&D is receiving more and more attention. In the wake of the IPCC's sixth assessment report on climate change, it is clear that climate change is happening faster than previously anticipated. Moreover, the global impacts of the ongoing coronavirus disease 2019 (COVID-19) pandemic have focused the debate on the disproportionate vulnerability, inequality, and intersections between peoples' situations and social structures. L&D is now entwined with climate litigation, the science of attribution, activism, and mobilization around climate change, and the topic will likely be at the forefront of the upcoming 26th session of the Conference of the Parties (COP26) to the UNFCCC, instead of a global platform for climate action. The negotiations have the potential to set the course for a road map for measuring, monitoring and assessing who is responsible and who will pay for losses and damages stemming from the effects of climate change.

Box 1. A brief history of L&D

The history of L&D is a long and contentious one as it brings with it the issue of compensation from Annex-1 countries. The first record of L&D was by the Alliance of Small Island States (AOSIS) in 1991, bringing the L&Ds suffered by vulnerable countries to the attention of the international community. It was only at the 13th Conference of the Parties to the UNFCCC that L&D was more prominent in the UNFCCC's negotiated text through its inclusion in the Bali Action Plan as part of enhancing action on climate change adaptation. This was followed by a work program on L&D launched at COP 16 (2010) to study approaches to address L&D, including assessing the risk of L&D (resilience and preparedness), impacts of extreme weather events and slow-onset events, as well as the international cooperation and expertise needed. This work paved the way for the establishment of the WIM at COP 19 (2013), to address L&D associated with climate change impacts in vulnerable developing countries. At COP 21 (2015), the importance of averting, minimizing, and addressing L&D was highlighted in Article 8 of the Paris Agreement, with a caveat that it does not involve or provide a basis for any liability or compensation. This means that, although the L&Ds are acknowledged, this acknowledgment does not automatically lead to the right to claim compensation. Further progress under the WIM included setting up a storehouse of information on how insurance can be used to manage risks, and establishing a task force to develop recommendations for integrated approaches to avert, minimize, and address the uprooting of people because of climate change. At COP 25 (2019) the Santiago Network was launched to step up the technical assistance to vulnerable developing countries on comprehensive approaches to address climate risks.

The caveat that accompanies Article 8 of the Paris Agreement undercuts an important element of the demand of some developing states with respect to the inclusion of L&D in the international climate change regime, namely compensation for the negative impacts from climate change. However, it does not preclude the development of ways to redress or to provide relief from L&D under the regime. This could be delivered through the WIM, or states can elect to revise the caveat. Notably, the caveat only makes reference to compensation and does not exclude other forms of remedies available under international law. Nevertheless, since the adoption of the Paris Agreement in 2015 (see box figure), states have not further developed the rules on compensation or other remedies for L&D, nor have any rights or obligations been adopted with respect to L&D finance. Thus, although states are still able to develop remedies for L&D, including compensation, they have not yet agreed to do so. Meanwhile, vulnerable countries will have to bear the brunt of climate change impacts, which are likely to worsen.

What is L&D?

L&D debates have been mired by lack of definition. There are different perspectives on L&D, as summarized in Figure 1. Differing definitions of L&D might also lead to different categorizations of legal cases as either seeking adaptation finance or L&D compensation. They might also lead to different climate actions (e.g., adaptation or mitigation) and priorities in the field (risk reduction or compensation). Among scientists, L&D refers to the science and measurement of loss and who experiences everyday loss from climate change impacts. They think about L&D in relation to adaptation limits and maladaptation. Adaptation limits relates to the social and natural constraints that people face in adapting to climate change, whereas maladaptation refers to the things that go wrong in trying to adapt to climate change. For example, in trying to protect one community from sea level rise, an intervention might result in a negative outcome on another community or lead to more emissions in the atmosphere (e.g., introducing air conditioning in cities as an adaptation strategy is considered a maladaptation or elite capture of adaptation financing that makes marginalized people even more excluded).

