CHAPTER 5

# A Conceptual Framework and Research Design for Assessing Losses and Damages from Climate Change in Vulnerable Communities

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**Abstract** The purpose of this paper is to present a conceptual framework and people-centred research design for assessing climate-induced losses and damages in vulnerable communities. The mixed-method research design builds on progressive insights from 12 fieldwork-based, empirical case studies, conducted across the Global South, in which more than 4000 respondents participated. The paper discusses key concepts, such as sudden-onset events, slow-onset processes, vulnerability, disaster risk reduction, coping strategies, adaptation and adaptation limits and constraints, and brings these together in a conceptual framework for assessing losses and damages in vulnerable communities. Subsequently,

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V. Wijenayake et al. (eds.), *Linking Climate Change Adaptation, Disaster Risk Reduction, and Loss & Damage*,
https://doi.org/10.1007/978-981-99-8055-0_5

the paper discusses research design considerations, such as purposive study site selection and random sampling of survey respondents. Lastly, it presents hands-on research tools, which include a household questionnaire, focus group discussions, expert interviews, participatory evaluation of climate action and open interviews to elicit personal testimonies of how climate change induces losses and damages and how this affects people's lives and livelihoods.

## 1 Introduction

'Loss and Damage' is an emerging topic in climate change negotiations, research and policy and the implementation of climate action. The world has entered in the third era of climate change, which is the era of Loss and Damage. In the first era, the era of mitigation, the hope was that we could avoid dangerous climate change by reducing greenhouse gas emissions. In the second era, the era of adaptation, we thought we could adapt to the climatic changes that were not avoided through mitigation. In the third era, we have realized that in some parts of the world, adaptation is increasingly difficult and sometimes impossible, and losses and damages have become inevitable there. In line with this, Loss and Damage[1] is now considered—alongside mitigation and adaptation—a third pillar of the United Nations Framework Convention on Climate Change (UNFCCC). It is still of utmost importance to reduce greenhouse gas emission to limit global warming (averting losses and damages), and to adapt to climatic changes where possible (reducing losses and damages). But we now also have to find ways to deal with unavoided and unavoidable losses and damages, and to protect the most vulnerable people (addressing losses and damages). There is an important climate justice element to this, as the people and countries that have least contributed to global warming are often the most likely to experience losses and damages from climate change (Boyd et al., 2021).

[1] In this paper, we follow the IPCC AR6 distinction between Loss and Damage (L&D) and losses and damages (l&d). L&D—singular and capital letters—refers to "political debate under the UNFCCC following the establishment of the Warsaw Mechanism on Loss and Damage in 2013"; l&d (plural and small letters) refers to "harm from (observed) impacts and (projected) risks and can be economic or noneconomic" (IPCC WGII AR6 Glossary).

At COP27 in 2022, a Loss and Damage Fund was established to support vulnerable countries that are most severely affected by climate change impacts. In the words of Simon Stiel, Executive Secretary of the UNFCCC, the fund is meant to "address the impacts on communities whose lives and livelihoods have been ruined by the very worst impacts of climate change" (UNFCCC, 2022). An important step towards meaningful action to address losses and damages in such vulnerable communities is to improve our ability to identify and assess these losses and damages.

As loss and damage is a relatively new area of research in the field of climate change (for an overview of the literature, see McNamara and Jackson, 2019), there are currently no well-developed assessment methods available to countries and organizations. This paper proposes a fit-for-purpose and adaptable research design for assessing losses and damages from climate-related hazards, with a focus on vulnerable communities.

The paper aims to advance methodologies for assessing losses and damages in the context of climate change, by building on the experiences of the first-ever multi-country assessment of losses and damages in vulnerable communities, which included case studies in The Gambia, Burkina Faso, Ethiopia, Kenya, Mozambique, Nepal, Bangladesh, Bhutan and the Federated States of Micronesia (Warner and van der Geest, 2013). Based on the experience of the first generation of case studies, a methods handbook was prepared and tested in Nepal, Pakistan and India (**van der Geest and Schindler, 2016, 2017). This paper builds on the cumulative learning-by-doing approach adopted in these case studies.

The paper argues that in order to effectively minimize and address losses and damages, we need to have a deeper understanding of the causes as well as the consequences. This involves examining the combination of physical stressors and social vulnerabilities that contribute to losses and damages, such as exposure to shocks and a lack of coping and adaptive capacity. It also involves a deep understanding of the values, perceptions, needs and preferences of people living at the frontlines of climate change. Studying these factors requires considering a range of disciplines beyond climate science. There is an urgent need to bring in research skills and experiences of anthropologists, psychologists, development scholars and other social scientists with a community-based approach to enhance our

understanding of the consequences of losses and damages and set priorities for addressing losses and damages together with affected communities (Tschakert et al, 2019).

At this point, it is essential to ask ourselves the question: what do we actually mean by *assessing* losses and damages? According to the Oxford Learners Dictionary, the verb 'to assess' means: "To estimate the nature, quality or value of something" (Oxford Learners Dictionary, 5th edition). What I want to emphasize here is that to assess something is not the same as to *measure* something, which, according to the same dictionary, means "to find the size, length or amount of something by comparing to a standard unit" (Oxford Learner's Dictionary, 5th edition). A central premise of this paper is that a proper assessment of losses and damages involves measuring what one can measure and documenting and understanding what one cannot measure. I argue that understanding losses and damages, with the aim of averting, reducing and addressing it, is at least as important as measuring it. Importantly, there is a wide range of losses and damages that cannot even be measured adequately. If the focus of a loss and damage assessment would be purely on measuring losses and damages, all these 'non-economic losses and damages' (NELDs) would stay under the radar (Chandra et al., 2023).

