Received: 22 January 2024 | Revised: 30 April 2024 | Accepted: 16 May 2024

DOI: 10.1002/wcc.910

OVERVIEW

WIREs CLIMATE CHANGE WILEY

The ethics of climate change loss and damage

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Edited by: Megan Blomfield, Domain Editor and Maria Carmen Lemos, Editor-in-Chief

Abstract

In the last decade, the international community has become increasingly aware that some negative impacts of climate change cannot be prevented. During the COP19 in Warsaw in 2013, the parties who agreed to the Warsaw International Mechanism (WIM) acknowledged that there were already greater climate impacts than could be reduced by adaptation (UNFCCC, 2014). These impacts have been called "loss and damage", and the policies and measures that deal with them are usually referred to as L&D, or L&D measures or policies. Since then, examples of loss and damage have unfortunately become abundant, but we lack a systematic approach to the ethical issues surrounding loss and damage. This article provides an overview of some of the ethical issues surrounding loss and damage in the context of climate change. We discuss what should count as loss and damage, how access to justice for loss and damage should be granted and their different rationale, as well as issues of noneconomic and nonanthropocentric loss and damage.

This article is categorized under:

Climate, Nature, and Ethics > Ethics and Climate Change

KEYWORDS

attribution, ethical dimensions, litigation, loss and damage

1 | INTRODUCTION

When climate change entered the scene in the late 20th century as one of the most serious problems facing humanity, policy discussion centered around avoiding climate change altogether by mitigating greenhouse gas emissions. Over the years, adaptation policies gained currency in climate policy negotiations. In the last decade, however, the international community has become increasingly aware that some negative impacts of climate change cannot be prevented (IPCC, 2022a, p. 170). During the COP19 in Warsaw in 2013, the parties agreeing to the Warsaw International Mechanism (WIM) acknowledged that there were already greater climate impacts than could be reduced by adaptation (UNFCCC, 2014). These impacts have been called "loss and damage", and the policies and measures that deal with them are usually referred to as L&D, or L&D measures or policies.

Examples of loss and damage have unfortunately become abundant. In August 2016, heavy rainfall resulted in massive flooding in Louisiana, leaving thousands of buildings underwater.[1] Thousands of people faced severe health-related problems and 70,000 died in the 2003 European heatwave.[2] Ten years later, seven people died in Argentina due to the

worst heatwave reported in the country until that date.[3] At the time of writing, residents of Lahaina, Hawaii, were still reeling from the aftermath of the wildfire that devastated their town, with a current death toll of 100. Simultaneously, Canada experienced the worst wildfire season on record, with by far the largest area ever burned and fire activity continuing well into autumn.[4]

This article provides an overview of some of the ethical issues surrounding loss and damage in the context of climate change. In Section 2, we discuss what should count as loss and damage and present three normative accounts. Section 3 considers how access to justice for loss and damage should be granted, from climate litigation to climate policies based on different rationales. Section 4 turns to the philosophical significance of the science of attribution and its role in questions of justice for loss and damage. Finally, Section 5 examines the issues of noneconomic and nonanthropocentric loss and damage.

2 | WHAT SHOULD COUNT AS LOSS AND DAMAGE?

The Intergovernmental Panel on Climate Change (IPCC) defines losses and damages as the "adverse observed impacts and/or projected risks [...][that] can be economic and/or non-economic" (IPCC, 2022a, p. 7). The report further states that these impacts materialize when the limits of adaptation are reached (IPCC, 2022b, p. 6). However, note that what counts as an "adverse" impact and when the limits of adaptation are reached does not only depend on empirical matters about the physical impacts of climate change. It also depends on a normative analysis about what we take to be "adverse" and where we set the limit of what can possibly be adapted without affecting anything of value. In sum, defining loss and damage is not only a descriptive matter but also a normative one.

Perhaps for that reason, the definitions of loss and damage have been contested. Various scholars concur that political agreements on the importance of loss and damage have been possible because of the use of ambiguous and vague language in defining these concepts (Boyd et al., 2017; Mechler et al., 2020; Puig, 2022). However, the implementation of policy measures requires clarity about the definition of loss and damage. This definition also has very important consequences for the implementation of loss and damage measures. First, it determines to whom the funds will flow (or, in other words, who will be compensated); second, it will influence what kind of measures will be funded. A few scholars have therefore proposed different normative definitions of loss and damage aimed at identifying the appropriate target of loss and damage policies.

