Seeing loss through land

On the emergence of disproportionate climate-related loss and damage in agrarian Cambodia

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KELLY DORKENOO
LUCSUS | FACULTY OF SOCIAL SCIENCES | LUND UNIVERSITY

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On the emergence of disproportionate climate-related loss and damage in agrarian Cambodia

Kelly Dorkenoo

LUND
UNIVERSITY

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Title and subtitle: Seeing loss through land: On the emergence of disproportionate climate-related loss and damage in agrarian Cambodia.

Abstract:

The climate is changing in ways that make loss more present. People and places in the Global South whose economies and rural livelihoods are centred on land and natural resources are considered particularly vulnerable to climate change and are expected to disproportionately experience climate-related loss. Evidence of such disproportionate burdens and the injustices they engender is growing and gaining significant attention in international negotiations on climate change under the umbrella term of 'Loss and Damage'. Yet, many uncertainties and disagreements remain about what constitutes (disproportionate) climate-related loss, for whom, and how it can be addressed.

In this thesis, I ask how climate-related loss emerges in agrarian contexts and how it can become characterised as disproportionate. I address this question through five articles. Employing an interdisciplinary and mixed-method approach, I review knowledge on disproportionality in loss and damage and empirically investigate climate-related loss in two case studies in Cambodia. I critically examine how disproportionality in climate-related loss is conceptualised, empirically analysed, and experienced; the processes that underpin climate-related loss, using land as an analytical entry-point; and the role of representation of smallholder farmers' interests in visions of the future with climate change in the emergence of disproportionate climate-related loss. I frame climate-related loss as losing the ability to derive benefits from objects or phenomena of value as a result of climatic and socioeconomic drivers and argue that it can be characterised as disproportionate in relation to the ability to influence the conditions that lead to this loss. Drawing on scholarship on the political economy of vulnerability and sociology of climate change and loss, I show how financialization plays a critical role in precipitating the loss of ability to derive benefits from the land for some, to the benefit of others. The findings of the thesis demonstrate the power-laden processes through which climate-related loss emerges in agrarian settings and how these unfold through changes in land relations.

In the thesis I make the following contributions: i) provide empirical evidence of climate-related loss in agrarian contexts in Cambodia; ii) conceptualise disproportionate climate-related loss as an emergent phenomenon at the intersection of access and value; iii) contribute to theorizations of climate-related loss beyond the frame of vulnerability; and iv) propose a relational justice lens to support the transformative potential of climate-related loss. In doing so, I critically engage with knowledge at the interface of science and policy and contribute to a deeper understanding of the role of climate-related loss in pathways towards sustainability.

Keywords: climate change; loss and damage; land; agrarian change; financialization; Global South; relational justice; critical realism; vulnerability; sustainability science.

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MADE IN SWEDEN

"The land knows you, even when you are lost."

Robin Wall Kimmerer

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Abstract

The climate is changing in ways that make loss more present. People and places in the Global South whose economies and rural livelihoods are centred on land and natural resources are considered particularly vulnerable to climate change and are expected to disproportionately experience climate-related loss. Evidence of such disproportionate burdens and the injustices they engender is growing and gaining significant attention in international negotiations on climate change under the umbrella term of 'Loss and Damage'. Yet, many uncertainties and disagreements remain about what constitutes (disproportionate) climate-related loss, for whom, and how it can be addressed.

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Abstract in Swedish

Klimatet förändras på ett sätt som gör förlusterna mer påtagliga. Människor och platser i det globala syd vars ekonomier och försörjning på landsbygden är centrerade kring mark och naturresurser anses vara särskilt sårbara för klimatförändringar och förväntas uppleva oproportionerligt stora klimatrelaterade förluster. Bevisen för sådana oproportionerliga bördor och de orättvisor de leder till växer och får stor uppmärksamhet i internationella förhandlingar om klimatförändringar under paraplytermen "förlust och skada". Ändå kvarstår många osäkerheter och oenigheter om vad som utgör (oproportionerliga) klimatrelaterade förluster, för vem och hur de kan hanteras.

I den här avhandlingen ställer jag frågan hur klimatrelaterade förluster uppstår i agrara sammanhang och hur de kan karaktäriseras som oproportionerliga. Jag behandlar denna fråga i fem artiklar. Med hjälp av ett tvärvetenskapligt tillvägagångssätt och blandade metoder granskar jag kunskapen om oproportionalitet i förluster och skador, samt undersöker empiriskt klimatrelaterade förluster genom två fallstudier i Kambodja. Jag undersöker kritiskt hur oproportionerliga klimatrelaterade förluster konceptualiseras, analyseras empiriskt och upplevs; de processer som ligger till grund för klimatrelaterade förluster, med mark som analytisk utgångspunkt; och vilken roll representation av småskaliga jordbrukares intressen i visioner om klimatframtider spelar för uppkomsten av oproportionerliga klimatrelaterade förluster. Jag definierar klimatrelaterad förlust som förlust av möjligheten att dra nytta av värdefulla objekt eller fenomen till följd av klimat-relaterade och socioekonomiska faktorer, och hävdar att sådan förlust kan karakteriseras som oproportionerlig i förhållande till förmågan att påverka de förhållanden som orsakar den. Med hjälp av forskning om sårbarhetens politiska ekonomi och sociologi om klimatförändringar och förluster visar jag hur finansialisering spelar en avgörande roll för att påskynda förlusten av förmågan att dra nytta av marken för vissa, till förmån för andra. Resultaten i avhandlingen visar de maktladdade processer genom vilka klimatrelaterade förluster uppstår i agrara miljöer och hur dessa utvecklas genom förändringar i markrelationer.

I avhandlingen gör jag följande bidrag: i) tillhandahåller empiriska bevis på klimatrelaterade förluster i agrara sammanhang i Kambodja; ii) konceptualiserar oproportionerliga klimatrelaterade förluster som ett framväxande fenomen i skärningspunkten mellan tillgång och värde; iii) bidrar till teoretiseringar av klimatrelaterade förluster utanför ramen för sårbarhet; och (iv) föreslår ett perspektiv av relationell rättvisa för att stödja den transformativa potentialen hos klimatrelaterade förluster. Genom att göra detta engagerar jag mig kritiskt med kunskap i gränssnittet mellan vetenskap och politik och bidrar till en djupare förståelse av den roll som klimatrelaterad förlust spelar i vägar mot hållbarhet.

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List of Papers

Paper I

Dorkenoo, K., Scown, M., & Boyd, E. (2022). A critical review of disproportionality in loss and damage from climate change. *WIREs Climate Change*.

Paper II

Dorkenoo, K., Nong, M., Persson, J., Chea, N., & Scown, M. (No date) Climate-related loss and damage in contexts of agrarian change: Differentiated sense of loss from extreme weather events in northeastern Cambodia. *In Review*

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Persson, J., **Dorkenoo, K.,** Nong, M., Nhong, S., Nguyen, V. (No date) From loss to transformation? Towards pluralistic and politicised agrarian climate futures in mainland Southeast Asia. *In Review*

Author contributions

Paper I: I (KD) am the first author of this paper, for which I led the conceptualisation, with support from MS and EB. KD undertook the review, analysis, and writing. MS and EB provided guidance and draft edits. *Paper II*: I am the first author of this paper, for which I led the conceptualisation. KD, MN, JP, NC, and MS developed the research design. KD and NC conducted the data collection. KD led the writing with contributions, guidance, and draft edits from MN, JP, and MS. *Paper III*: I am the first and sole author of this paper, for which I led the conceptualisation, data collection, analysis, and writing. *Paper IV*: KD and PR developed the conceptualisation jointly, conducted the data collection separately, analysed the data and wrote the manuscript jointly. *Paper V*: JP, KD, MN, SN, and VN, conceptualised the paper and conducted data collection (jointly and separately). JP and KD share co-first authorship and jointly led the writing with contributions from MN, SN, and VN.

Abbreviations

COP	Conference of the Parties
CPP	Cambodian People's Party
ELCs	Economic Land Concessions
GDP	Gross Domestic Product
ICLT	Indigenous Communal Land Title
IPCC	Intergovernmental Panel on Climate Change
L&D	Loss and Damage
LDC	Least Developed Country
MFIs	Microfinance Institutions
SEZs	Special Economic Zones
SIDS	Small Island Developing States
UNFCCC	United Nations Framework Convention on Climate Change