To properly understand the losses and damages that individuals, households, communities, business and other actors incur, an assessment should focus not just on *what* is lost and damaged, but also on *how* and *why*. This shifts the purpose of the loss and damage assessment to a stronger consideration of the adaptation limits and constraints that vulnerable communities face (Berkhout and Dow, 2022; Mechler et al., 2020).

### *1.1 Limitations*

The research design presented in this paper is suitable for assessing losses and damages in vulnerable communities, where severe climate impacts are already a present-day reality; where adaptation limits are approached or already crossed; and where significant constraints to adaptive capacity exist. So the focus is on people and losses and damages that are already occurring. For research on projected risks of future losses and damages, and for more quantitative and less people-centred assessments of losses and damages at higher levels of scale (national, global), other methods are needed (see e.g. Bouwer, 2019). Similarly, for research on loss and

damage to ecosystems, other methods are needed (see Janzen et al., 2021).

This paper uses 'losses and damages' as a composite term, and does not attempt to distinguish losses from damages. Some scholars have explored the added value of separating the two, defining losses as permanent or irreversible and defining damages as repairable (Doelle and Seck, 2019; McNamara and Jackson, 2019; Tschakert et al., 2019; Puig, 2022). There may be value in doing this, but there are also important drawbacks, as there is a large gap between this conceptual distinction and the language reality. For example, we tend to speak of 'loss of livelihood' when people's livelihoods are hit by a drought, flood or storm. However, when we say this, we do not want to imply that these livelihoods are lost forever.

### *1.2 Outline*

The structure of this paper is as follows. First, key concepts are discussed and brought together in a conceptual framework for assessing losses and damages in vulnerable communities. Second, the paper provides guidance on the overall design and organization of fieldwork activities, including site selection, sampling of survey respondents and training of research teams. Third, the different work streams and methods for data gathering are discussed, including desk study, the household questionnaire, focus group discussions, expert interviews, story-telling tools and a method for participatory evaluation of climate action by governments and NGOs.

## 2 Key Concepts

This section gives an overview of key terms used in relation to loss and damage from climate change. Many of the key concepts originate from other thematic areas in global change research, particularly disaster risk reduction and climate change adaptation. The work on loss and damage has the potential to link these fields, but to do so effectively, it is important to create conceptual clarity. After introducing and defining the key terms, they will be placed in a conceptual framework that informs the research design for loss and damage assessment proposed in this paper. The key concepts fall in different domains: climate, vulnerability, impacts and responses.

### *2.1 Climate*

As this paper considers losses and damages as a result of actors' insufficient capacity to respond to different climate stressors, it is important to distinguish the different types of climatic stressors in the first place. Each of these stressors types have different time dimensions and require different responses. First, we have climate hazards and risks which are more or less permanent characteristics, and which require ex-ante risk management strategies by households and governments and organizations. Second, there are sudden-onset climatic events that occur at a specific point in time, and which require coping strategies at household level and emergency responses by governments and organizations. Thirdly, there are longer-term or slow-onset changes in climatic conditions that require adaptation by households, governments and organizations.

**Hazard**: The potential occurrence of an anthropogenic or non-anthropogenic physical event that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision and environmental resources (IPCC, 2012).

**Risk**: The potential for consequences where something of human value (including humans themselves) is at stake and where the outcome is uncertain. Quantitatively, risk is often represented as probability of occurrence of a hazardous event(s) multiplied by the consequences if the event(s) occurs (IPCC, 2014).

**Disaster**: Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions lead to widespread adverse human, material, economic or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery (IPCC, 2012).

**Sudden-Onset Events**: These take place over short time frames (typically hours, days or weeks). Climate-related sudden-onset events include floods, cyclones, tornadoes, landslides, sudden collapses of riverbanks, extreme rainfall events, heat waves and wild fires.

**Slow-Onset Processes or Changes**: These take place over longer time frames (typically years to decades). Climate-related examples are sea level rise, salinization, ocean acidification, temperature rise, desertification and changing rainfall patterns. Droughts are usually categorized as slow-onset phenomena, but in terms of the consequences and the coping strategies

adopted in response, a drought is often similar to sudden-onset events (van der Geest and van den Berg, 2021).

### *2.2 Vulnerability*

To study and understand how climatic events result in life-threatening losses and damages for some, and hardly a scratch for others, the concept of vulnerability is crucial. The IPCC defines vulnerability as "the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC, 2014: 1775). In one of the first papers on vulnerability to climate change, Robert Chambers (1989) distinguished external and internal vulnerability and this distinction is particularly relevant for assessing losses and damages in vulnerable communities. Chambers describe the external side of vulnerability as exposure and the internal side as a lack of coping capacity (Chambers, 1989). Current thinking and studies about vulnerability still use this distinction, and add a third element: sensitivity (Füssel and Klein, 2006).

Sensitivity refers to "the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise)" (IPCC, 2007).

Similar to the distinction between the internal and external side of vulnerability, it is helpful to distinguish collective vulnerability and individual vulnerability: Collective vulnerability results from area-level variables that are the same for all households in a given community, region or country. By contrast, the level of individual or household vulnerability differs between households in a community (Adger, 1999; McLeman, 2010).

### *2.3 Responses*

To study losses and damages from climate changes as impacts beyond or despite actors' efforts to avoid them, the research design presented in this paper distinguishes three broad categories of responses to different

climatic stressors: preventive measures, coping measures and adaptation measures.[2]

**Preventive Measures/Ex-ante Risk Management**: This involves the actions households take to prevent or minimize future impacts of climate changes and extreme weather events. Classic risk management theory distinguishes four ways of dealing with risk that are usually adopted as a function of the probability and severity of events (Bekefi et al., 2008). Risk avoidance: Refrain from certain activities or avoid certain places or situations because the probability of severe impacts is too high. Risk reduction: Actions taken to lessen the probability and/or negative consequence associated with a risk. Risk transfer: Sharing the burden of a loss with others, including insurance solutions and community-based systems related to social capital. Risk retention: Accepting a risk because of low probability and non-severe impacts that make it possible for adverse effects to be absorbed.