Edward Page and Clare Heyward were among the first authors to propose a normative definition of loss and damage. They argued that "loss and damage refer to the unjustified disruptions in the lives of individuals and communities, whether permanent or otherwise, that are attributable to anthropogenic climate change and which remain after mitigation and adaptation efforts have been attempted" (Page & Heyward, 2016, p. 3). They thus advocate for a so-called "beyond adaptation" or ex-post interpretation of loss and damage (cf. Boyd et al., 2017). This approach considers loss and damage as happening after adaptation measures have failed to prevent the negative impacts of climate change (cf. Mace & Verheyen, 2016). They distinguish this approach from one that focuses on risk management and risk prevention, stressing the importance of increasing resilience (see below).

Moreover, they propose an interpretation of loss and damage according to which the currency of disruption in loss and damage should be "human ends" rather than physical objects because these are only normatively significant due to their importance for human ends, such as human security, human development, human rights, or capabilities. In their words: "We talk of loss and damage to objects and resources because of the concern that this will lead to loss of (or damage to) certain important human ends" (Page & Heyward, 2016, p. 5). However, rather than commit to any particular account of human ends, they point out that there are many relatively uncontroversial human ends, such as "being nourished, sheltered and in reasonable health" (Page & Heyward, 2016, p. 6).

Other authors have argued that loss and damage concern not only the aforementioned unavoided adverse impacts, but also some of the risks associated with these impacts. (Mechler & Schinko, 2016; Schinko et al., 2019; Wallimann-Helmer, 2015; Wallimann-Helmer et al., 2019) In Mechler's words: "A 'Risk Management' view suggests the main remit of the L&D debate is to highlight opportunities for working towards comprehensive risk management including linkages to national risk management systems and technological solutions" (Mechler, 2017, p. 687). This view, which we call the risk-management approach, is taken to include an ex-ante or forward-looking perspective on loss and damage because it intends to address the negative impacts of climate change before they occur.

Specifically, following Dow et al. (2013), scholars that take this approach have proposed a differentiation between acceptable, tolerable, and intolerable risks, where only intolerable risks belong to the category of loss and damage. In

their words, the idea is "to delineate a policy space for L&D, composed of curative measures for *unavoided and unavoidable impacts*, and transformative measures for avoiding and managing intolerable risks" (Mechler & Schinko, 2016, p. 290). In this categorization, intolerable risks are often defined as arising when "a human system is no longer able to secure valued objectives" (Wallimann-Helmer, 2015, p. 472). They illustrate this point with the example of a farmer cultivating a specific crop under increasingly stressed water resources. As they argue, "at some point, no new adaptation options are available to respond to growing risks, or the level of adaptive effort required to maintain valued objectives becomes infeasible. At this point, the farmer may, for example, choose to abandon farming altogether" (Dow et al., 2013, p. 306). Loss and damage occur when that level of intolerable risk is reached.

Finally, García-Portela has recently defended a minimal account of loss and damage grounded in the capabilities approach. She argues that loss and damage occur, at least at a minimal level, "when climate change disrupts people's lives by pushing them below a sufficient standard in their opportunity to enjoy the central aspects of a dignified, flourishing life (or capabilities)" (García-Portela, 2024). With this proposal, García-Portela develops and integrates the two proposals outlined above. First, she develops the idea that loss and damage occur when human ends are disrupted. She describes the relevant human ends in terms of the capabilities approach, thereby including the human ends envisioned by capabilities scholars as relevant for human flourishing, such as bodily integrity, emotions, practical reason, affiliation, control over one's environment, and so forth (Nussbaum, 2011).

Second, García-Portela's approach also integrates the idea that intolerable risks are part of loss and damage. She argues that the example of the farmer can provide insights on the relationship between valuable objectives, intolerable risks, and capabilities, suggesting that intolerable risks emerge when people's ability to attain a sufficient level of capabilities is affected. The farmer example shows that their valuable objectives are related to their work as a farmer and the forms of affiliation and social interaction associated with their farming activities or their close relation to nature. One could imagine that, at some point of water stress, all this is at risk because, if they continue, they might incur significant economic losses or even be unable to secure enough food to eat. This is arguably an intolerable risk because it forces the farmer to search for a different job, perhaps in a different location, thereby negatively affecting the continuation of some of their valuable objectives.