List of key terms

Term/concept	Definition
Agrarian society	The FAO defines an agrarian society as "one in which agriculture plays a large role in defining economic, political and cultural values." (FAO, 2003)
Climate change	The IPCC glossary defines climate change as: "A change in the state of the climate that can be identified (for example, by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or land use. Another conceptualisation relevant to this thesis is the one by Taylor (2014), which describes the climate as co-produced at various scales through the interactions of meteorological forces, forms of social organisation, physical infrastructure and discursive practices that shape the lived environments.
Climate-related loss (and damage)	Loss can broadly be described as the fact or process of losing something; a transformation from presence to absence that affects objects or phenomena of value (Barnett et al., 2016; Elliott, 2018). I refer to loss as climate-related, to emphasise that impacts and risks arising from climate (change) do not cause processes of loss on their own, but rather conjunctly with and through multiple other processes, dynamics, and relations. In policy discussions and scholarship on loss and damage, loss is often distinguished from damage through the notion of irreversibility or incommensurability. I use the term "climate-related loss" to encompass both loss and damage because I approach them as interconnected.
Disproportionate /Disproportionality	In common usage, "disproportionate" refers to something too large or small in relation to something else. It can also refer to a sense of unfairness or injustice (Pomerleau, n.d.).
Extreme weather event	The IPCC glossary defines an extreme weather event as "An event that is rare at a particular place and time of year. Definitions of 'rare' vary, but an extreme weather event would normally be as rare as, or rarer than, the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense." (IPCC, 2022a, p. 2908)
Impact	An impact denotes having an effect or influence on something. It may be positive or negative.
L/loss and D/damage	The IPCC Glossary provides the following definition: "Research has taken Loss and Damage [capitalised] to refer to political debate under the United Nations Framework Convention on Climate Change (UNFCCC) following the establishment of the Warsaw Mechanism on Loss and Damage in 2013, which is to 'address loss and damage associated with impacts of climate change, including extreme events and slow onset events, in developing countries that are particularly vulnerable to the adverse effects of climate change.' Lowercase letters (losses and damages) have been taken to refer broadly to harm from (observed) impacts and (projected) risks and can be economic or non-economic (Mechler et al., 2018)." (2022, p. 2912)
(Climate) vulnerability	Vulnerability can be broadly defined as the potential for loss (Cutter, 1996). More broadly, the concept denotes the combination of physical and social factors that put people and places at risk of undesirable outcomes and the differentiated capacities to cope with and adapt to stressors associated with social and environmental change (Adger, 2006; Cutter, 1996; IPCC, 2022a; Wisner et al., 2003).

Introduction

"When everything changes, what do we hold onto for hope?" Mon asked, as he reflected on his future. He worried that this year, the rain would be late, again. When I met Mon, he had only started farming five years before, but with each passing season, his worries had deepened and the risk of losing his land had grown.

For most of his life, he had managed to make a living and provide for his family despite the hardships. In his village, in the northeast of Cambodia, he had been able to use abundant land and vast tracts of forests for his and his family's livelihood. Before becoming a farmer, Mon had mainly lived off foraging and fishing. When forests decreased and companies and in turn other villagers started claiming land, this access abruptly decreased and he turned to ad-hoc construction work for a few years. There also, opportunities dwindled. Instead, farming cassava had seemed like a good option.

Despite optimistic beginnings on the farm, yields have declined, and the seasons are not what they used to be. The once-predictable rainy season has become increasingly erratic. As Mon described: "The rain arrives late, and when it does come, it's too fleeting or unusually heavy." Pests and crop diseases are more frequent, leaving Mon no choice but to use more pesticides and fertilisers.

A late rain would mean more than a bad harvest. He would risk losing his newly planted crops and being pushed further into debt. Mon had relied on loans to cover his expenses and buy essential supplies, using his land title as collateral. Despite his best efforts, he felt trapped in an endless cycle of bad weather and poor harvests and feared that he would lose his land.

Selling his land would not only represent a financial loss, it would also herald a loss of hope itself. There are just too many things over which Mon has little if any control: the weather, market prices, loan conditions, and overall development and change in his province. Yet, when asked about how he felt about his situation, Mon explained he had no choice but to manage somehow and hold onto hope for the future.

This story illustrates three core themes of this thesis:

i) Climate and development processes intertwine in ways that produce undesirable outcomes for many, particularly in agrarian contexts.

ii) The climate is changing in ways that make loss, in its many forms, increasingly present.

iii) This affects some people and places more than others and is fundamentally a matter of justice.

Cambodia is classified as a Least Developed Country (LDC) and is considered particularly vulnerable to climate change.[1] The increasing burden of harm, loss, and damage associated with climate change affecting certain places and people, has gained significant attention in global climate governance under a policy framework called *Loss and Damage*. Countries in the Global South whose economy and people are highly dependent on climate-sensitive sectors such as agriculture, like Cambodia, are expected to *disproportionately* experience climate-related loss and damage.

How does climate-related loss come to be and in what ways can it be disproportionate? In this thesis, I explore processes and experiences of climate-related loss in agrarian contexts in Cambodia to better *understand* and *address* disproportionate climate-related loss.

Photo. Riverine landscape in northeastern Cambodia.

[1] The United Nations define Least Developed Countries as low-income countries confronting severe structural impediments to sustainable development, which are are highly vulnerable to economic and environmental shocks and have low levels of human assets. (United Nations, n.d.-a)

Agrarian-climatic change in mainland Southeast Asia

The intertwined processes of climate change and development are particularly salient in agrarian-rural regions, such as in mainland Southeast Asia, where they unfold through complex relations centred on land.[2] The cultivation and use of resources provided by land are central to agrarian systems and the livelihoods of smallholder farmers in the region. In such contexts, climate change leads to more extreme weather events and acceleration of land desertification and degradation that severely affect agricultural productivity and land-based livelihoods. This tends to aggravate poverty and food insecurity (IPCC, 2019). Meanwhile, the intensification of agriculture and shifts in land use related to industrialisation that is witnessed in the region contribute to climate change (IPCC, 2019). Agrarian-rural regions in mainland Southeast Asia, which host many of the world's small-scale farmers and are the source of a significant portion of global food production, are often described as particularly vulnerable to climate change (ETC Group, 2022; IFAD, 2013; IPCC, 2022b).

Legacies of unequal development extensively influence the extent to which people are exposed to climate change as well as their capacities to adapt to its impacts. Furthermore, decades of rural development policies and interventions since the 1950s that have promoted the intensification of land use have redefined the relations of production in the agricultural sector (Ellis & Biggs, 2001; McMichael & Weber, 2022). These regions were gradually integrated into an increasingly globalised economy. Smallholder production systems are no longer solely dependent on family labour and the production of crops for subsistence but are increasingly oriented towards producing crops for global markets (Bernstein, 2010; Castella, 2012). Demands for higher productivity have generated an ever-increasing need for fertiliser, pesticides and other chemical farming inputs. Coupled with monocropping, this is accelerating soil degradation and a decline in biodiversity (Hirsch, 2020; Shattuck, Werner, et al., 2023). These structures, as remnants of historical processes, continue to shape the possibilities of life on land in the wake of climate change.

Consequently, many smallholder farmers and other social groups in rural-agrarian regions of mainland Southeast Asia are finding it increasingly difficult to make a living from the land. Rice production remains central to the livelihoods of many farming households that depend on rainfed agriculture and consistent tropical monsoon rains (Nong, 2021). Erratic seasons jeopardise their ability to produce sufficient food for their own consumption and the market. It also makes it more difficult to respond to the imperatives of global food production as new crops become economically attractive

[2] Cambodia, Laos, Myanmar (Burma), Thailand, Vietnam, and the peninsular part of Malaysia

and market dynamics lead to price swings. Together, these changes render farmers increasingly dependent on financial instruments, especially microfinance loans, to sustain increasingly fragile and precarious farming systems (Clapp & Isakson, 2018; Green, 2020a; Isakson, 2015). This increasing dependence on financial instruments reflects broader patterns of financialization of agriculture and land in the region, which is associated with a growing influence of financial actors, institutions, and markets in economic systems (Epstein, 2005). Social differentiation and patterns of marginalisation related to processes of state formation in Southeast Asia further condition ownership of and access to land and natural resources, often along the lines of ethnicity, wealth, and gender (Firth, 1950; T. M. Li, 2001, 2010). Combined with limited access to social protection and insecure land tenure, these exacerbate the socio-economic inequalities that extreme climate events can engender (IPCC, 2022b).

Climate change exacerbates pressures on the land and those who depend on it. Across mainland Southeast Asia, landscapes where productive agricultural land coincides with carbon and biodiversity-rich forests are increasingly at the epicentre of competing claims. Global climate politics and the need for land for mitigation measures such as afforestation have, in many cases, legitimised large-scale land acquisitions and led to a loss of access to land for smallholder farmers (Borras Jr et al., 2020; Franco & Borras Jr, 2021; Sekine, 2021). More than an asset or means to produce, the land is core to socio-cultural systems and ways of life of many people in the region – especially its indigenous populations and ethnic minorities. Loss of land is thus more than an economic matter; it has deep social, cultural, and political implications. As Shattuck, Grajales, et al. (2023, p. 491) note, "climate change and climate policies are already making rural life more difficult and violent […] Nothing has provoked the will to fight as much as land". The growing burden of climate-related losses and damages redefines what is possible, desired, and for whom under conditions of climate change, bringing the question of responsibility centre stage.

The rise of Loss and Damage and disproportionality in global climate governance

> Losses and damages [from climate change] are unavoidable and are unequally distributed: Adaptation cannot prevent all losses and damages. Losses and damages are disproportionately experienced by developing countries and by vulnerable groups.
>
> Adelle Thomas, Lead author on the IPCC's 2022 report on Impacts, Adaptation and Vulnerability, in an interview with the United Nations

In 2022, the Loss and Damage Fund was established under the United Framework Convention on Climate Change (UNFCCC), more than thirty years after the first appearance of the proposal in international negotiations. This was described as a historic moment. For some, establishing the fund constitutes a critical step towards acknowledging and addressing the disproportionate burden of climate-related impacts affecting developing countries in the Global South.