**Coping Strategies**: Defined by the IPCC (2012) as "The use of available skills, resources, and opportunities to address, manage, and overcome adverse conditions, with the aim of achieving basic functioning of people, institutions, organizations, and systems in the short to medium term".[3] Literally, to cope means 'to deal successfully with something difficult' (Oxford Learner's Dictionary, 5th edition). In livelihood research and development studies, the term is reserved for the things people do in the aftermath of adverse events (such as a flood or drought-induced crop failure) to survive or 'get back to normal'. Examples are: selling assets, migration, reliance on alternative sources of food and income when the main source of livelihood fails (e.g. food aid, wild foods, petty trade, labour), taking loans, etc (Warner and van der Geest, 2013).

**Adaptation**: Changes in social-ecological systems in response to actual and expected impacts of climate change in the context of interacting non-climatic changes (Moser and Ekstrom, 2010). Several types of adaptation measures can be distinguished:

- Autonomous and Planned Adaptation: Planned adaptation involves actions and deliberate policy by public bodies (e.g. governments,

[2] The relationship between preventive strategies, coping and adaptation is described in detail in van der Geest (2004: 20–29).

[3] This glossary entry builds from the definition used in UNISDR (2009) and IPCC (2012a).

NGOs) to protect citizens against climate change and its impact (Smit et al., 2001). By contrast, autonomous adaptations are natural or spontaneous adjustments to climatic changes by individual actors, such as households, small enterprises or communities[4] (Carter et al., 1994, in Fankhauser et al., 1999: 69).

- Pro-active and Reactive Adaptation: Pro-active or anticipatory adaptation measures are adopted in response to future expected climate, and before impacts have occurred. Reactive adaptation measures are adopted in response to climatic changes or events that have already had adverse effects or caused damage (Füssel, 2007).

Many studies use the terms coping and adaption synonymously (Birkmann, 2011). This is problematic because they involve different types of responses to different types of stresses (van der Geest and Dietz, 2004). Coping strategies are short-term responses to the impacts of sudden or unusual events. By contrast, adaptation refers to longer-term adjustments to more permanent changes in the climate.[5]

Table 1 shows how the three types of responses (prevention, coping and adapting) connect to different types of climate stresses, and provides some examples of these responses in practice. There are multiple linkages between different types of household responses to climatic stressors. First, the success of ex-ante preventive measures determines the need for and success of ex-post coping strategies. Second, short-term coping measures can evolve into more permanent livelihood adaptations when they become recurrent. Third, when households change their preventive measures in response to changes in perceived risk, they are in fact adapting.[6]

[4] The term autonomous adaptation is also used for spontaneous adjustments in ecosystems (see e.g. IPCC WG2 AR5, Chapter 4).

[5] For the more elaborate definition of adaptation we used in the case studies, see Moser and Ekstrom (2010). Their definition recognizes that adaptation measures are often adopted in response to a mix of climatic and non-climatic changes and aim to meet more than climate goals alone.

[6] For an overview of linkages between prevention, coping and adapting, see van der Geest and Dietz (2004). The framework is inspired by the early work of Susana Davies (1996) on 'adaptable livelihoods' in Mali.

**Table 1** Different climatic stressors require different household responses

| *Climatic stressor* | *Household response* |
|---|---|
| **Climate variability, risk and hazards**<br>• Normal climate/weather uncertainties<br>• Normal risk of extreme weather events | **Preventive measures (disaster risk reduction)**<br>• Physical protection, such as seawalls<br>• Risk spreading in agriculture and livelihoods<br>• Creating buffers<br>• Investing in social safety nets |
| **Climate-related events (disasters)**<br>• Floods<br>• Droughts<br>• Cyclones/storms<br>• Landslides | **Coping strategies**<br>• Selling assets<br>• Alternative income sources<br>• Reliance on social networks<br>• Food aid and other relief |
| **Climatic changes**<br>• Changes in 'average' conditions<br>• Changes in risk (frequency and severity) of extreme weather events | **Adaptation**<br>• Agricultural change<br>• Livelihood diversification<br>• Migration<br>• Changes in 'normal' risk management, including • preventive measures and coping strategies |

*Source* Author's own, building on van der Geest and Dietz (2004)

### *2.4 Impacts and Loss and Damage*

Though there is much overlap between impacts of climate change and loss and damage from climate change, the two terms are not the same (Roberts et al., 2014; Zommers et al., 2016). The concept of loss and damage emphasizes that avoidable impacts have not been avoided and that some impacts cannot be avoided even with large improvements in mitigation and adaptation policy.

The IPCC defines impacts as "effects on natural and human systems of physical events, of disasters, and of climate change… Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system" (IPCC WG2 AR5 glossary).

The IPCC definition of losses and damages is, in my view, problematic because it does not adequately distinguish the concept of 'loss and damages' from 'impacts'. According to the IPCC, losses and damages

"refer broadly to harm from (observed) impacts and (projected) risks and can be economic or noneconomic" (IPCC, 2022). To set the concept aside from 'impacts', it is necessary to emphasize the residual aspect of loss and damage, by emphasizing that losses and damages incur despite efforts to avoid them. A concise definition could be that losses and damages refer to "adverse effects of climatic stressors that occur despite mitigation and adaptation". A more precise definition would be that *losses and damages refer to adverse effects of climatic stressors resulting from inadequate efforts to reduce greenhouse gas emissions and insufficient capacity to reduce the risks associated with climatic stressors, to cope with impacts of climatic events and to adapt to climatic changes*.