García-Portela argues that these valuable objectives map quite nicely with the functioning corresponding to some of the classical capabilities (such as the capabilities of enjoying our relationship with other species and particularly with the world of nature; affiliation; practical reason; or control over one's material and political environment). The risk the farmer faces due to water stress forces them to abandon their activity altogether, which means, as García-Portela argues, that "they may no longer have the real opportunity to develop at least some of those core elements of the flourishing life to a sufficient level. And the real opportunities to develop those core elements of a flourishing life are precisely the capabilities" (García-Portela, 2024).

In a nutshell, García-Portela's argument is that intolerable risks, defined as no longer having the ability to secure valued objectives, are implicitly risks that already affect people's ability to reach a sufficient level of capabilities. In that sense, loss and damage always occurs ex-post, namely, after people's capabilities have already been affected beyond a critical level. This minimal account has the advantage of supporting the demands of developing and vulnerable countries to have a policy mechanism to cover the loss and damage experienced in their territories due to climate change since we can expect that it is in such countries that the negative effects of climate change impact people's ability to enjoy the minimum to live a sufficiently decent life.

3 | ADDRESSING LOSS AND DAMAGE: FROM LITIGATION TO CLIMATE POLICIES

Loss and damage measures have often been subsumed under the umbrella of compensation. Page and Heyward famously proposed a compensatory account for L&D (Page & Heyward, 2016). Overall, they argue that the role of L&D should be to compensate people by making them "whole again". Following Goodin, they argue that compensating people in this sense requires helping them to lead lives "as well off as they would have been, had it not been for the loss" (Goodin, 1989, 61; Goodin, 2013, pp. 484–485).

Page and Heyward also follow Goodin in distinguishing between means-based compensation and ends-based compensation. Means-based compensation is called for when the losses and damages affect people's means of pursuing their valued ends. For example, if someone's valued end of cultivating their own food is damaged due to rising temperatures that destroy their crops, they should be compensated with more heat-resistant seeds. However, replacing the means will

not always be possible. In some cases, human ends will be impaired in a way that cannot be fixed. The loss of homeland for small island nations due to rising sea levels, for example, cannot be compensated by relocating them to other islands. Nor is it really feasible to restore their islands, which Page and Heyward call ends-restitution. In these cases, the best we can do is to offer ends-displacement: compensation with other goods and opportunities that make those who have suffered loss "subjectively as well off overall as they would have been had they suffered no loss at all" (Goodin, 1989, p. 60).

If loss and damage is understood as being about compensation for climate change impacts, then it fits naturally with civil law, and especially tort law, which also focuses on compensating for damages (Boran & Heath, 2016; Hinteregger, 2017; Tigre & Wewerinke-Singh, 2023). For this reason, loss and damage has usually been associated with climate litigation and the prospects of achieving climate justice for loss and damage in the courtroom.

Climate litigation is a relatively new type of environmental litigation, having begun in the early 2000s. After the noteworthy success of the *Urgenda* case initially filed in 2013 (State of the Netherlands v. Urgenda Foundation, 2019), the number of climate litigation cases has risen sharply in the last 5 years with many judgments expected to be handed down soon (Setzer & Higham, 2023, p. 3). However, despite the intuitive connection between loss and damage and litigation, only a small (yet growing) portion of lawsuits can be classified as loss and damage litigation, since only a few of them involve claims of compensation for past and present loss and damage from climate change (Toussaint, 2021, p. 22). The small number of loss and damage litigation cases, Setzer and Higham suggest, is due to the difficulty of establishing causal links between emissions and harms (Setzer & Higham, 2023, p. 37). However, as discussed below, scientists have recently developed methods that could provide the necessary links (Otto, 2023; Wentz et al., 2023).

An oft-cited example of loss and damage litigation is Saúl Luciano Lliuya v. RWE (2015). Lliuya is a Peruvian farmer and alpine guide whose land is threatened by climate-change-induced flooding from a glacier lake. Lliuya sued the German energy company RWE, which is one of the global carbon majors and is responsible for 0.5% of total global emissions. Lliuya sued RWE for 17,000 USD—0.5% of the overall cost to install flood protection measures to protect his land. Since Lliuya is seeking protection against the threat of harm from flooding, the case fits the ex-ante understanding of loss and damage discussed above.[5] By contrast, the compensatory rationale clearly features in Asmania et al. *v.* Holcim (2023) brought forward by inhabitants of Indonesian islands against the Swiss construction materials company Holcim. Holcim is responsible for 0.42% of total global CO_2 emissions and is thus another carbon major (Heede, 2022). The lawsuit pursues two goals: it demands that Holcim reduce emissions drastically and pay for adaptation costs to prevent future loss and damage to the islanders; it also seeks compensation for loss and damage incurred on the island of Pari in a 2021 flood (Setzer & Higham, 2023, p. 37).