Loss and Damage (L&D) emerged from a growing awareness of the shortcomings of efforts to mitigate and adapt to climate change. It also reflects an acknowledgement that those who stand to suffer most from its impacts have the lowest financial resources to face them. The concept first appeared in international negotiations on climate change in 1991 in a proposal from a group of negotiators from AOSIS/Small Islands Developing States (SIDS). The proposal emphasised the need for an insurance mechanism to address the differentiated impacts from, responsibilities for, and capacities to deal with climate change (Roberts & Huq, 2015). In science, "loss and damage" (not capitalised) refers to the various forms of harm to people, societies, and the environment resulting from climate-related impacts and risks (Warner & Geest, 2013). L&D, meanwhile, represents the broader policy agenda associated with the Warsaw International Mechanism for Loss and Damage that aims to "address loss and damage associated with impacts of climate change, including extreme events and slow onset events, in *developing countries that are particularly vulnerable* to the adverse effects of climate change. [emphasis added]" (IPCC, 2022a, p. 2914).

The issue is more than a question of differentiated vulnerability to climate change. Evidence is mounting that some places and social groups are and will be disproportionately affected by climate-related loss and damage (IPCC, 2022b; United Nations, n.d.-b). Assessments show that current climate policies and emission reductions have set the world on a path that leads to well above the agreed 2°C warming limit, whilst adaptation efforts of the last two decades have not yielded the intended and necessary outcomes (Berrang-Ford et al., 2021; IPCC, 2023). With every degree

of warming, occurrences of extreme weather events increase, adaptation options narrow, and the probability of less likely but high-impact events grows (IPCC, 2022b). Evidence indicates that the loss of sea ice and snow causes extreme weather events and storms to be stronger in the southern hemisphere than in the northern hemisphere (Shaw et al., 2022). A global assessment of the impacts of climate change on public health stated that in 2010 alone, as many as 98% of the 400,000 climate-related deaths globally occurred in developing countries (Climate Vulnerability Monitor, 2012). While some countries strive to maintain their achieved levels of socio-economic development in this new set of climatic conditions, others see theirs being "set back" decades with every occurrence of extreme weather (Benjamin & Thomas, 2023; Martin del Campo et al., 2023).

Though disproportionality is increasingly invoked in scientific and political discourses on climate-related loss and damage, it remains poorly defined. In common usage, disproportionate refers to something too large or too small in relation to something else. The term can also refer to a sense of unfairness or injustice (Pomerleau, n.d.). In the context of global climate governance, it is mainly formulated as a question of responsibility, whereby those who contribute the least to climate change are most impacted by it (Deivanayagam et al., 2023; Diouf Sarr, 2022). Studies show that Global North countries hold disproportionate historical responsibility for the climate crisis due to unfair and excessive use of atmospheric commons to the detriment of Global South countries (Fanning & Hickel, 2023). Other approaches to disproportionality centre around the relationship between hazard and its degree of impact, whereby the same climate-related hazard affects different places or people disproportionately in relation to a pre-determined baseline (Boda et al., 2021). Understanding how and why some people and countries disproportionately experience climate-related loss and damage across socio-political and geographical contexts, poses significant conceptual, methodological, and normative challenges. These include determining what constitutes and who suffers a loss, assessing responsibility for climate-related losses, and evaluating the extent to which and how they can be compensated (Adger, 2023; Barnett et al., 2016).

Climate change, loss, and sustainability: research focus and rationale

A central concern and departure point for this thesis is the starkly unequal – increasingly characterised as disproportionate – burden of climate-related loss that affects certain people, groups, and places. This I argue, undermines social justice and fairness, and constitutes a sustainability problem. Sustainability is often defined in reference to the definition of sustainable development put forward in the Brundtland Commission report of 1987, as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). My understanding of sustainability, however, more closely aligns with conceptualisations oriented around rights and well-being. In particular, I highlight two aspects:

i. sustaining human freedom and well-being, by ensuring people's capabilities to live a life they find meaningful (Sen, 2013)

ii. principles of climate justice that call for ecological unity of all species and the right of communities "to be free from climate change, its related impacts and other forms of ecological destruction" (*Bali Principles of Climate Justice*, 2002).[3]

Despite a significant uptake in loss and damage research, climate-related loss remains a blind spot in sustainability science.[4] Loss (and damage) has largely become conceptualised as an aftermath of failing to adapt to climate risks or reaching adaptation limits (Mechler et al., 2019). But as sociologist Rebecca Elliott (2018) argues, loss invites us to reverse our gaze and in doing so serves as a "provocative riposte" to sustainability: "It adjusts the analytical focus, asking about what does, will, or must disappear rather than about what can or should be sustained. […] It can highlight contradiction: what is lost so that other things can be sustained?" (pp. 303–304). Such a focus calls for critical examinations of the root causes of unsustainability.

Hence, I situate my thesis within critical scholarship on climate justice and sustainability. These bring to the foreground climate change as a systemic problem

[3] The Bali Principles of Climate Justice redefine climate change from a human rights and environmental justice perspective. The principles were developed by a coalition of civil society organisations at the final preparatory negotiations for the Earth Summit in Bali in June 2002. (International Climate Justice Network, 2002)

[4] The number of scientific articles on loss and damage multiplied five fold between 2013 and 2023 (source: search "loss and damage" and "climate change" on Scopus). However, in a recent comprehensive review of sustainability science by Clark & Harley (2020), loss and damage does not appear in the text.

rooted in global processes of unequal development, uneven access to resources, and power relations (Dehm, 2020; Deivanayagam et al., 2023; Nightingale et al., 2020; Ribot, 2022; Sultana, 2021). What makes the problem of climate change a social justice issue is the *disproportionate* (as opposed to merely differentiated or uneven) burden of climate-related impacts that affect some people and places and their associated responsibilities (Boyd et al., 2021; Bullard et al., 2016). Critical climate justice views the spatially (between places, social groups and countries) and temporally (historical and future) uneven distribution of harms and responsibilities related to climate change as historically, systemically, and structurally rooted (Sultana, 2021). Climate change constitutes a symptom of a deeply unequal, racialised, capitalist system of production and consumption, and climate justice aims to:

> [I]dentify and foreground the needs of individuals and groups most marginalized in the face of climate change impacts as well as our responses to these impacts (i.e. mitigation and adaptation strategies), and to dismantle the individual and structural architectures of marginalization, exploitation and oppression towards these groups. In this sense, climate justice is prefigurative; it envisions not only a world in which climate change no longer exacerbates social inequity, but one in which societal responses to its impacts themselves offer an opportunity to build a more equitable and sustainable world. (Mikulewicz et al., 2023, p. 1277)

In both science and policy, there has been limited progress on ways to address the disproportionate burdens of climate-related loss affecting some people and places. Borrowing from the work of novelist Amitav Ghosh and the notion of Great Derangement, Nightingale et al. (2020) recently declared that climate change research was "at an impasse", unable to move beyond a dualistic understanding of nature-society relations, to "reimagine the climate dilemma and embed a political understanding in the climate change field".[5] Unsurprisingly, the current climate governance regime has so far been unable to advance "the scale of progressive, meaningful action that centres the needs and bridges the *many justice deficits* facing climate-vulnerable countries and regions [emphasis added]" (Perry & Sealey-Huggins, 2023, p. 1). L&D debates in global climate governance have mostly centred on distributive dimensions of climate justice between North/South and developed/developing countries. For over a decade, scholars have emphasised that such approaches to justice in climate governance struggle to account for the priorities and diverse values of groups and people affected by climate change (Forsyth, 2014).

[5] In 2016, novelist Amitav Ghosh published a book titled "The Great Derangement: Climate Change and the Unthinkable".

Vulnerability is currently considered the principal criterion on which to design systems of allocating L&D financing between countries. This raises many concerns. Primarily, the extent to which vulnerability adequately captures the multiple dimensions of climate-related loss and fosters justice in L&D (Naylor & Ford, 2023; Robinson, Roberts, et al., 2023). As the predominant framework for research on the impacts of climate change, vulnerability has taken centre stage in discussions on loss and damage. The use of vulnerability in science, policy, and practice, is, however, subject to intense debate (Barnett et al., 2008; Cutter et al., 2003; Kelman et al., 2016). Key points of contention revolve around the way climate vulnerability in its varied understandings, treats and engages with causality, responsibility, agency, scale, and normativity. In other words, explaining what went wrong and why, where and for whom, as well as what can and needs to be changed for the better. Some approaches to vulnerability have faced criticism for reinforcing a static view of human-environment interactions and obscuring the agency, diverse values, and risk perceptions of some groups and places by portraying them as inherently vulnerable (Arora-Jonsson, 2011; Ford et al., 2018; Ribot, 2014). Other approaches, often described as "social-causal" and more rooted in political-economic analysis, understand vulnerability as socio-politically produced (Barnett, 2020; Eriksen et al., 2015; Ribot, 2022). In this view, hazards only serve to reveal underlying conditions of precarity. As I discuss in Chapter 2, while vulnerability frameworks are foundational for understanding the potential for climate-related loss to occur, it is necessary to integrate notions of value to understand how, why, and for whom climate-related *loss* – beyond mere impact – arises.