Several types of loss and damage can be distinguished, for example:

**Economic and Non-economic Losses and Damages**: The main distinction between the two categories is whether the lost items are commonly traded in markets (Fankhauser et al., 2014). Table 2 gives an overview of different types of non-economic losses and damages.

**Avoided, Unavoided and Unavoidable Loss and Damage**: According to Verheyen (2012), there are three types of losses and damages: avoided, unavoided and unavoidable. The term 'avoided losses and damages' refers to impacts of climate change that have been avoided by mitigation and adaptation action. Unavoided losses and damages could

**Table 2** A categorization of different types of non-economic losses and damages (NELD)

| *Human life* | *Meaningful places* | *cultural heritage* | *Intrinsic values* | *Biodiversity* | *Ecosystem services* |
|---|---|---|---|---|---|
| Lives | Territory | Heritage | Dignity | Species | Landscapes |
| Health | A place to call 'home' | Traditions | Agency | Biodiversity | Productive land |
| Well-being | Sacred sites | Customs | Identity | Habitats | Supporting services |
| Livelihoods | | Culture | Social cohesion | Flora | Regulating services |
| | | Indigenous knowledge | Security | Fauna | Provisioning services |
| | | | Sovereignty | | Cultural services |

*Source* The table builds on past and ongoing work at UNU-EHS, with inputs from Magdalena Mirwald and Cathleen Eberle

have been avoided, but have not been avoided because of inadequate mitigation and adaptation efforts. Lastly, there are losses and damages that are unavoidable no matter how ambitious mitigation and adaptation efforts are. Avoidable losses and damages can be addressed by more effective adaptation measures, removing adaptation barriers, improved disaster risk reduction and increasing resilience and coping capacity of vulnerable communities. However, those impacts that are either unavoided or unavoidable will need to be addressed by a range of other approaches, such as social protection, planned relocation, assisted migration, insurance solutions and compensation. The establishment of the Loss and Damage Fund is an important step towards operationalizing these approaches.

Some key terms in the emerging literature on loss and damage are closely related to adaptation such as:

- Maladaptation: "Action taken ostensibly to avoid or reduce vulnerability to climate change that impacts adversely on, or increases the vulnerability of other systems, sectors or social groups" (Barnett and O'Neill, 2010: 211).
- Erosive Coping: Coping strategies are erosive when they undermine future livelihood security (van der Geest and Dietz, 2004; Opondo, 2013). Examples of this include selling productive assets to buy food and taking a child out of school to beg or work in the informal sector.
- Adaptation Constraints: Factors that make it harder to plan and implement adaptation actions or that restrict options (IPCC WG2 AR5 glossary).
- Adaptation Limit: The point at which an actor's objectives (or system needs) cannot be secured from intolerable risks through adaptive actions (IPCC). This is the case when "no option exists, or [when] an unacceptable measure of adaptive effort is required" (IPCC, 2014: Ch. 16, p. 8). Soft Limit: No adaptive actions are possible to avoid intolerable risks. Hard Limit: Options are currently not available to avoid intolerable risks through adaptive action (IPCC WG2 AR5 glossary).

## 3 Conceptual Framework

The framework discussed in this section connects losses and damages from climate-related stressors to vulnerability, disaster risk reduction, coping strategies and adaptation (Fig. 1). The framework results from progressive insights from working on loss and damage in vulnerable communities in the past ten years (Warner and van der Geest, 2013; van der Geest and Schindler, 2017; van der Geest and Warner, 2015, 2020), and previous work on impacts of and adaptation to climate change in dryland West Africa (van der Geest 2004, 2011; van der Geest and Dietz, 2004). This work, in turn, builds on a longer tradition of studying livelihoods in risk-prone environments that emerged in the 1990s (Chambers, 1989; Davies, 1996; Blaikie et al., 1994; Scoones, 1998; Ellis, 1998).

The blue box in the upper part of Fig. 1 shows the vulnerability context of households and communities that shape households' livelihood strategies and the measures they put in place to reduce the risk of being adversely affected by climatic and other stressors. The framework distinguishes collective vulnerability—resulting from area-level variables that are the same for all households in a given community—and individual or household vulnerability (Adger, 1999; McLeman, 2010). When a region experiences adverse slow-onset processes or when sudden-onset extreme weather events hit, some households will experience impacts (such as a crop failure or damage to properties) while others may not. This depends on their vulnerability profile—particularly their exposure—and the measures the household has adopted to reduce risk prior to the event. When the household experiences no impact, there is also no loss and damage (hence the green colour of the 'no-impact-box'). When the household is affected by the climatic stressor, it may incur or avoid residual loss and damage depending on whether effective measures are adopted to adjust (hence the red-green colour of the impact and coping/adaptation boxes).

In the case of sudden-onset events, household responses to deal with impacts are 'coping strategies'. If there are no impacts, there is also no need to cope. This is different in the case of slow-onset changes. Households can adapt in response to *actual* or *expected* impacts (Moser and Ekstrom, 2010: 22026). Reactive adaptation is in response to actual impacts and pro-active adaptation is in response to expected impacts.