Climate litigation for loss and damage faces three important philosophical challenges: first, identifying defendants and establishing the grounds of their responsibility; second, showing that we can reasonably expect to achieve justice through climate litigation; and third, determining whether environmental impacts can be attributed to anthropogenic climate change. The first two problems are dealt with in the next two subsections before section III addresses the causation problem and the possibilities of overcoming it through attribution science.

3.1 | Identity and responsibility of defendants

Climate litigation cases have taken different kinds of entities as the relevant agents of climate justice. For example, the Urgenda case names a state as the defendant. What speaks in favor of naming states as defendants is that they are the parties to the UNFCCC and that climate burden-sharing debates are often framed in terms of which countries emitted how much, and which countries need to undertake what and how much effort to limit global warming. Various climate ethicists have supported the idea of nation states being the relevant agents of climate justice because they are the central unit of agency in the current global political regime (Francis, 2020; Page, 2012; Zellentin, 2015).

However, in other cases, such as the *Lliuya v. RWE* and *Asmania* et al. *v. Holcim*, companies are named as defendants. Loss and damage litigation with companies as defendants is especially brought forward against fossil fuel producers. Arnold and Bustos (2005) argue that companies can be held morally responsible for the harm they cause because their behavior, at least for post-2001 emissions, can be understood as negligent. Recent work on the emissions of the so-called carbon majors has identified 224 companies to whom 72% of global CO_2 emissions since the beginning of the Industrial Revolution can be traced, with most of these companies being fossil fuel extractors (Griffin, 2017).

Determining the identity of defendants, however, is not enough. First, identifying a party as a defendant is not enough since climate change loss and damage is jointly caused by multiple parties. This is not a unique feature of

climate change but is also relevant in other cases, such as those involving harm from environmental pollutants (Byers et al., 2017, p. 283). The market share liability principle holds that responsibility for damages is to be attributed based on the market share of those that have used or produced the relevant pollutants, even if it cannot be shown that the damages derive from their actions in particular. The market share liability principle is contested in the context of climate change loss and damage, especially in the international domain, because it raises various new and complex issues, for example, concerning "jurisdiction, choice of law, and recognition and enforcement of foreign judgments" (Byers et al., 2017, p. 286) or the exact shape of litigation based on violations of the Paris Agreement (Doelle & Seck, 2020, p. 15).

Second, responsibility for emissions does not straightforwardly follow from shares of emissions because some emissions might be justified (and thus exempted from responsibility) for being "subsistence emissions" that are necessary for securing people's livelihoods (Shue, 1993). In contrast, luxury emissions are those that are "inessential for either survival or decency" (Shue, 1993, p. 55) and more significant for assigning climate policy-related duties.

Third, responsibility also does not directly follow emissions shares, because different types of agents, apart from producers, are involved in making emissions happen. Had it not been for the demand for fossil fuels by consumers, they would not have been produced by companies in the first place. But consumers' demand would also have been left unsatisfied if no one had been willing to satisfy it (Steininger et al., 2014, p. 79). Furthermore, emissions would also not have been produced and consumed were it not for political decisions by states to allow and encourage fossil fuel extraction, subsidize it, and so forth. A growing literature on normative emissions accounting tackles the question of the relative responsibility of the various parties who jointly bring about emissions (Duus-Otterström & Hjorthen, 2019). The debate about relative shares of responsibility is situated within the broader debate about the limits of responsibility in the context of climate change (Jamieson, 2015; Kyllönen, 2018; Vanderheiden, 2007).

Finally, excusable ignorance further complicates the attribution of responsibility for loss and damage based on past emissions. Climate change is caused by the combined emissions since the beginning of the Industrial Revolution. It may be argued that the normative status of the relevant emitting activities differs according to when they occurred. We might say that early emitters could not have been aware of the harmful effects of their emissions and may thus be merely causally but not morally responsible for the harm caused by those emissions. Even so, this argument is usually thought to hold water only for pre-1990 emissions, before the first IPCC report was released (Bell, 2011, p. 393).[6] However, recent research has shown that some fossil fuel producers were aware of the harmful effects of their products already in the 1970s and undertook considerable efforts to keep this knowledge from the public (Supran et al., 2023). Such facts would certainly entail an earlier date from which at least those companies could be considered morally responsible for the negative effects of climate change.