Some think that L&D is a distraction from mitigation and adaptation and that it is important to concentrate on taking action to reduce emissions on the basis of what we know about climate change impacts. At the other end of the spectrum, others consider L&D as an existential matter that requires mapping and an unpacking of the drivers of losses; for example, L&D is really about claims of compensation for historical harms and to address restrictions on vulnerable peoples' capacity to adapt to climate change. Historical loss of lands is one example of where constraints in the existing conditions limit the ability to find alternatives. Many have settled on an intermediate definition of L&D: to avert and minimize the residual risks associated with climate change impacts (i.e., when mitigation and adaptation have failed). This perspective considers risk management as a key way to effectively handle L&D. Currently this is the most accepted definition of L&D.

Measurements and scales of L&D

Economic and non-economic L&D

Economic L&Ds include those related to physical and financial assets that can be assigned a monetary value or be associated with loss of earnings or productivity. For example, an extreme event might lead to loss of buildings and infrastructure in a coastal area, and that same event might lead to loss of important documents, papers, or cash among communities living in informal settlements, affecting livelihoods. Non-economic L&D (NELD) represents intangible or tangible impacts that cannot be traded in markets but still hold significant value for people. NELD has been shown to affect people's sense of place, identity, and individual and collective well-being. NELD includes, among other impacts, loss of life, territory, cultural heritage, local and Indigenous knowledge, social cohesion, and biodiversity and ecosystem services (Figure 2). Although typologies have emerged for policy and knowledge production purposes, NELD is potentially infinite, being dependent on diverse beliefs and worldviews that inform people's perceptions and experiences of loss. There are examples of L&D in all parts of the world, but not all are easily measurable (see below).

Differentiated vulnerability

L&Ds are matters of social justice. L&D discussions provide an opportunity to critically reflect not only on the impacts of an

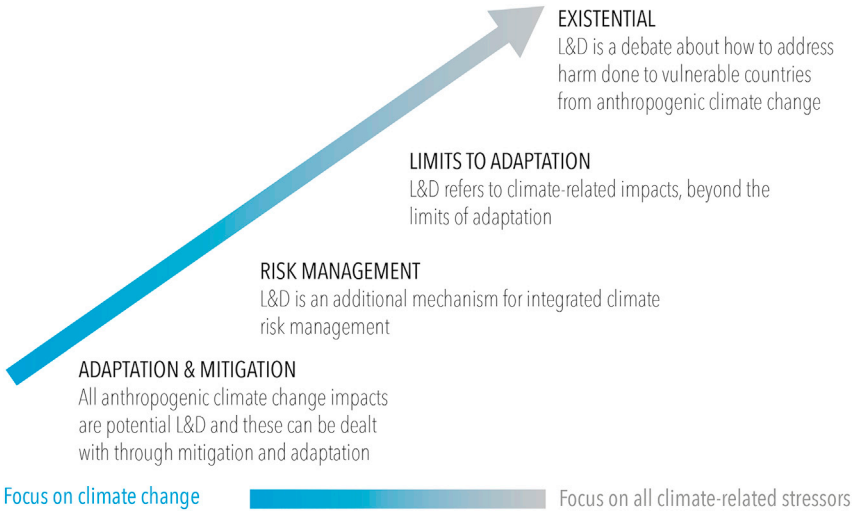


Figure 1. The varying definitions of climate change-related L&D

Different perspectives on the meaning of loss and damage among scientists, policy, and practitioner communities. Some consider all climate-related impacts as potential loss and damage. Others consider the potential irreversible nature of climate change impacts such as sea level rise as existential loss and damage and a matter of climate justice. (Adapted from Boyd et al., 2017.)

extreme event but also on the root causes of the impacts. The scale and magnitude of the impacts of an extreme event are a product of socio-political processes that create vulnerability. Although we see disproportionate impacts of disasters differently across the world, drivers of vulnerability must also be disentangled. This can shed light on the root causes of underlying differentiated vulnerability, by providing knowledge that is crucial for transformation. Often, processes of vulnerability creation are not only due to visible formal governance mechanisms but also due to informal and invisible governance processes that shape daily life in many of the places disproportionately affected by extreme and slow-onset events. Although climate change is real and happening now, these processes must also be seen and presented in a historical socio-political context as it is these processes that manifest themselves in the form of L&Ds. To minimize, avert, and address L&D, climate change risk and adaptation discussions must include a focus on addressing root causes of vulnerability.