If there is nothing the household can do to cope or adapt, it will incur losses and damages (hence the red colour of the no-adaptation

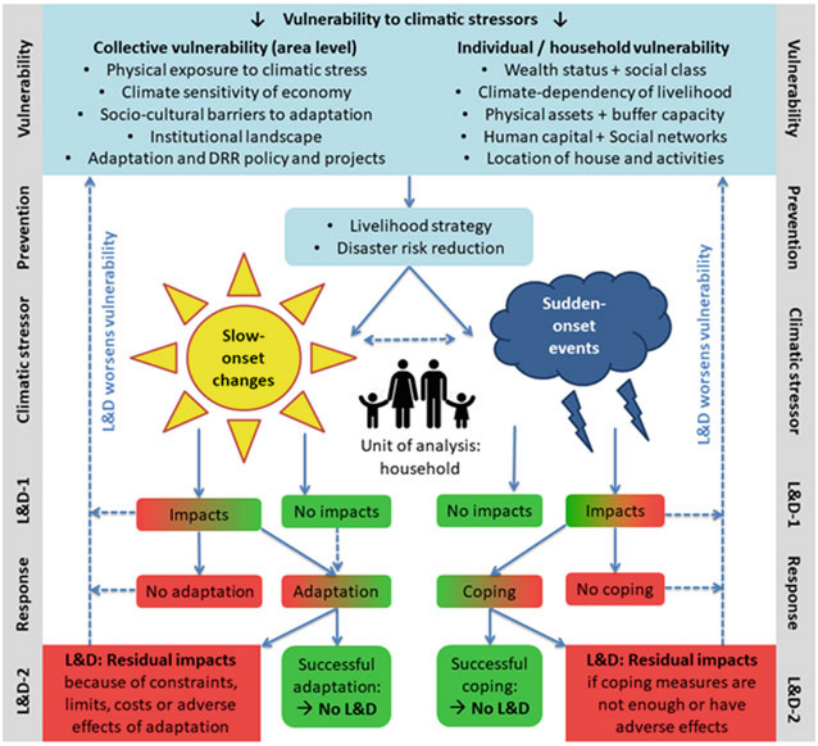


**Fig. 1** Conceptual framework

and no-coping boxes). If coping or adaptation measures are adopted, these may or may not be effective in avoiding residual loss and damage, depending on the household's adaptive capacity and the magnitude of the climatic stressor (or in other words: adaptation constraints and limits[7]). If measures are insufficient, costly or 'erosive' in the longer term, households incur loss and damage (Warner and van der Geest, 2013). Lastly, there is a feedback loop connecting loss and damage back to the

[7] IPCC's Fifth Assessment Report defines adaptation constraints as "factors that make it harder to plan and implement adaptation actions" and it defines an adaptation limit as "the point at which an actor's objectives … cannot be secure from intolerable risks through adaptive actions" (See also Dow et al., 2013).

household's vulnerability profile. This is because the losses and damages incurred render the household more vulnerable in the face of ongoing climatic changes and future extreme events.

A key insight from Fig. 1 is that households can incur loss and damage in two ways. When households incur impacts of climatic stressors despite the risk reduction measures and pro-active adaptation measures they adopted to avoid such impacts, we speak of first-order losses and damages (LD-1). The second way in which households incur losses and damages is when the coping strategies and adaptive measures they adopt have costs or negative side-effects that affect livelihood sustainability in the longer term (erosive coping and maladaptation). These are called second-order losses and damages (LD-2). Alternative one can speak of direct and indirect losses and damages.

## 4 Research Design

This section provides guidance on how to design a mixed-method, people-centred research project that documents already occurring losses and damages from climate change in vulnerable communities. The actual research tools are discussed in the subsequent section.

### *4.1 Scale*

This research design in this paper has been prepared for place-based assessments of losses and damages in local, community-based case studies. However, with sufficient human and financial resources and smart sampling techniques, there is potential for scaling up to regional and even national level. The case studies that informed this paper were generally conducted in one district (or similar administrative unit) per country. In each district, a select number of villages were surveyed. The budget for fieldwork was usually between 20,000 and 35,000 euro per test country. With more budget, a larger study area can be covered, or more households within the study area can be surveyed. Research teams typically consisted of a principal investigator, four to eight enumerators, a note taker for the qualitative interviews and a logistics manager. The average duration of the fieldwork was three to four weeks per case study. The teams conducted approximately 150 to 350 household questionnaires, five to ten focus group discussions (FGDs) and five to twelve expert interviews (EIs).

### 4.2 Research Domains

As explained in the introduction, to properly assess losses and damages in vulnerable communities, it is not enough to simply document items that are lost or damaged. Data need to be gathered and analysed in seven different research domains. For each domain, ideally, data need to be gathered and analysed at household level, but also at district or regional level. The type of data needed in each domain is shown in Table 3.

The household questionnaire covers all seven domains at household level, and generates a combination of quantitative data and more qualitative information from open questions. In-depth insights on each domain at the level of individual people can be obtained through 'life history' type of open interviews, which we have also called 'livelihood histories' (van der Geest, 2004; Ayeb-Karlsson et al., 2016; Ahmed et al., 2019). Additional research tools, such as desk study, focus group discussions and expert interviews can be used to gather and analyse information at the district or regional level, including the effectiveness of planned adaptation and emergency support by the government and organizations.

### 4.3 Site Selection

As this paper aims at improving methods for enhancing our understanding of what losses and damages look like on the ground, site selection is crucial. This section lists a set of criteria for selection of case study areas. In empirical studies of loss and damage, the site selection should be 'purposive' (not random), while selection of survey respondents within study sites should be random. This way, the result can stand academic tests and at the same time provide relevant insights.

**Relevance**: The study area must have experienced and be vulnerable to climate hazards. The research team has the option to study the losses and damages associated with a certain event (e.g. a cyclone or flood that hit the area in a certain year) or focus on a broader range of climate-related stressors.