Climate-related loss is increasingly framed as historically rooted in processes of uneven development. There are, however, limited insights into how it arises in diverse social and political-economic contexts, especially *within* countries in the Global South. As I illustrated above, smallholder farmers, indigenous people, and ethnic minority groups in agrarian settings in the Global South are often identified as particularly "vulnerable" to climate change and likely to experience a disproportionate burden of losses and damages from climate impacts. This is partly due to historically rooted patterns of socio-economic and political marginalisation. However, the empirical body of knowledge on climate-related loss and especially how capitalism and associated political-economic drivers manifest in and influence climate-related loss in these contexts remains nascent (McNamara & Jackson, 2019). This is surprising given the influence of colonial legacies and extractive forms of development on these groups and their capacities to face climate change impacts (Agarwal & Narain, 2019; Farbotko et al., 2023; Robinson, Douma, et al., 2023; Scheidel et al., 2023). In their systematic review of experiences of climate-related loss, Tschakert et al. (2019) found that only 11% of the 106 studies in their sample had been conducted in low-income countries

compared to high and middle-income, and indigenous perspectives were largely absent.[6] Similarly, while some countries and geographical regions are well represented in loss and damage literature (For example, Bangladesh and SIDS), others remain overlooked. This includes Cambodia which – as I show in Chapter 3 – starkly illustrates the complex relationships between development, climate vulnerability, and loss in agrarian contexts.[7] These empirical gaps foster an uneven representation of experiences and processes of climate-related loss in specific contexts and across scales. The findings of this thesis, particularly Chapter 5, partly remedy some of these gaps.

Optimistic perspectives signal a transformative potential in climate-related loss and damage. However, for this potential to be realised, several additional gaps need to be addressed. L&D is perceived as an opening to foster climate justice by equitably redressing injustices to the benefit of those who face the greatest – or disproportionate – loss from climate change (Boyd et al., 2021; Sultana, 2021). Despite the important practical and normative implications of disproportionality in climate-related loss, it remains under-theorised. To date, there is limited conceptual insight into what is disproportionate and in relation to what. Similarly, while L&D may offer an opportunity to adopt "development pathways that address the root causes of vulnerability" but this requires greater representation of the objectives and values of affected people who "are often excluded from decision-making processes yet forced to live with their outcomes" (Roberts & Pelling, 2019, pp. 1, 9). If climate justice is prefigurative and aims to address power imbalance, then it is necessary to understand how those social groups who are disproportionately affected by climate-related loss are represented in visions of the future in a changing climate and what role this plays in producing loss. To adequately address the justice implications of disproportionality in L&D, there is a need for more situated normative frameworks that can account for the scalar dimensions of climate-related loss, which I discuss in Chapter 6.

My approach in this research is critical, in the sense that I interrogate the conditions that create the problem of *un*sustainability in the first place (Jerneck et al., 2011). I do this by examining terms and concepts vis-à-vis the relationships, processes, and events they are meant to describe. A central task in my work is therefore untangling the relationships between vulnerability, climate impacts, loss, disproportionality, and representation. In addition, to drawing out their justice implications for marginalised groups and places. To do so, I employ critical realism as a meta-theory and a methodological approach consisting of an embedded case study and mixed methods

[6] The World Bank classifies countries as: low income, $1,135 or less; lower middle income, $1,136 to $4,465; upper middle income, $4,466 to $13,845; and high income, $13,846 or more (2024).

[7] None were found in peer-reviewed academic publications.

using land as a lens through which to study the emergence of (disproportionate) climate-related loss in agrarian contexts in Cambodia (Chapter 4).

Aim and research questions

My research starts from the body of evidence that some places and social groups are disproportionately affected by climate change and climate-related loss. From there, I explore disproportionality and climate-related loss as interlinked phenomena, conceptually and empirically. The overarching aim is to better understand and address the emergence of disproportionate climate-related loss.

My main research question is: *How does climate-related loss emerge in agrarian contexts and how can it become characterised as disproportionate?* Three sub-research questions address this:

1. How is disproportionality in climate-related loss and damage conceptualised, empirically analysed, and experienced?
2. What processes underpin climate-related loss through land?
3. What role does representation of smallholder farmers' interests in visions of the future with climate change play in the emergence of disproportionate climate-related loss?

The thesis is a compilation of a synthesis or *kappa* (coat in Swedish) accompanied by five research articles. Each article, summarised below, has its own framework and approach and contributes a piece of the research puzzle. The kappa can be read as a standalone document, and its content draws from the articles that contribute responses towards the three sub-research questions. Taken together, the findings of the articles and the kappa address the overarching aim and main research question. An overview of which articles contribute to each of the research questions is provided in Table 1.

Paper I. *A critical review of disproportionality in loss and damage from climate change* is based on a systematic review of peer-reviewed publications on loss and damage. It assesses how "disproportionality" is used, conceptualised, and operationalised. It develops an analytical framework composed of three main themes – risk, impacts, and burdens – to characterise and identify the limitations of the use of the term. It primarily contributes by providing evidence of knowledge gaps on disproportionality.

Paper II. *Climate-related loss and damage in contexts of agrarian change: Differentiated sense of loss from extreme weather events in northeast Cambodia* is an empirical and

methodological paper that focuses on experiences of climate-related loss among smallholder farmers belonging to indigenous and ethnic minority groups in Ratanakiri province in Cambodia. It uses mixed methods including statistical analysis of primary survey data. The analysis combines climate vulnerability with experiential and relational dimensions of agrarian-climatic change to explain differentiated sense of loss.

Paper III. *Salt and Power: Making sense of loss in a changing climate through scalar politics*, zooms in on the case of Cambodia's only salt production site, which is facing severe impacts from erratic rainfall during the dry season. The analysis is based on qualitative data and centres on what disappears and persists, and for whom in the context of climate change to understand how loss occurs as a scalar and political process.

Paper IV. *On the production of vulnerability and loss: Land dispossession, indebtedness, and climate change amongst indigenous and ethnic minority communities in northeast Cambodia* is a multi-method paper that takes a historical perspective on climate-related loss among indigenous and ethnic minorities in the region. The analysis analyses the production of land and livelihood insecurity, and loss.

Paper V. *From loss to transformation? Towards pluralistic and politicised agrarian climate futures in mainland Southeast Asia,* is based on empirical data from Cambodia and Vietnam and presents a framework – agrarian climate futures – that is intended to enhance the representation of smallholder perspectives in discussions about the future in a changing climate and related sustainability transformations.

Table 1. Contributions of each article to the research questions

Research question	**Articles**				
	I	II	III	IV	V
How is disproportionality in climate-related loss and damage conceptualised, empirically analysed, and experienced?	■	■			
What processes underpin climate-related loss through land?			■	■	
What role does representation of smallholder farmers' interests in visions of the future with climate change play in the emergence of disproportionate climate-related loss?	■	■	■	■	■

Conceptualising climate-related loss in agrarian contexts

At the core of every scientific inquiry lie assumptions about the nature of being (ontology) and the knowledge of it (epistemology). Being cognisant of and explicit about those assumptions is a necessary step towards articulating and using knowledge about the social world. This thesis is positioned within sustainability science, which is typically described as a normative science that centres on solving complex sustainability challenges (Clark & Harley, 2020; Kates, 2011). Employing critical and problem-solving approaches that bridge the social and natural sciences, while questioning assumptions of knowledge and its production, are core tenets of sustainability research (Caniglia et al., 2021; Jerneck et al., 2011). My approach to knowledge is grounded in *epistemological relativism*, which posits that knowledge is partial, situated, and therefore fallible. To critically examine and navigate the complexity of climate-related loss, I draw on *critical realism* as a philosophy of science.

Closely aligning with the normative aims of sustainability science, critical realism places an explanation of the causal mechanisms of specific problems as central to the pursuit of human emancipation (Bhaskar, 1986). The emancipatory implications of scientific explanations are, however, not inherent. Rather, they are dependent on a situated understanding of the world combined with sets of values that in turn "always depend upon our social experience and context" (Elder-Vass, 2010, p. 11). My understanding of sustainability and climate justice is largely rooted in the notion of emancipation, which I understand as expanding rights and well-being through liberation from oppressive structures (Mikulewicz et al., 2023; Sen, 2013). My approach to this research follows recent contributions and applications of critical realism in related fields, which subject pre-existing explanations of socio-environmental change to "critical scrutiny" while aiming to increase the spaces for representation of overlooked perspectives and affected social groups in science (Forsyth, 2008).

This chapter describes the theoretical and conceptual choices that underpin my approach to studying climate-related loss as an *emergent* phenomenon. I first introduce critical realism as a meta-theory before describing my interdisciplinary conceptual

framework derived from the fields of climate science, sociology, political ecology, and critical agrarian studies. While each paper in this thesis has a distinct theoretical approach, they all draw from and contribute towards the overarching framework presented here.