3.2 | Access to justice

Access to climate litigation is highly unequal. Especially in the global south, those affected by loss and damage often do not have the means to pursue climate litigation (Setzer & Benjamin, 2020, p. 19). Furthermore, pursuing claims across borders is difficult, since "states often do not recognize the jurisdiction of international dispute settlement fora" (Rajamani, 2015, 19). These problems may lead to a situation in which those who need compensation for loss and damage the most are least likely to receive it and, conversely, those who are most likely to successfully litigate may be the well-off from the global north (Doelle & Seck, 2021, p. 5). Similarly, Boran and Heath note that achieving justice through the courts is "too time-consuming and costly" as well as "difficult to be relied upon to produce just outcomes" (Boran & Heath, 2016, p. 248; similarly: Wallimann-Helmer, 2023). Thus, these critics suggest that climate litigation may need to be supplemented with other measures to ensure that all loss and damage claims are addressed and not merely the claims by those who can afford to litigate.

However, this need not mean that climate litigation should not be promoted. After all, access to litigation is highly unequal in other domains, too. Nevertheless, climate litigation can be useful as part of a larger portfolio of tools for achieving climate justice. Moreover, climate litigation can pursue other goals apart the direct achievement of climate justice. For example, litigation can be used to raise attention for climate change loss and damage (Hinteregger, 2017, p. 260) and to change the calculus for companies engaged in emissions-generating activities by raising the chances of suffering reputational harm or being sued (Setzer & Higham, 2023, pp. 3–4).

Some authors have proposed that, precisely to avoid problems of access to justice, compensation could be included in the portfolio of international climate policies. That is, compensation for loss and damage can be thought of as the

"third pillar" of climate policies (Calliari et al., 2019). In fact, this is what Page and Heyward seem to have in mind with their compensatory account. With this approach, those suffering the negative effects do not need to go through complicated legal processes to get compensation for losses and damages caused by climate change. Instead, a policy mechanism would immediately initiate a compensatory response once loss and damage occur.

However, the idea of a compensatory climate policy mechanism has been received with skepticism due to feasibility concerns in attributing liability, which in turn might affect people's access to justice. Feasibility concerns arise due to the political rejection of a compensatory narrative in Article 8, paragraph 52 of decision 1/CP.21 of the Paris Agreement, which rules out any basis for liability and compensatory claims (UNFCCC, 2015). Some philosophers and political theorists have argued that the language of compensation may generate a polarized atmosphere among political parties, which, in turn, would hinder a consensus in political negotiations on climate policy. In the absence of that consensus, we would not reach any meaningful solution to climate change or to the problems associated with loss and damage (Boran & Heath, 2016; Moellendorf, 2014; Posner & Weisbach, 2010; Wallimann-Helmer et al., 2019).

Nevertheless, a policy mechanism for addressing loss and damage does not need to be built on the idea of compensation or attribute liability for emissions to polluters. Some authors proposed instead to devise a policy mechanism for addressing loss and damage based on considerations of efficiency and solidarity, which are not outright excluded in the Paris Agreement (e.g., Schinko et al., 2019; Wallimann-Helmer, 2023; Wallimann-Helmer et al., 2019). This alternative narrative might be more successful at granting victims of loss and damage access to justice. However, others have argued that solidarity-based accounts fail short in acknowledging the responsibility of high polluters in causing climate change (Butt, 2017; García-Portela, 2018).

4 | ATTRIBUTION SCIENCE AND LOSS AND DAMAGE

Another line of criticism against compensatory approaches is based on the possibilities offered by attribution science. In principle, a compensatory rationale requires that those responsible for climate change bear the burdens associated with climate change-related harm. Hence, a compensatory approach requires identifying harm caused by climate change. While the connection between slow-onset events directly linked to rising temperatures and climate change is robust, the attribution of extreme weather events (EWEs) is more complicated. While the overall incidence and magnitude of extreme weather events are projected to increase with rising temperatures (IPCC, 2021, p. 1523), we cannot say whether a *particular* extreme weather event has been caused by climate change. This is because extreme weather events do occur in the absence of climate change and because particular types of extreme weather events in particular places may also become weaker or less severe with higher temperatures (Hinteregger, 2017, p. 240).