Measurements

L&Ds from climate change are challenging to measure, in part due to their context specificity and temporal and spatial scales. L&Ds are rarely temporally bounded; socio-economic and ecological impacts can often unfold over several decades or last years after an event. Estimates of immediate economic losses after extreme events, although challenging, remain widely accessible with available methods and tools, but this is not the case for so-called non-economic L&Ds, which are often qualified as incommensurable. L&Ds to people, society, and the environment cannot be translated into a single measurement unit, nor can they be measured against a hard baseline. Although, in the context of policy and governance, L&Ds from climate change are largely treated as distinct from other change processes, reality on the ground rarely provides such a distinction. L&Ds occur in specific locations where existing socio-economic patterns of exposure and vulnerability shape the outcomes and severity of climate-related events. Methodologies that can account for people's differentiated experiences of climate-related impacts and provide space for various understandings of value and desired futures are necessary but not readily available. Engaging more closely with existing methods and research on well-being and social justice provides one avenue to address some of these challenges and advance the science of L&D. Alternative ways to measure L&D could be considered through social and human development indicators. Measuring the loss of capabilities, such as loss of education or loss of access resulting from an extreme event, could help to calibrate L&D social costs. Measurement of disproportionate impacts can be sought through combining existing data on demographics and housing, for example together with existing methods of qualitative vulnerability assessments.

Quantitative L&D research has so far focused mainly *a priori* on climate risk and attribution—comprising the hazard event, the exposure or where people live, and their vulnerability to that exposure and hazard—with much less attention paid to empirical data of L&D that is connected to an attributed climate event. For example, attributable events such as wildfires in Australia or California, floods in China, or the 2018 heatwave across Europe have received limited systematic assessments of NELD. Global disaster impact databases (e.g., EM-DAT; DesInventar) are relevant for a stocktake of L&D, but these focus on population affected, fatalities, and economic damage, whereas NELD (except for fatalities) is not recorded. The dominance of monetary, population, and infrastructure metrics used in existing evaluations skews our focus to highly populated places and areas of concentrated capital, while overlooking other important places. Data gaps are particularly pronounced for lower-income regions and when considering more diffused L&Ds associated with extreme heat and wildfires. Very few countries outside North America and Europe systematically monitor or report the health impacts of heatwaves, despite being the deadliest category of extreme weather and exhibiting the fastest increases in frequency due to climate change. NELD driven by wildfires, including the substantive health impacts of related air pollution, are also chronically underreported to disaster impact databases. The types of metrics used in disaster or L&D stocktakes can also preclude governance to a particular set of responses.

Governing L&D

Following directly from the aforementioned challenges associated with defining and measuring L&D is the challenge of governing both L&D as an object of global climate change policy, and the widespread and emergent L&Ds that continue to affect life on Earth. Evolving as a third major approach in global climate

Number	Example	Icon
1	The Louisiana floods in August 2016 led to loss of quality of life and lasting mental health effects due to losses of homes, security and memories among vulnerable people and groups.	
2	Hurricane Maria in 2017 lead to extreme rainfall over Puerto Rico which resulted in loss of safety networks when people were displaced thus eroding community capacity and actions.	
3	Increased outburst flood hazards from Lake Palcacocha coupled with seasonal water scarcity poses a threat to highly exposed and vulnerable communities and their livelihoods.	
4	Urban drought and lack of water in urban informal settlements in Bangladesh have led to negative health consequences among people and groups in vulnerable situations.	
5	The wildfires in Sweden in 2018 exacerbated the loss of cultural way of life among Sami reindeerherding communities.The ecosystems are under threat and this is coupled with contentious claims to land rights.	
6	Devastating impacts of early examples of extreme events, such as storm 'Desmond' in 2015 in the UK has lead to broader concerns about the loss of cultural heritage and tensions with how to manage heritage in the future.	
7	The unprecedented Europe heat in June-July 2019 impacted ecosystems and led to loss of crops in some places. It generated impacts in the building sector through health impact on workers. Heatwaves are being considered as an occupational health hazard with both physical and mental health effects.	
8	The loss of local and cultural knowledge and loss of homes and places that are culturally and socially important is occurring in the Pacific due to sea level rise.	
9	Australia bushfires, 2019-20 is an example where researchers documented multiple losses. This includes loss of lives, mental health impacts and loss of biodiversity. This is not the only example of multiple losses experienced in a disaster but it is a good example of where reserachers rapidly assessed multiple losses in different studies in a short time.	
10	The East Africa drought 2017 in Tanzania, Ethopia, Kenya and Somalia resulted in devastating loss of lives.	