Critical realism as meta-theory

> In virtue of the remarkable sensitivity of people to their contexts – which derives particularly from our ability to interpret situations rather than merely being passively shaped by them – social phenomena rarely have the durability of many of the objects studied by natural science, such as minerals or species. Where they are relatively enduring, as many institutions are, then this is usually an intentional achievement, a product of making continual changes in order to stay the same, or at least to maintain continuities through change, rather than a result of doing nothing. Consequently, we cannot expect social science's descriptions to remain stable or unproblematic across time and space; hence a preoccupation with conceptualization is entirely to be expected and certainly not a sign of scientific immaturity.
>
> Andrew Sayer, Realism and social science (2000, p.13)

Critical realism was developed in the 1970s by Roy Bhaskar and is often described as an alternative to constructivism and positivism (Bhaskar, 1975). Constructivism foregrounds that reality is socially constructed and therefore subjective, while positivism posits that there is an objective reality that can be observed through empirical investigation. Bhaskar argues that these epistemological positions are essentially reductionist and are prone to what he calls *epistemic fallacy* – in other words, reducing reality to what can be known or understood. In seeking to disambiguate epistemology and ontology, critical realists posit that a world exists independently of – and therefore cannot be reduced to – our knowledge of it (Bhaskar, 1975/2008). This reality, however, cannot be fully apprehended due to perceptual limitations. Humans produce knowledge *about* reality with theories, techniques, and models, rendering that knowledge context-dependent, historically contingent, and thereby imperfect (Zachariadis et al., 2013). Critical realism therefore holds both an *intransitive* dimension of knowledge (the objects of scientific knowledge) and a *transitive* one (comprising the knowledge that humans generate about these objects) (Sayer, 2000). In doing so, it accommodates an epistemology that recognises that knowledge is socially produced as well as "an ontology that asserts the reality of the material dimension of the problems" (Cornell & Parker, 2010, p. 32).

Explanations of social phenomena in critical realism rely on a stratified or "depth" ontology that distinguishes between three domains: the real, actual, and empirical (Bhaskar, 1975/2008; Sayer, 2000). The *real* refers to what exists independently of our ability to understand or perceive it. This consists of the social or natural entities or objects and structures, and their causal powers and liabilities, that can result in causal mechanisms (Sayer, 2000).[8;9] The *actual* denotes what happens when those powers are activated and the mechanisms may generate *events.* The *empirical* refers to the realm of experience where events or traces of events are experienced and potentially – but not necessarily – observed. *Objects* can be structures or a part of them, while *structures* are typically constituted by relatively durable relations between their components that can change from the activation of causal powers by other entities and structures (Elder-Vass, 2010; Sayer, 2000). Causal powers refer to "capacities to behave in particular ways", and liabilities denote passive powers or "specific susceptibilities to certain kinds of change" (Sayer, 2000, p. 11). The causal powers of entities in the real may result in (generative) mechanisms that may or may not generate events, depending on other *contextual conditions* (Figure 1). The same mechanism can, therefore, produce different results and different mechanisms can produce the same outcome (Sayer, 2000).

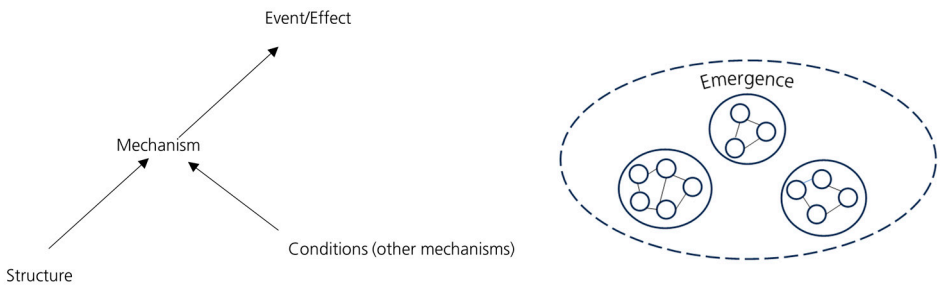

Figure 1. Illustrations of causation and emergence
On the left: illustration of causation through a critical realist view. Author's own based on Sayer (2000, p. 15). On the right: illustration of emergence. Author's own based on ideas from Elder-Vass (2010).

Another central feature of a critical realist approach is recognising that the world is constituted (mostly) by complex "open systems" and phenomena characterised by

[8] In this view, social structures and phenomena emerge out of biological phenomena (Sayer, 2000).

[9] While mechanism as a term is often associated with an understanding of interactions and relations between things often rooted in engineering, in critical realism it does not necessarily have such a connotation. They are also referred to as generative or causal mechanisms. The term simply refers to "a way of acting of things" (Bhaskar, 1975, p. 42). Mechanisms can also be thought of as "deep generative processes" (Easton, 2010, p. 122).

emergence (Elder-Vass, 2010).[10] Emergence occurs when an entity or phenomenon has properties or powers that are emergent – meaning they are not possessed by its constitutive parts (Figure 1). A classic example is that of water. While water is made up of oxygen and hydrogen, it possesses properties that are different from its components when not combined in the way that constitutes water, but that have other properties when combined in other constellations. Emergence can be conceptualised through a hierarchical ordering of levels at which mechanisms with "higher order level provides the boundary conditions for the lower order or more basic level […] and the lower order or more basic level provides the conditions of possibility or framework for the emergent or higher order level" (Bhaskar, 2010, p. 12). A relational conception of emergence posits that "it is because a higher-level entity is composed of a particular stable organisation or configuration of lower-level entities that it may be able to exert causal influence in its own right " (Elder-Vass, 2010, p. 23).

Explanation, therefore, requires

i) asking what it *is* about this object that enables it to do certain things

ii) identifying mechanisms that *produce* a given emergent property or phenomenon, and

iii) uncovering the conditions that *make it possible* for mechanisms to generate an event.

This requires asserting whether a relationship between two entities is *necessary* or simply *contingent*. It also encourages the use of *counterfactual analysis*, or exploring what could have happened with alternative actions or circumstances. This process typically relies on existing knowledge and theories about these relationships. The research follows a *retroductive* approach, which involves iterating between theory and empirical examination at different levels of reality (real, actual, empirical), to understand the simultaneous and interactive operation of causal mechanisms that generate specific outcomes or phenomena (Bhaskar et al., 2010). The overall ambition is therefore to identify *tendencies* and to *explain* rather than predict.

However, the problem of disaggregating "holistic phenomena into manageable areas" remains (Cornell & Parker, 2010, p. 30). The researcher must choose what would be considered manageable areas and justify and reflect on their choices in relation to their research aims and positionality. In other words, they must adopt a reflexive approach, recognising that knowledge is situated and that it is not possible to examine all possible

[10] Emergence theories are developed and used in a broad range of fields including philosophy, physics, sociology, and biology. In this thesis, I focus on emergence as it is used within critical realism.

constitutive elements of a given phenomenon (Runde & de Rond, 2010). Multiple explanations can exist for the same phenomenon and identifying which explanation is most adequate depends on evaluating and comparing alternative explanations. The multiplicity of mechanisms underlying complex phenomena – such as climate-related loss – asserts the importance of interdisciplinary and case-study research.

This critical realist research logic is reflected in the papers and overall thesis. The first paper, critically examines how the notion of disproportionality is framed and used in conceptualisations of climate-related loss. The criticality in the approach consisted of assessing current knowledge and identifying gaps within it. From this process, I found that existing explanations for disproportionate climate-related loss predominantly draw from notions of risk and vulnerability to climate impacts. The second paper thus departs from there and describes the ways smallholder farmers experience climate change and related impacts as *events,* examining the relationship between sense of loss and climate vulnerability further. In the third and fourth papers, I delve deeper into the structural and generative mechanisms underpinning the emergence of climate-related loss by analysing the reworking of land relations in the context of climate change and how loss occurs as a process across scales and levels. Finally, linking back to the emancipatory dimensions, in the fifth paper I engage with the question of representation by proposing a framework for inter- and trans-disciplinary science to better integrate the perspectives of rural-agrarian inhabitants in visions of the future with climate change and related sustainability transformations.

Assembling an interdisciplinary conceptual framework

In this thesis, I approach climate-related loss as a surface-level phenomenon that is constituted by both biophysical and social dimensions. Climate-related loss thus needs to be understood as a social experience *and* as a material phenomenon. I refer to loss as climate-*related* to emphasise my object of focus and that impacts and risks arising from climate change do not cause processes of loss on their own, but rather in conjunction with multiple other processes, dynamics, and relations, in line with critical realism's core assumption. My "manageable" area of focus is delimited through the intertwined processes of climate change and financialization, and how they affect conditions of access to resources and consequently land and livelihood security. Agrarian contexts set the boundaries of the empirical setting for this research and land constitutes the lens I use to explore these processes across different scales and levels of a stratified reality.

The existence of humans and societies is inherently dependent on a biophysical foundation. Of particular interest in this thesis is how the social world and phenomena

within it feed back into or influence these biophysical entities and mechanisms. Specifically, how human actions interact with the climate system through the production of greenhouse gases that trap heat and alter the atmosphere's composition causing an increase in global temperature and climate change. In addition, how human actions influence the outcomes of climate change impacts. The generation of any social outcome involves the interplay of agency, structure, and culture (Archer, 2010). Such outcomes are therefore subject to historicity. To understand climate-related loss I therefore draw on knowledge and existing theories on climate-society interactions and relations.

To uncover the conditions and mechanisms that underlie the emergence of climate-related loss, I use *vulnerability* as a departing point, understood as the potential for loss (Cutter et al., 2003). Vulnerability arguably represents the predominant theorisation of the conditions that underpin undesirable outcomes from climate change. My research interests in more cogently engaging with questions of responsibility, normativity, and historicity in processes of climate-related loss leads me to scholarly perspectives that aim to explain the *production* of vulnerability through political-economic structures. Specifically, I use the work of Ribot (2014) which conceptualises vulnerability as a matter of *access* to – or ability to derive benefits from – resources, to examine the political and social structures and relations that prevail and how these shape the outcomes of financialization and climate change in agrarian settings. The way individuals act and experience specific events, however, cannot solely be reduced to structural conditions. It is necessary to also explain the complexities of social interactions between individuals, groups, and institutions, and the role of agency and culture. This is why I turn to the sociology of climate change and loss, specifically the notion of *value*.