To solve this problem, climate scientists have proposed two main attribution methods: the probabilistic approach and the storyline approach. Thus far, the probabilistic approach has been the conventional methodology in attributing EWEs to human forcing (Allen, 2003, 2011; Mera et al., 2015; Otto et al., 2017; Stott et al., 2016). This approach takes a certain event as a token of a class of EWEs and assesses how much climate change has changed the probability of the event occurring. Drawing on a tort-law rationale, events that surpass a threshold of 100% increase in probability are then attributed to climate change. The possible advantage of this approach is its fit with legal thinking, which might make us optimistic about the eventual prospects of using such an approach in the courtroom (Stuart-Smith et al., 2021). The storyline approach differentiates between dynamic variables (i.e., related to atmospheric circulation) and thermodynamic variables (i.e., related to temperature) and considers how much the magnitude of a certain extreme weather event has changed due to climate change, assuming that dynamic variables remain the same (Pall et al., 2017; Patricola & Wehner, 2018; Shepherd, 2016, p. 32; Sillmann et al., 2021; Takayabu et al., 2015).

Both approaches have received criticism. The probabilistic approach is considered unreliable, at least in a good number of instances, due to the existing difficulties in representing dynamic changes (Shepherd, 2014, p. 706). The storyline approach has been criticized as not accounting for dynamic changes, thereby possibly overstating the effects of climate change (Stott et al., 2017; however, see García-Portela & Maraun, 2023). In short, although attribution studies have improved significantly in the last decade (Stuart-Smith et al., 2021), they are still in development and not free of important objections.

Another point of contention concerns the causal relationship between extreme weather events and climate change-related harms. As it is well-known, climate disasters are the results not only of changes in the climate system, but also of vulnerability factors (Raju et al., 2022). The same extreme weather event can be much more or less harmful depending on the background social structures and injustices in a given context. This issue might also make it hard to

establish responsibility for loss and damage exclusively based on emissions since we might think that the responsibility of high emitters is magnified or diminished when social institutions play an intervening role in exacerbating or limiting the harmfulness of climate impacts like extreme weather events (Blomfield, 2023).[7]

These difficulties in attributing extreme weather events to loss and damage caused by climate change have been discussed as a second reason for skepticism about the current feasibility of a compensatory approach to loss and damage, aside from the above-mentioned problems concerning liability (Caney, 2010; Farber, 2017; Wallimann-Helmer et al., 2019). In this vein, it has been argued that a solidarity-based approach as discussed above would not require a connection between particular extreme weather events and anthropogenic climate change in order to address losses and damages. For instance, Wallimann-Helmer has argued that his solidarity-based approach favors helping victims of environmental impacts reach a certain threshold of well-being "regardless of whether communities are vulnerable due to human activities or natural climate variability" (Wallimann-Helmer, 2023, p. 64). With this "solidarity-based approach" Wallimann-Helmer seems to have in mind a mechanism for addressing loss and damage that neither requires polluters to pay for the expected negative effects of their emissions nor a connection between environmental impacts and polluting activities.

Other scholars have put forward an "insurance-based" approach which constitutes a middle-way approach between a fully "solidarity-based" approach and a compensatory approach to loss and damage. According to such an approach, we could implement an insurance mechanism that gathers funds from polluters (as compensatory approaches would do) and redistributes them to those negatively affected by environmental impacts (as solidarity-based approaches would suggest). In this way, it is not necessary to attribute environmental impacts to climate change in order for people to receive adequate compensation (cf. the insurance model for climate displacement proposed by Draper, 2024).[8] Although this approach explicitly addresses polluters and thus does not rely on a mere "solidarity-based" approach, it might still fall short of addressing loss and damage as a specific injustice caused by climate change.

On a critical note, García-Portela has argued that it is misguided to assume that climate justice approaches to loss and damage could be satisfactory without dealing with attribution issues, or at least striving to integrate the empirical results of attribution studies in the long run. In fact, she argues, considering climate justice as a specific justice domain requires integrating, in one way or another, some connection between climate change and those who would receive assistance from a loss and damage fund. That is, if we accept that loss and damage is a "third pillar" of climate policies meant to address the negative impacts or risks *associated with climate change*, it is necessary to establish some linkage between the causes of climate change and the impacts that these policies will address (García-Portela, 2023). This is precisely what attribution science is meant to do.