Figure 2. Examples of non-economic L&D

Examples of climate change impacts framed as economic loss such as livelihoods and non-economic loss and damages among other impacts, loss of agency, biodiversity, cultural heritage, ecosystem services, health, human life, and identity. The categories presented in the figure, as well as the number of loss and damage categories related with each event, are not exhaustive; there are other kinds of loss and damage, such as loss of communal and production sites and infrastructure and physical assets that result from climate change or extreme events.

policy, L&D governance consists of national approaches, strategies, and tools to manage risk, and formal policy mechanisms employed to address residual impacts of anthropogenic climate change after the failure of mitigation and adaptation. Global-level policy mechanisms (e.g., Warsaw International Mechanism for Loss and Damage [WIM], Article 8 of the Paris Agreement) currently lack the substantive teeth necessary to pursue accountability for and to redress L&Ds, and thus fail to establish a comprehensive venue for global governance of L&D, leaving much of the effective governance of L&D embedded in national and international approaches to disaster recovery, risk management and reduction, and adaptation. The governance of L&D has major implications for climate justice. Approaches to L&D governance are emerging within and outside of the UNFCCC, including through litigation in domestic courts, supported by advancements in climate change attribution science and growing empirical data of L&D at individual, household, and community levels worldwide.

L&D data and the Global Stocktake

Measuring and recording L&D are essential steps in a global empirical stocktake of impacts to inform and support governance of climate change. As explained earlier, there are challenges associated with measuring L&D that are important to understand in a science-policy context. In the Global Stocktake (GST) in 2023, there will be need to quantify and assess L&D on a global scale. This task will require a large-scale effort to systematically document a vast number of L&Ds associated with climate change extreme and slow-onset events, with limited data available where the most vulnerable reside. There is a risk that the extent of extreme and slow-onset events will be overlooked, particularly where they have the biggest impact on the most vulnerable populations in future GSTs, which will have political implications. The GST outcomes will result in a political message and recommendations for national and international collective action for climate change.

Financing for L&D

Financing for L&D is a critical area because it has been overlooked thus far despite calls from LDCs for international monetary support. Although there is agreement that financing for L&D is important for vulnerable communities to cope with climate change impacts, there are divergent views on this relating to historical responsibility and principles of equity. Civil society advocates for L&D to be considered separately from and in addition to adaptation finance and existing financial commitments such as the US$100 billion Climate Fund associated with climate mitigation. For example, this could include a tax on carbon majors (i.e., fossil fuel producers) to fund compensation for climate damage. Others advocate that L&D financing should be linked to solidarity and common but differentiated responsibilities. Finance could include bilateral or multilateral solidarity funds, national mechanisms, innovative finance sources and risk pooling, and insurance. Challenges include a fair distribution and recognition of who should receive financing given disproportional L&D across nations. COP26 will need to see progress on what financing will be available for L&D and in what form.

Mobilizing around L&D

Social movements as collective actions and the evolution of L&D policy and debates have multiple connections. The inclusion of a standalone article on L&D in the Paris Agreement has been an achievement of advocacy exercised by the Association of SIDS and by the LDCs at COP negotiations. Crucially, it was also the result of non-governmental organizations' successful work intensifying attention to the issue and coalition growth, ultimately translating into influence. Although the driving aim was to formalize discussions related to compensation for damage from climate change, sharp divisions between rich and poor countries emerged early on and prevented a shared formalization of liability as a precondition to compensation.

Calls for compensation are an extension of calls for reparations, and both are linked to the language of climate debt. In turn, the language of climate debt has its roots in the concept of ecological debt. The latter results from the plunder of resources by rich northern industrial countries from countries