To grasp what *climate-related* means, I draw on the body of knowledge demonstrating how climate change and its effects are constituted both by biophysical and social dimensions. I use climate science, specifically (regional) climatology to grasp meteorological patterns and events *as well as* sociological literature on climate change to understand how these are experienced. I view loss as distinct from impact and find that a focus on values provides a useful way in which to engage analytically with this distinction. It also helps to account for the role of history and relations of power. My analytical focus is not on what power is, but on what it *does*. Hence, I focus on examining the ways in which power is exercised (intentionally and unintentionally) to shape abilities to derive benefits from resources in agrarian contexts. In other words, *socialising* climate change and loss helps me understand who produces loss and who benefits from it.

I use relationships and values embodied in land as an entry point to analyse how loss is *produced* and *reproduced* in agrarian settings and how changes occur across scales, both spatially and temporally. Land provides a platform for situated readings of shifts in socio-ecological relations, values, and conditions of access, and how these are shaped by distant institutions, projects, and actors. My understanding of agrarian contexts and land is broad. It goes beyond farming or land itself to include the wider set of relations, uses and values that they entail. My approach to understanding how climate change and financialization processes unfold in agrarian contexts thus foregrounds situated readings of how people experience and relate to shifting conditions of access, control, and dependency. This involves considering patterns of social differentiation along the lines of ethnicity, gender, and wealth. It also means considering the way differentiation relates to broader ideas and sociopolitical and material legacies of development and colonialism. Therefore, concepts and theories in the specific papers are mostly derived from scholarship on political ecology, which engages power relations and outcomes in processes of socio-environmental change.

Political economy of (climate) vulnerability

In this thesis, I understand vulnerability as the potential for loss. Climate vulnerability is, moreover, embedded in unequal structures and relations of *access* to socio-political, economic, and environmental resources that span multiple scales. Seminal works in agrarian and peasant studies have long shown how the differentiated outcomes of climate events and other environmental hazards arise through intersecting factors that shape people's exposure to risks and capacities to cope with adverse events. Scholars explain crises and their effects by identifying the causes of people's precarity or lack of security as failure of entitlements, assets, and social protections (Sen, 1983; Watts, 1983).[11] Extending from entitlements, theorists explain the causal chains revealing the production of livelihood insecurity as a multi-scalar political economic process (Blaikie & Brookfield, 1987; Watts & Bohle, 1993).

These conceptualisations of vulnerability emphasise the importance of people's ability to influence those who govern and the broader political economy that shapes their security or lack thereof (Ribot, 2014). This includes, for example, the ways in which political economy influences people's capabilities (Sen, 1999/2001) and assets or capitals (Bebbington, 1999), as constitutive of people's (ability to) influence the structures of relationships in which they are embedded. Ribot & Peluso (2003) posit

[11] Sen refers to entitlements as a set of commodity bundles that a person can command "through the legal means available in that society" (Sen, 1981, p. 433)

that limited or failed access to entitlements, assets and social protections, and the precarity that ensues from this failure, cannot be understood solely through the lens of laws and rights. Rather, it must be understood as a situated de facto *ability to derive benefits* from resources, whether legal, extra-legal, or illegal. Understanding conditions of access, therefore, requires unearthing the institutions and enduring structures and relations that order social life, particularly the state and other political entities, and economic systems including markets. This involves critically examining the way capitalism reconfigures the organisation of relations between "humans and the rest of nature" (Patel & Moore, 2017, p. 3). In particular, how capitalist forces shape the social and material relationships that make it possible for people to produce and reproduce their means of living in agrarian contexts (Akram-Lodhi & Kay, 2010a, 2010b; Bernstein, 2010; Bernstein & Byres, 2001; Shattuck, Grajales, et al., 2023).

In this thesis, I focus on processes of *financialization* in agrarian settings. Financialization has typically been defined as a later stage of capitalism and associated analytically with periods of industrialisation in American and European economies (Sawyer, 2013). In this thesis, I adopt a complementary but broader conceptualisation of financialization put forward by Epstein (2005), as "the increasing role of financial motives, financial markets, financial actors, and financial institutions in the operation of the domestic and international economies" (p. 3). This definition allows me to engage empirically with the material manifestations and distinct features of financialization beyond the confines of any specific period and geographic space (Sawyer, 2013).

Specifically, I focus on how financialization relates to agrarian change through two central and interrelated themes: agrarian finance with household credit and debt, associated with measures to expand financial inclusion (microcredit), and financial investments in land. The term *agrarian finance* helps to capture the diversity of "relations of credit and debt among households engaged in smallholder agriculture, but whose economic and social lives are also connected to non-rural spaces through commodity markets, outmigration, and financial flows" (Green, 2022, p. 850). This extends analyses beyond a focus on market forces and class relations to include interpersonal relations such as kin-based or communal forms of dependencies, recognising that rural households' credit and debt are not always related to agricultural production (Green, 2022). I also focus on processes of land financialization, through which land becomes a financial asset and object of speculation for local and external investors, which can potentially lead to varied forms of dispossession (Casolo & Doshi, 2013; Hall et al., 2011; Taylor, 2011). In doing so, I pay particular attention to the processes through which land becomes a potential object of investment through varied practices including formalising property rights and through the powers of legitimation and state regulation (Green & Bylander, 2021; T. M. Li, 2014).

I find that Ribot's (2014) "unbounded access framing" allows me to coherently integrate the scalar dimensions of the political-economic structures and changes associated with financialization that underpin climate vulnerability and thereby the conditions of possibility for loss to occur. Taking access as the central entry point for analyses of vulnerability, he emphasises four key aspects in empirical analyses. Firstly, the need to depart from lost *valued* attributes and those who incur this loss. Secondly, understanding how this loss relates to "failed access to adequate assets and protections" should uncover what *enables* or *disables* that access (Ribot, 2014, p. 694). Thirdly, moving "outward" by contextualising these causes in the broader social, biophysical, and political-economic relations in which people are situated – considering, for example, the role of knowledge, ideas, and technology. Finally, the importance of engaging with the emancipatory recursive elements that shape people's ability to influence these relations, especially questions of representation.[12] This, he argues, can unearth the causes of undesirable outcomes, identify responsible structures and institutions, and "point to the multiple social scales at which solutions may reside" (Ribot, 2014, p. 674). However, as Barnett et al. (2008, p. 105) remind us, vulnerability is fundamentally about "values at risk" and contingent on "complex spatial politics" that need to not only be recognised but *also* made explicit (see also Adger et al., 2009). A missing link to understanding how the potential for loss becomes realised out of climate vulnerability, or how climate-related loss arises, remains a closer attention to the values of diverse actors.

Socialising climate change and loss

The story of anthropogenic climate change can be described as "the meeting of Nature and Culture" (Hulme, 2009, p. xxviii). The scientific definition of climate change illustrates the complex, systemic, and scalar nature of such an encounter, as well as the integrative efforts that have been made to form what constitutes the field of climate science (Cornell, 2010).[13] It is not surprising then, that research on the socio-ecological and socio-institutional dimensions of climate change has encountered a range of epistemological and ontological issues, such as a persistent separation of climatic drivers

[12] Ribot defines recursive as "looping back, iterative or producing feedback" (2014, p. 668).

[13] Climate change is defined as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer", which is due to natural internal or external drivers, such as *anthropogenic* (resulting from human activity) drivers affecting land-use or atmosphere composition (IPCC, 2022a, p. 2902). As a physical phenomenon, climate change implies a long-term change in the climate system that translates to more intense, unpredictable, and frequent weather events often qualified as extremes, as well as slow-onset processes (e.g., sea level rise, desertification).

from social ones (Nightingale et al., 2020). This reinvigorated what some describe as environmental determinism, which locates "the dominant agency" with nature (the climate) and frames the climate as an external global factor that manifests in the local (Nielsen & Sejersen, 2012, p. 195). Counter to this, *socialising* the climate helps us to frame and understand the effects of climate change, including climate-related loss as sociocultural, political, and inextricably linked to values, rather than as acts of nature that are external to society.

The physical sciences describe the climate as a system consisting of five interacting components: atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere (IPCC, 2022a). This definition can and should be complemented by an understanding of the diverse meanings people ascribe to climate and weather across cultural contexts and over time (Hulme, 2009, 2017). This also implies recognising that humans shape the climate by transforming the physical environment to produce their lived environments from the local to the regional and global scale (Taylor, 2014). Broadly, this includes how the onset of settled agriculture and related land-use management practices affect the climate (Foley et al., 2013); the effects of deforestation on local temperature (Afrane et al., 2006); the long-distance effects of changes in forest cover in eastern Africa on monsoon rain patterns in South Asia (Gupta et al., 2005); and the application of more locally specific farming practices that help produce suitable microclimatic conditions (Dove, 2003).

Understanding what climate change and climate-related loss means and for whom requires engaging with the diverse and culturally specific ways that people *cognise*, *experience*, and *shape* the climate and associated socio-ecological phenomena (Chakraborty et al., 2021; Chakraborty & Sherpa, 2021; Hulme, 2008; Mehta et al., 2019; Nightingale et al., 2020). Therefore, I follow Taylor (2014) in understanding the climate as *co-produced* at various scales through the interactions of meteorological forces, forms of social organisation, physical infrastructure and discursive practices that shape lived environments. This 'socialisation' helps us to move beyond global atmospheric processes and allow for fuller analyses of the historical processes, social hierarchies and power relations that shape the co-production of the climate (Taylor, 2014).