**Data Availability**: Availability of at least 30 years of meteorological and/or hydrological data is highly desirable. Depending on the focus of the study, daily data on rainfall, temperature, wind speed, water levels and/or river flow volumes would be used to provide a more solid scientific base for linking losses and damages to climatic stressors. It is extremely helpful to conduct a pre-fieldwork analysis of meteorological and/or

**Table 3** Research domains

| *Research domain* | *Questionnaire and in-depth interviews* | Example | *Desk study, focus groups and expert interviews* | Example |
|---|---|---|---|---|
| Climatic stressors, including sudden-onset events and slow-onset processes | People's perceptions | *Changes in rainfall patterns* | Meteorological data | *Drought risks, flood extent; sea level rise* |
| Vulnerability of livelihoods to impacts of these stressors | Household vulnerability | *Distance between house and eroding river bank* | Area-level data | *Data from ministries on crop production in drought years* |
| Preventive measures to deal with existing climatic risks and variability | Household measures | *Mixed cropping; protecting houses* | Information on planned measures by organizations | *Early warning systems* |
| Loss and damage from direct impacts of climatic stressors despite preventive measures | At household level | *Harvest failure, loss of properties; damage to houses* | At area level | *Loss of lives, damage to infrastructure, number of displaced people* |
| Adaptation to climatic changes and impacts | By households | *Livelihood diversification* | By organizations | *Construction of sea walls* |
| Coping with impacts of climate-related events | By households | *Sale of livestock to buy food; migration* | By organizations | *Emergency relief or food aid* |
| Loss and damage related to the costs and adverse side-effects of adopted measures | To households | *Erosive coping measures* | At area level | *Maladaptation; adverse effects of emergency relief* |

*Source* Author's own

hydrological data to ensure that the selected study area has, in fact, experienced climatic disturbances or deteriorations. For example, if the assessment focuses on loss and damage from changing monsoon patterns or increasing temperatures, it is important to ascertain, in advance of the fieldwork, that the meteorological data for rainfall and temperature indeed show adverse changes. If the research team does not have access to local meteorological data at the time of site selection, it is worth checking online databases with high-resolution environmental data (see e.g. de Sherbinin, 2014).

**Climate Sensitivity**: The population in the study area should have livelihoods that are sensitive to climatic perturbations. This is more typical in rural areas than in urban areas. The most climate-sensitive livelihoods occur in areas with predominantly rain-fed agriculture, in areas that are relatively remote with few opportunities for earning a non-farm income and in areas that are in unstable transition zones between agro-ecological systems (e.g. the desert margins and areas close to the permafrost limit).

**Local Contacts**: It is helpful if the implementing organization has well-established contacts in the study area, preferably through a local NGO or government agency with an office in the area or very nearby. Inhabitants and local leaders can also serve as valuable local contacts. While they may lack the formal and bureaucratic capacities, as well as the network of contacts that NGOs or government may have, they may provide unique insights to specific areas that NGOs or the government are unaware of. These contacts make it easier to organize the fieldwork and disseminate findings or organize follow-up activities afterwards.

**Communication**: The best research results are attained if at least some members of the team speak the same language as the study population. This should be considered when selecting a study area. Or vice-versa if a loss and damage assessment needs to be done in a particular place, it is important to recruit research team members who speak the local language.

### *4.4 Survey Sample*

To obtain representative results from a selection (sample) of households in a certain location or area that can be generalized to the whole population, a systematic random sampling procedure is required. Random sampling means that each household in the study site has the same chance of being

selected for an interview. There are different techniques for achieving this, for example:

- All households living in a location or area are listed, and a random selection is drawn from this list. This method can be convenient if a reliable and up-to-date list of households can be obtained from local authorities, other organizations or the population census. In the absence of such a list, when all households need to be identified by the research team, this method can be time-consuming.
- Households are selected from a map that is detailed enough to identify houses. All houses on the map are numbered and listed and a random sample is drawn from the list. For most locations in the world, the 'earth view' in Google maps can be used to create such a detailed map, but there may be quite a bit of 'noise' because not every physical structure is, in fact, a house (e.g. barns, livestock shelter, haystack, companies, public buildings, etc.). Moreover, a house can contain several households. A systematic approach is required to deal with this.
- Line Sampling: Lines are drawn through a location, and households are selected randomly along those lines, e.g. every fifth house on the left and right within 50 metres from the line. Some knowledge of spatial distribution of households (in terms of ethnicity, wealth, occupational groups, etc.) is required to draw the sample lines in a correct way.

In many cases, it will be desirable to sample households in two steps. Typically, the study area for a loss and damage assessment is not a single location, but a district, a municipality, a catchment area, an island or another area unit containing several localities. In this situation, a two-stage sampling procedure is desirable. The following example aims to illustrate this. If the area has a population of approximately 100,000 inhabitants in 50 localities, assuming an average household size of five (can be checked with census data), and a 1 per cent sample is required (i.e. 200 households), the team could decide to first select five localities and then randomly select 40 households per locality. The selection of localities can be random, but in many cases, it can be desirable to use a purposive selection procedure to make sure that certain characteristics that can influence vulnerability to climatic stressors (such as altitude, distance

to main roads, distance to river, etc.) are well represented in the overall sample.

The choice of sampling methods mostly depends on the information that the research team has at its disposal and the time and human resources it is willing to invest in a quality random sample.

### *4.5 Pilot Study*

It could be useful to split the fieldwork for assessing loss and damage into two parts: a 'pilot study', followed by the main research. During the 'pilot study', a small team, including the principal investigator, tests the questionnaire, prepares the sample framework, conducts one or two FGDs and organizes logistics for the arrival of the whole research team. Subsequently, possible lessons learned are considered, before the main research begins.

A standard questionnaire for assessing losses and damages from climate change, that should be relevant and applicable in a wide range of study sites, is publicly available. However, quite a lot of questions (e.g. on livelihoods, impacts and adaptation) are location- and climate-specific. The pilot study can be used to customize the questionnaire and adapt it to the local context and research needs.