5 | NONECONOMIC LOSS AND DAMAGE

The literature on loss and damage distinguishes between economic and noneconomic loss and damage. Many climate change impacts are quantifiable losses of resources, goods, and services. They consist of things "that are commonly traded in markets" (Fankhauser et al., 2013, p. 3) and are thus considered economic. However, some authors have stressed that not all loss and damage can be valued economically. Examples include cultural heritage, indigenous knowledge, and ancestral homelands. If these are lost or damaged, they cannot be re-acquired in markets or compensated for with money. They are thus considered noneconomic loss and damage. Serdeczny et al. (2018) distinguish noneconomic loss and damages along the intrinsic/instrumental and the material/nonmaterial divide, yielding four different kinds of noneconomic loss and damage. In this framework, indigenous knowledge would fall under instrumental, nonmaterial noneconomic loss and damage, since it is instrumentally valuable for a certain way of life and because it is nonmaterial knowledge. Ancestral homeland would fall under intrinsic, material noneconomic loss and damage since it is valued for its own sake and consists in a physical place.

Noneconomic loss and damage is difficult to identify, and for policymakers to address. To decide where to set priorities and how much funding to allocate to prevent or address noneconomic loss and damage, policymakers need ways to identify loss and damage and be able to ascertain the relative importance of preventing various noneconomic losses and damages compared with each other and with economic loss and damage. The stakes involved are further heightened because, as Fankhauser et al. note, "in many developing countries, noneconomic losses may well be more significant than economic losses" (Fankhauser et al., 2013, p. 3).

Fankhauser et al. suggest using the concept of "total economic value" to account for noneconomic loss and damage. They argue that although noneconomic items are not commonly traded in markets, they are still valued by people and

contribute to their welfare or well-being. The value of species or ecosystems, for example, may be understood to consist in the "satisfaction of knowing that [they] exist" (Fankhauser et al., 2013, p. 16) and the value of cultural heritage may be found in its non-consumptive use-value for people's "spiritual and cultural well-being" (Fankhauser et al., 2013, p. 17). While Fankhauser et al. admit that the valuation of noneconomic impacts is notoriously difficult, they point out that there are various valuation techniques with different advantages and limitations (Fankhauser et al., 2013, p. 38).

Different mechanisms to address the different types of noneconomic loss and damage have been proposed in the literature. In some cases, monetary compensation is possible. What is lost and damaged may not be replaceable with money but money can be used to substitute it with other valuable things, to some extent. The aforementioned concept of total economic value helps in such circumstances to determine how much is necessary to compensate. However, in many other cases, substitution may not be possible. Difficulties are especially apparent in cases where the loss in question is not properly described as a loss in well-being or welfare, but something fundamentally affecting relationships, people's sense of identity, life plans, and so forth.

In situations in which material compensation is no longer possible, symbolic compensation could remain effective. Two rationales for addressing noneconomic loss and damage with symbolic measures have been discussed in the literature: the victim-centered rationale and the agent-centered rationale (García-Portela, 2020). When, for example, a people's cultural heritage or ancestral lands are lost, the only option may be victim-centered symbolic reparations—that is, measures that "enable victims of climate change injustice to record their story, to recount what was lost and its effects upon them" (Heyward, 2012, p. 163). As Barnett et al. (2016) have argued, the ultimate goal of those practices is to manage grief and sustain the association with what would otherwise be forgotten. Museums and memorials are among the most prominent victim-centered forms of symbolic reparations. Recently, the issue of forced migration has received heightened attention (Draper & McKinnon, 2018; Zellentin, 2015). Although the connected harms, such as the loss of political self-determination, are difficult to compensate for, some authors have advocated for a free movement passport to help the territorially dispossessed rebuild their political and cultural identities in a new territory, at least to the extent that this is possible (Heyward & Ödalen, 2016).

The agent-centered rationale for addressing noneconomic loss and damage with symbolic measures instead seeks to restore the relationship between those suffering loss and damage and those most responsible for it (García-Portela, 2024). Agent-centered symbolic reparations include apologies, statements of (agent-)regret, truth-telling measures, and guarantees of nonrepetition (García-Portela, 2020). The challenges of reconciliation measures such as these are also discussed in a rich literature that brings together colonial injustice and climate injustice and may offer further insights to addressing noneconomic loss and damage (Reibold, 2023; Tully, 2018; Whyte, 2020).