I approach climate-related loss as a socially organised phenomenon that involves a process of transformation from presence to absence affecting objects and phenomena of value (Barnett et al., 2016; Elliott, 2018; Tschakert et al., 2017). Sociologist Rebecca Elliott characterises that process as involving disappearance, depletion, destruction, and dispossession (Elliott, 2018). In this way, loss does not merely constitute an outcome of failed attempts at adapting to climate change but is also a matter of politics, knowledge, and practice (ibid). This directs attention to questions of value: what is

valued and by whom, individually and collectively; whose value counts in decision-making processes; and by whose norms the distribution of climate-related loss is evaluated. I adopt an analytical focus on value in the context of processes of socio-environmental change understood as "what is of value in everyday material realities, as a relational construct in space" and time (Tschakert et al., 2017, p. 5). While there is no universal typology of value, literature on human-environment relations and ethics provides a useful distinction between:

i) intrinsic value (holds value in its own right)

ii) instrumental value (as a means to a desired end)

iii) relational value (derived from relationships and responsibilities to them) (Chan et al., 2016).

As Adger et al. (2009) remind us, that values "are not held in isolation and are different for different stakeholders with levels of influence and power over their own destinies" (p. 338). It is therefore necessary to account for the role of power relations and understand how values intertwine with culture and ideologies including how some values become prioritised over others, according to what logic and for what purposes.

Seeing loss through land

Land lies at the epicentre of the intricate socio-ecological dynamics and shifts that climate change and financialization processes engender in agrarian settings. Processes of depletion, destruction, and loss of and on the land have been studied extensively in political ecology (Borras Jr & Franco, 2012; Hall, 2012, 2013; Peluso, 2009; Tsing, 2003). This body of work not only illuminates the shifts in conditions and relations of access to land and natural resources but also how such shifts are *produced* and *contested*. To understand how climate-related loss arises in agrarian contexts, I engage with the various ways people perceive and experience the effects of climate change on and through the land. I focus on access and land relations – who uses, owns, and values the land and for what purpose – as a lens to explore these dynamics and shifts and their differentiated outcomes.

Three key theoretical considerations emerge from viewing land relations as an analytical entry-point to examine how loss manifests through interactions between climate change and financialization, which led me to the theoretical choices that underpin the papers.

The first is how climate impacts livelihood security by diminishing people's ability to sustain a living. This calls for examining relations of production and reproduction, as situated within a broader set of social, economic, and political structures and relations

that condition life on land. That is why in Paper II, I examine how processes of agrarian change interact with impacts from extreme weather events through the lens of land and livelihood security, and the ways they affect experiences and sense of loss amongst smallholder farming communities. In addition, drawing from scholarship on agrarian finance and debt-driven dispossession, Paper IV focuses on the interactions between climatic impacts and smallholder farming practices, over-indebtedness, and land loss.

Secondly, land does not only constitute a central basis for livelihoods, but it is also often deeply intertwined with diverse cosmologies and ways of being and knowing (Beban & Work, 2014; Padwe, 2020; Scheer, 2017). Pluralistic notions of value extend beyond the purely economic and rational. For this reason, Paper II integrates diverse notions of *value* to understand how people experience the outcomes of intertwined processes of climate change and political-economic changes. Paper IV draws on theorisations of nature-society relations to understand the historical and relational dimensions of processes of climate-related loss amongst smallholder farming indigenous and ethnic minority communities. Specifically, it focuses on how socioecological shifts associated with financialization and climate change manifest in changes in how people relate to the land.

Lastly, processes of socioenvironmental change around land manifest through relationships that stretch across scales. Paper III integrates conceptualisations of climate-related loss from sociology (Elliott, 2018) with the concept of *scalar politics* developed by MacKinnon (2011). Using his critical realist conceptualisation of scale, I examine the discursive and material relationships that produce (conditions for) climate-related loss. Finally, climate-related loss in agrarian settings has implications for the way rural-agrarian smallholders, and other actors, envision a future on the land. For this reason, Paper V draws on scholarship on sustainability transformations, loss and damage, and anticipatory governance to engage with questions of representation and future visions in relation to climate-related loss in agrarian settings. Further details on the specific concepts and theoretical frameworks are provided in the respective papers.

Setting the scene in agrarian Cambodia

Cambodia was once one of the most aid-dependent countries in the world and has undergone a rapid economic transformation. However, it is also considered one of the most vulnerable countries to climate change. It is unsurprising then that the country provides a distinct illustration of the diversity and complexity of processes related to climate change and financialization, which are of interest in this thesis. In its 2023 Climate Change and Development country report, the World Bank stated: "While successful at achieving rapid growth and significant poverty reduction, Cambodia's current development path has increased, rather than reduced, vulnerability to both physical and transition risks from climate change" (The World Bank Group, 2023, p. 2). Since the 2000s, Cambodia has experienced rapid and sustained economic growth making it one of the fastest-growing economies in the Southeast Asia region (Asian Development Bank, 2024). The economic, social, political, and environmental changes engendered by such change have fundamentally redefined the place and role of agriculture, land, and natural resources in its society. While Cambodia can still qualify as an agrarian society, it is one where financialization has taken a stronghold, and land and livelihood insecurity remain prevalent issues. A recent survey carried out across the country showed that 75% of interviewed Cambodians felt that climate change impacts their lives, ability to earn money (81%), and health (85%) and that these impacts compound broader concerns regarding socio-ecological change, especially in relation to declining fish stocks and agricultural productivity (Southall et al., 2019). The changes in land relations and precarity that these processes engender are geographically and socially differentiated.

In this chapter, I begin by describing Cambodia's transformation, before turning to the core features of its geography, livelihoods, and climatic changes. In the final section, I introduce the two cases presented in the thesis and outline their relevance to the research.

Cambodia's transformation

As a relatively small country of 16.5 million people in Southeast Asia, long known for its complex and violent history, Cambodia has gone from being one of the most aid-dependent countries to one of the fastest-growing economies in the world over three decades. This transformation has been described as a successful but somewhat troubling case of post-conflict reconstruction combined with the pursuit of "capitalist developmentalism" (Hughes & Un, 2011, p. 4). Having gained its independence from colonial rule in 1953 and experienced a civil war (1967-1975) and the Khmer Rouge genocide (1975-1979), Cambodia underwent a period of post-conflict reconstruction following the UN-organised elections of 1993. This was marked by the establishment of a multi-party democracy and an outpouring of diverse forms of international support flowing into the country, which received an estimated five billion dollars of Official Development Assistance (ODA) (Ear, 2007). Since the 1990s, the country has experienced a period of relative political stability with increasingly authoritarian ruling by the Cambodian People's Party (CPP).

Cambodia's political and economic transformation cannot be dissociated from the environment and the radical shifts in nature-society relations it engendered. In the 1990s, natural resources extraction played a key role in the development of the state and consolidation of power by the CPP, to the extent that the relationship between the "state, the ruling party, and natural resources" has been described as symbiotic (Milne et al., 2015, p. 29). Scholars have explained this through the presence of a neo-patrimonial regime, whereby informal patronage-based alliances and networks depend on resource flows (Milne et al., 2015; Un & So, 2011). This period was also marked by a restructuring of the Cambodian economy with reforms to facilitate an influx of capital in the country. Regional market integration through economic corridors and Special Economic Zones (SEZs) ensued, fuelling the expansion of agricultural and forest commodities production, alongside the development of the garment industry and infrastructure.[14] The 2001 Land Law constituted a pivotal moment.[15] The amendment

[14] Special Economic Zones are established by zone developers who receive preferential incentives and lease out the area to investors. The purpose of these zones is to enhance Cambodia's investment climate by providing investors with a defined area where their business activities can benefit from improved infrastructure and other incentives (ODC, 2015).

[15] The 2001 Land Law laid the foundation for developing a series of policy regulatory and administrative frameworks for liberalizing and privatizing land use that were further promulgated in subsequent political documents and programmes like Sub Decrees and land titling programmes. Crucially, it formalized tenure arrangements around three categories: state land, collective property, and private

included institutional reforms to support market-oriented agricultural development and set out a framework for the regulation and allocation of Economic Land Concessions (ELCs).[16] Large-scale investments in agriculture and land for both productive and non-productive purposes accelerated, and agricultural commodity markets strengthened with growing exports of cash crops – cashew, rubber, cassava – to neighbouring countries, especially Vietnam. An estimated 13% of the total land area has been contracted to foreign and domestic agribusinesses since the 1990s (Johansson et al., 2020). These trends reconfigured the role and place of agriculture and smallholder farming in Cambodia's economy. The contribution of agriculture, forestry, and fishing to the country's Gross Domestic Product (GDP) gradually declined from 45.3% to 22.2% between 1993 and 2022 (The World Bank, n.d.). Meanwhile, between 2000 and 2020, forest cover went from 61.1% to 45.7%, giving Cambodia one of the highest rates of deforestation in the world since 2010 (FAO, 2020), largely due to the expansion of ELCs (Davis et al., 2015).