### *4.6 Training of the Fieldwork Team*

It is important that the enumerators and research assistants receive a proper training before they start interviewing households. Depending on their level of experience, typically, two to three days of intensive training should be enough to provide a good knowledge base for the fieldwork. The principal investigator should walk them through the methodology and particularly the questionnaire in detail. The team members should then discuss among themselves how to exactly ask questions in the field, and test the results of their work on each other to detect potential problems. When the research is conducted in areas with different languages, some extra time may be needed to ascertain if all questions can adequately be translated in the local languages.

## 5 Research Tools

This section describes the research tools used to assess losses and damages. It includes methods for quantifying losses and damages that are measurable and qualifying losses and damages that are not measurable. The assessment uses a mixed methods approach (Burke Johnson et al., 2007; Morgan, 2007). Six broad work streams are distinguished:

- Desk study
- Household questionnaire
- Participatory research tools, including focus group discussions
- Expert interviews
- Stories of Loss and Damage
- Participatory evaluation of planned climate action

### *5.1 Desk Study*

The desk study consists of a literature review and an analysis of existing climate data (e.g. rainfall data) and, if available, impact variables (e.g. crop yields). The literature review should focus on relevant existing knowledge about impacts of climate change, risk management, coping mechanisms and adaptation in the study area and similar places nearby. In most cases, the climate threats we are studying are not new. Farmers in the Sahel, for example, have had to cope with drought impacts since time immemorial. Impacts of and responses to drought in the Sahel have been studied extensively, and assessments of losses and damages should build on such knowledge. Importantly, the assessment should go beyond this by also exploring limits and constraints to adaptation and the impacts of climate stressors that actors are not able to deal with. The literature review should give a brief overview of existing knowledge on this and identify knowledge gaps.

### *5.2 Household Questionnaire*

The household questionnaire is a central tool in the research design for assessing loss and damage in vulnerable communities. The template questionnaire used in the 12 case studies that this paper builds on is about 10 pages long and the questionnaire interviews took approximately 45

to 60 minutes. The design and structure of the questionnaire follows the conceptual framework in Fig. 1. A balance is sought between measuring and understanding losses and damages, by gathering quantitative as well as qualitative information through open-ended and closed questions.[8] For example, the questionnaire first asks the respondent how a certain climate-related event, such as a drought, affected his or her household. This is an open question. After this, the questionnaire inquires in more detail about specific impacts (with pre-determined categories) and tries to quantify losses and damages if possible.

The questionnaire has been designed as a template that should be applicable across different types of study sites in rural areas of developing countries. Most questions in the questionnaire have relevance in all rural areas in developing countries. However, there are two sections in the questionnaire that need to be customized per study area. First, the closed questions about risk reduction and adaptation, and second, the closed questions about impacts. These sections need to be stressor-specific. For example, adaptation to sea level rise requires very different action than adaptation to increased drought risks. Similarly, impacts of a flood are quite different from impacts of a drought. Future users of this template questionnaire will need to phrase specific questions about impacts and adaptation for the climatic events and changes that their studies focus on (e.g. drought, flood, cyclone, sea level rise, heat waves).

**Part 1: Household Info, Livelihood and Vulnerability:** The questionnaire begins with the most basic socio-demographic information about the household, such gender, age, household composition, education level, marital status, etc. (max 1 page). This is important info as it helps to identify—in the analysis phase—which groups of people are most likely to suffer harm from climate-related stressors, and how this can inform policy to address losses and damages. The questionnaire continues with questions about people's sources of livelihood and more information that sheds a light on their exposure and sensitivity to climate-related hazards, such as the location and quality of their house. Data from this part of the questionnaire can be used as input for a multidimensional vulnerability index (MDVI) and related to the effectiveness of household measures to avoid and minimize losses and damages (see e.g. van der Geest and warner, 2015).

[8] Caution: The team leader has to be on top of the enumerators to ensure that the answers to the open questions are documented in sufficient detail.

**Part 2: Climatic Stressors, Impacts, Responses and Loss and Damage**: In this part of the questionnaire, we try to quantify what is quantifiable (crop losses, damage to houses and properties) and to qualify losses and damages that are not measurable (e.g. non-economic losses and damages (NELDs), such as loss of social cohesion, identity and mental health). This section includes questions about the following topics:

- Changes in the frequency and intensity of climatic stressors;
- Preventive measures to deal with 'normal' climate risks in the area and the effectiveness of these measures;
- Impacts of a specific climatic event on households' livelihood and well-being, e.g. crops, livestock, fishing, non-farm income, food prices, housing, properties, health;
- Coping strategies that households adopt to deal with unavoided impacts of climate-related events, and the effectiveness of these strategies (Fig. 2 provides an example of research results on this);
- Longer-term adaptation to climatic changes and impacts and their effectiveness; and
- Constraints to the effectiveness of preventive, coping and adaptation measures.

The questions about preventive measures, coping and adaptation were asked at two levels. First, we asked about households' own measures. After that, we inquired about the measures developed by organizations in the area.

As an example of research results from the questionnaire survey, Fig. 2 compares the ability of households to avoid losses and damages from droughts and floods in Kenya and the Gambia. The comparison between people who adopted certain coping strategies and those who didn't. An [*] indicates a statistically significant difference at $p < 0.05$ level. People who coped with droughts or floods by relying on non-farm income sources, for example, were less more successful at avoiding losses and damages. A policy implication could be that livelihood diversification can increase resilience to droughts and floods.