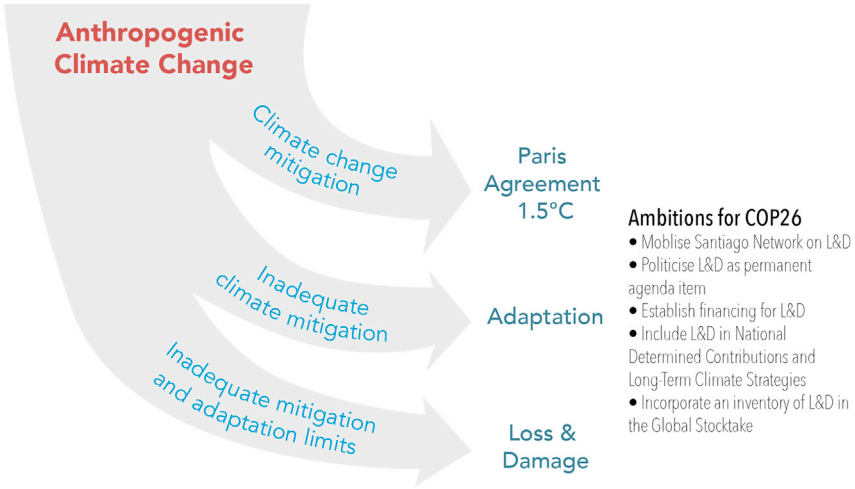
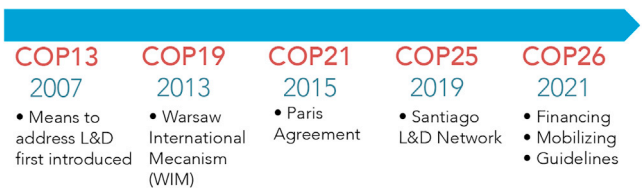


Figure 3. Ambitions for L&D in the context of COP26

Anthropogenic climate change requires us to reduce our global emissions through climate change mitigation to achieve the Paris Agreement and 1.5°C target. Failures to adequately mitigate climate change requires adaptation actions. There are limits to adaptation such as lack of governance conditions or funding that are already leading to growing losses and damages, both of meanings and of basic material needs and enabling conditions. In the light of the recent IPCC report and the severe extreme events experienced around the world many also believe COP26 requires us to consider a range of practical and political commitments on loss and damage.

and peoples of the Global South, often low-income and politically or culturally marginalized, and from the North's disproportionate occupation of environmental space, like land, oceans, and atmosphere. Climate debt is one item in the larger balance sheet of ecological debt, gaining traction as a potentially subversive idea that raises the central question of historical responsibility and who owes whom for what. Holding wealthier countries responsible and ensuring payment of such debts is an ongoing political struggle fought in the name of climate justice. However, although financial reparations are a fundamental part of this battle, this is not a struggle that can be reduced to monetary terms only. It includes rights to mobility and the acknowledgment of responsibility in legal frameworks.

The transnational youth movement Fridays for Futures has been one of the most vocal among mainstream climate movements on the need to put justice at the center of climate negotiations. Fridays for Futures includes many nodes and participants from among the most affected people and areas; i.e., the communities that suffer the most from the effects of climate change because of geographical location, socio-economic status, and/or other intersecting injustices and discriminations. On the ground, social movements to instigate political change in relation to climate adaptation and L&D still receive limited attention compared with studies focusing on climate activism for mitigation or protests against the continued use of fossil fuels. However, failures in adaptation and limits of adaptation are already leading to growing L&Ds, both of meanings and of basic material needs and enabling conditions, which will likely be discussion points at COP26 (Figure 3).



Box 1 Figure. L&D timeline
(Source: Adapted from UNFCCC)

Conclusion

In the wake of new knowledge on the physical effects, displacement, and social impacts of climate change, L&D has gained a more prominent role in scientific discourse, policy, and social justice debates. The interdisciplinary research community can help to fill the gaps identified in this article. Currently, there is a lack of knowledge on national-level financing and effective mechanisms for managing L&D. Further, understanding of the full extent of the impacts of climate change, particularly in the context of NELD, remains limited and requires further study. NELD pull into focus the ethical and justice dimensions of climate change, where countries and peoples across the world are disproportionately affected, and their cultures and ways of life, meanings, and purposes are being severely affected. From burial grounds being lost along coastlines of small islands to the reduced efficacy of Indigenous and local knowledge tied to a particular place and climate, or the widespread loss of deep worldviews, NELDs are happening right now and need to be foregrounded in research, policy, and practice. We require new ways of accounting for NELD globally, and for all aspects of L&D in places lacking complete reporting. This task raises questions of whose responsibility it is to record L&Ds, and how to do so, which will require novel solutions.

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