Finally, noneconomic loss and damage is connected with the issue of nonanthropocentric loss and damage. Fankhauser et al.'s approach, for example, considers all loss and damage as loss and damage to what is valued by humans. However, some examples of loss and damage discussed in the literature do not fit that description, such as species loss and the loss of biodiversity. While these may affect humans, some authors argue that their value may be understood in nonanthropocentric terms as independent of human valuing or any contribution to human welfare or well-being (McShane, 2013, p. 126; Preston, 2017, p. 147). Note that the normative accounts of loss and damage that we discussed in Section 2 of this article ground the normative significance of loss and damage in impacts or risks of impacts on humans. Nonanthropocentric loss and damage would thus require amendments to these accounts. This is also important since nonanthropocentric values play a role in the (political) discourse on noneconomic loss and damage. For example, biodiversity is considered to be an objective and intrinsic value in the United Nation's Convention on Biological Diversity (Convention on Biological Diversity, 1992). To the best of our knowledge, there has thus far been little philosophical discussion of whether and how to account for nonanthropocentric loss and damage.

6 | CONCLUSION

While understandings of loss and damage remain plural, the latest synthesizing proposal is to understand loss and damage as the effects of climate change on core aspects of human flourishing, whether those occur due to the actual impacts of climate change or due to climate-change-related intolerable risks.

There is also a plurality of views on how to address loss and damage. Although climate litigation loss and damage cases as yet constitute a small part of all climate litigation cases, they are likely to increase due to cutting-edge advances in the science of attribution. However, they will still need to deal with more legal and philosophical questions surrounding responsibility for climate change. Furthermore, from a policy-making perspective, the aims of loss and

damage policies are contested. While some are also inspired by issues of responsibility in the context of the large-scale, long-term, multi-agent problem of climate change and are aware of the possibilities offered by the newest advances in the science of attribution, others are more mindful of specific feasibility constraints in the context of the UNFCCC negotiations.

Compensation for loss and damage also raises interesting ethical problems due to the nature of what is lost and damaged. Often, loss and damage is noneconomic and consists in the loss of a people's cultural heritage, language, social structures, and so on. Compensating people for a lost sense of identity will often only be partially possible through symbolic compensation. Finally, more discussion is required concerning who can be affected by loss and damage, whether this is only possible for human beings or the impacts of climate change on other species should also be considered.

AUTHOR CONTRIBUTIONS

Eike Düvel: Conceptualization (equal); investigation (equal); project administration (equal); writing – original draft (equal); writing – review and editing (equal). **Laura García Portela:** Conceptualization (equal); investigation (equal); project administration (equal); writing – original draft (equal).

CONFLICT OF INTEREST STATEMENT

No conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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RELATED WIREs ARTICLE

Loss and damage: A review of the literature and directions for future research

ENDNOTES

[1] For detailed information, see: https://www.bbc.com/news/world-us-canada-37121404.

[2] For detailed information, see: https://www.carbonbrief.org/study-links-heatwave-deaths-london-paris-climate-change.

[3] For more detailed information, see: https://www.independent.CausationObjection.uk/news/world/americas/seven-people-die-in-the-worst-heat-wave-ever-recorded-in-argentina-9032202.html.

[4] For more detailed information, see: https://www.cbc.ca/news/climate/wildfire-season-2023-wrap-1.6999005.

[5] It does not neatly fit the ex-post understanding, however, since Lliuya is not suing for compensation of damages already incurred. For discussion, see Tigre & Wewerinke-Singh, 2023, p. 2; Toussaint, 2021, p. 22.

[6] However, as the IPCC report states: "Of [the total emissions], more than half (58%) occurred between 1850 and 1989 [1400 ± 195 $GtCO_2$], and about 42% between 1990 and 2019 [1000 ± 90 $GtCO_2$]" (IPCC, 2022b, p. 6). Our World in Data estimates emissions up to and including 1990 at 47% of overall emissions (around 794 billion tons out of around 1690 billion tons of CO_2) ("Cumulative CO_2 Emissions by World Region" 2022). Our World in Data does not include emissions from land use change.

[7] We would like to thank an anonymous reviewer for making us aware of this point.

[8] We would also like to thank an anonymous reviewer for their contribution in bringing up this point.

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How to cite this article: Düvel, E., & García-Portela, L. (2024). The ethics of climate change loss and damage. *WIREs Climate Change*, e910. https://doi.org/10.1002/wcc.910