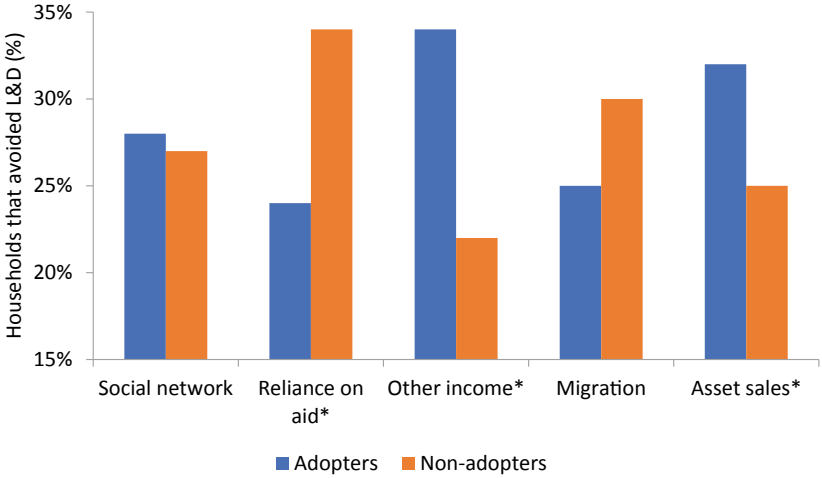


**Fig. 2** Example of research finding about coping strategies

### *5.3 Participatory Research Tools*

Participatory Research Approach (PRA) methods, such as focus group discussions, can be used to ask participants open questions that have more detailed, complex and sometimes contested answers. The insights from these research tools help the researchers better understand the dynamics between key concepts of this research (climate threats, impact, vulnerability, coping, adaptation and loss and damage). PRA tools complement the household survey (questionnaire) in that they yield more qualitative information on how climate variability and climate change can lead to losses and damages among local populations. Another advantage of conducting PRA sessions is that they depict the different experiences of men and women, young and old and possibly of different occupational groups (e.g. crop cultivators, pastoralists, labourers, traders) and socio-economic classes. This can be achieved by having separate groups for different categories of participants. Besides focus group discussions, there is a wealth of other PRA tools that can be useful for loss and damage assessments (see e.g. Rademarcher-Schulz et al., 2012; Afifi et al., 2016).

### *5.4 Expert Interviews*

Expert interviews (EIs) should be conducted to obtain information that would not easily be obtained from PRA sessions and the questionnaire survey, particularly about planned adaptation measures and other interventions by governmental and non-governmental organizations that aim to reduce the risk of loss and damage or provide emergency support when disasters strike. Questionnaire respondents and participants in FGDs may be able to list some projects and interventions by government agencies and NGOs that aim to address adverse effects of climate variability and climate change in the study area. However, certain information about these interventions are often unknown to them. Expert interviews, including online, can also be useful in the pilot study phase when the main fieldwork and research instruments are prepared, and when information about climatic hazards, local livelihoods and typical adaptation measures is needed.

### *5.5 Stories of Loss and Damage*

A select number of households could be interviewed in more depth to extract compelling stories of loss and damage. An efficient way to do this is to instruct questionnaire enumerators to alert the principal investigator when they conduct the questionnaire interview with a person who seems to have relevant experiences to share, for example, someone who has experienced specific adverse effects of climate change or someone who has successfully avoided losses and damages by adopting certain risk reduction or coping measures. These stories can be used in case study reports and other publications in the form of boxes and quotes.

Based on open interviews with checklists, the personal stories of loss and damage aim to give a face to the more quantitative data we gather, and that are presented in aggregates. The stories could take a life history or 'livelihood history' perspective. This method requires quite advanced interviewing and writing skills (a social science background is preferable), and can be time-consuming. Typically, a senior researcher or the principal investigator conducts these interviews.

### 5.6 *Participatory Evaluation of Climate Action*

The objective of this work stream is to assess the ability, effectiveness and constraints of existing climate change-related interventions by governments and NGOs in the study areas to avert, minimize and address losses and damages. This work stream complements the household questionnaire, which focuses more on autonomous adaptation and risk reduction measures by households themselves. Moreover, the exercise can inform possible solutions/actions for each research site, and local practitioners can learn a lot from the analysis as it sheds light on what works, what does not and why, from the point of view of intended beneficiaries.

This work stream builds on prior experiences from the Participatory Assessment of Development project (Dietz, 2013**; Pouw et al., 2016) and the Gibika Research to Action project (Ayeb-Karlsson et al., 2016). Data are gathered during FGDs and EIs. The work stream consists of four steps, in chronological order:

- A list of project or interventions is compiled during FGDs.
- Expert interviews are conducted to clean and complete the list.
- During FGDs, the effectiveness of these projects is evaluated from a people-centred perspective.
- This is followed by a needs assessment (part of the same FGD) to elicit people's views on what is needed to effectively avoid, minimize or address losses and damages in their communities.

This work stream is described in more detail in van der Geest and Schindler (2017).

## 6 Concluding Remarks

While the academic literature on losses and damages from climate change is growing fast, most of these studies use existing databases of disaster losses, often at national level. This type of research is useful in itself, but does not do justice to the perceptions, needs and preferences of the people who are most severely affected by climate change impacts. The conceptual framework and research design presented in this paper aim at helping to improve the empirical evidence of how people at the frontlines of climate change experience losses and damages. It brings a much-needed people-centred perspective into the Loss and Damage debate.

The COVID-19 pandemic made fieldwork-based empirical research in climate-vulnerable countries very difficult in the past few years (Hermans et al., 2021). With a new generation of young researchers, including many who are based in the Global South, focusing their attention on the emerging theme of Loss and Damage, it is my hope that some of the insights, shared in this paper, will help towards improving the quality of empirical, policy-relevant research in different parts of the world.

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