The wide-ranging environmental and social consequences of rapid economic growth largely driven by unfettered natural resource exploitation prompted significant pushback. Extensive land-use change and deforestation in the 2010s coincided with numerous cases of land conflicts, widespread land grabbing, violence and dispossession across the country (Hak et al., 2018; Park, 2019; Park & Maffii, 2017; Vigil Díaz-Telenti, 2019). Combined with declining natural resources, especially forests and fisheries, these patterns spurred a rise in landlessness and internal migration (Hayward & Diepart, 2021). The social outcomes and discontent that ensued attracted attention

land, and established concessions as a legal mechanism for granting use rights to private domestic and foreign entities, including Economic Land Concessions and Social Land Concessions. (Open development Cambodia - https://opendevelopmentcambodia.net/topics/land/). The 2001 Land law was the result of a process of reform by the government of Cambodia supported by the Asian Development Bank. Prior to this the 1992 Land law, asserted that "the state owned all land, and that no land rights existed before the establishment of the People's Republic of Kampuchea (PRK) in 1979" (Baird, 2023, p. 3). The 2001 Land law also introduced the possibility for indigenous communities to apply for Indigenous Communal Land Titles (ICLTs).

[16] Established by the 2001 Land Law and further specified in the 2005 Sub Decree on Economic Land Concessions, ELCs are granted to private companies for exploitation of land and natural resources state land to attract foreign direct investment and promote agri-business. Originally limited to areas of 10,000 hectares and for a period of 99 years, they have been the primary driver of forest loss and land conflicts. Mounting discontent with ELCs led to a "Directive 01" in 2012 to improve management, revoke ELCs in breach of contracts, and place a moratorium on further issuance of ELCs. A Social Land Concession, meanwhile, is a legal mechanism to grant private use rights to state land for social purposes, mainly to grant landless, displaced and veteran households with access to residential and farmland and is promulgated in the 2003 Sub Decree on Social Land Concessions. (Sub-Decree No. 19 ANK/BK/ on Social Land Concessions, 2003; Sub-Decree No. 146 ANK/BK on Economic Land Concessions, 2005)

from various governmental actors, civil society, and the international donor community. The ruling party, which faced one of its worst electoral results in the 2013 elections, initiated a series of reforms to appease contestation. Issuances of new ELCs were frozen through moratorium and some reversed, and a process of land restitution began, while a number of Social Land Concessions (SLCs) were awarded across the country. These processes, however, yielded very mixed results (Ngin & Neef, 2021). Illegal deforestation, meanwhile, continued despite the presence of formal rules aiming to prevent it. This is partly explained by the ad-hoc enforcement of regulations and inextricable relationship between control of natural resources and state power and the influence of various non-state actors in the illicit extraction of resources, which together have been described as constitutive of Cambodia's shadow state (Work et al., 2022).

The growing influence of finance and financial institutions in agriculture, land, and rural life reflects a broader neoliberal turn in Cambodia's governance (Norman, 2011; Springer, 2013). While Cambodia's development strategy has yielded significant improvements in living standards, it has also been qualified as "economic growth without development" (Ear, 2013). Poverty levels have nearly halved between 2009 and 2019/2020, from 33.8% to 17.8%, with rising wages and increased access to basic services (Karamba et al., 2022).[17] Yet, the rate of GDP growth outpaces poverty decline (Bérenger, 2016) and a closer look at indicators provides a more nuanced picture (see Box 1). Spending on social assistance stands at only 0.3% of GDP, "well below" averages for countries of the ASEAN region (Hansen & Gjonbalaj, 2019). Cambodia ranks amongst countries with the "highest shares of out-of-pocket expenditures for health care expenditures in the world" (World Bank, 2017). The rural-urban divide is growing, with land and livelihood insecurity remaining prevalent issues (Andersen, 2019; Bylander, 2015; Chheng & Resosudarmo, 2021). Landholding size declined with an average of only 1.3 hectares per rural household with 15% of rural households owning less than 0.5 hectares, and 23% not owning any land (Asian Development Bank, 2021). Nonetheless, land and natural resources remain central to the lives of many with as much as 63% of households involved in agricultural activities (National Institute of Statistics (NIS) et al., 2023). Much like other countries in Southeast Asia, Cambodia displays strong signs of persistence of smallholder farming, challenging predictions of a widespread transition from farm to factory work (Rigg, 2020; Rigg et al., 2016). The role of private microfinance debt, migration, and remittances in rural livelihoods, has grown exponentially, raising many concerns, especially concerning over-indebtedness (Green & Estes, 2019; Samnang, 2018).

[17] According to the national poverty line in Cambodia of KHR 10,951 per person per day [USD 2.71]

Microfinance indebtedness in the country, especially for the poorest, is reaching what some describe as 'unsustainable' levels. Cambodia is said to have the highest average amount of microloan debt per borrower, at around USD 3,370 (LICADHO, 2019). Interest rate levels are also relatively high, with a cap of 18% (compared to 20-30% before 2017) and typically rely on the provision of land titles as collateral (*MFIs Increasing Fees after 2017 Rate Cap*, 2021). Microfinance loans have been facilitated by a rather lax regulatory environment that leaves borrowers largely unprotected (Andersen, 2019). A study by Samnang (2018) found that only about 37% of microfinance loans in their sample are used for investments, with the remainder used for households' consumption needs, health-related costs, and servicing existing debts.

Box 1 – The poverty number incident

Poverty reduction objectives have become increasingly central in political debates in Cambodia. An incident involving a disagreement over poverty statistics illustrates this. In 2018, the Cambodian government announced that the number of people living in poverty in Cambodia (solely measured by income – $ 1.90 US a day being the threshold) stood at 13.5%, compared to approximately 40% twenty years ago, while explaining that it showed how living standards had dramatically increased under their ruling (Hutt, 2018). A few months later, a report led by the United Nations Development Programme (UNDP) announced that the poverty rate – understood as multidimensional poverty – stood at 35% with significant differences between provinces and many living one small shock away from falling into poverty. The release of the report triggered a dispute whereby government officials explained that the government had not adopted multidimensional poverty as a framework for measurement and that the release of the figure "may have a detrimental effect on the government's success in reducing poverty" (Chhengpor, 2018). An official apology by UNDP had to be released as a result.

Photo. View of the city centre and royal palace in Phnom Penh, capital of Cambodia.

Geography, climate change, and livelihoods

Cambodia shares borders with three of the six countries that form the Mekong region (Laos, Thailand, and Vietnam) and comprise the transboundary Mekong River basin stretching across 795,000 km^2, from the southern part of China to the southern tip of Vietnam. Cambodia's landscape comprises low-lying alluvial central plains, flood plains, mountainous regions, and coastal areas, including islands. The low-lying central plains are home to Southeast Asia's largest freshwater lake, the Tonle Sap. Surrounding the Tonle Sap, are the lower Mekong River floodplains that support a large and diverse population of vegetation and animal species (Poole, 2018). The plains are surrounded by mountainous and highland regions, with the *Chuŏr Phnum Dângrêk* [Dangrek] and Central Annamite mountains to the north and the *Chuŏr Phnum Krâvanh* [Cardamom] and *Chuŏr Phnum Dâmrei* [Elephant] mountains to the south. In the southern and southwestern parts of the country, Cambodia's coastline (443 km) extends along the Gulf of Thailand, with coastal waters that include 60 islands (Figure 2).

Figure 2. Map of Cambodia

Ratanakkiri province is located in the northeastern part, and Kampot is a coastal province in the southern part of the country. (Source: The United Nations. Reprinted with permission by The UN Geospatial Information Section).

Cambodia has a tropical savanna climate characterised by two seasons of typically equal length: the (tropical) wet or rainy season from November to April driven by the monsoon winds, and the dry season from May to October. The rainy season brings about 80% to 90% of the annual precipitation in the country (average 1400 to 2000 millimetres) with heavier rainfall in the southern and southwestern parts (up to 4000 millimetres) (RIMES & UNDP, 2020). Inter-annual variations are also observed due to the influence of the El Niño Southern Oscillation and La Niña events, with drier and hotter conditions across Southeast Asia during the former, and cooler-than-average temperatures during the latter. Annual mean temperature across Cambodia ranges between 27-29 °C, with some variations between heavily forested mountains and urban areas, a minimum of 17°C and maximum temperatures reaching 38°C.

Cambodia's varied landscape sustains a broad diversity of livelihoods in rural areas. The total cultivated land area (4.5 million ha) is dominated by rice production (70%), both dry and wet season rice, with the remaining 30% for secondary crops including rubber (7%) and perennial crops (4%) (Asian Development Bank, 2021). Most of the agricultural production is predominantly rainfed and depends on monsoon rains and the natural flood cycle of the Mekong River and Tonle Sap.[18] Floods have long been a central and crucial part of Cambodia's ecological productivity and riverine populations have lived at the rhythm of the Mekong River flood pulse for centuries. About 20% of the Mekong River catchment is found in Cambodia and the Tonle Sap – which quintuples in size during the rainy seasons from 2,500 km^2 to 15,000 km^2 – and its floodplains, are home to one of the world's most productive inland fisheries (Osti et al., 2011; Uk et al., 2018). Though declining, mangrove forests are found in all coastal provinces, sustaining fishing livelihoods. Unsurprisingly, as much as 80% of animal protein intake in the diet of Cambodian people comes from fish and fish products (Hortle, 2007). Most of the rice production takes place in the central plains, where soil fertility is higher. Beyond the central plains, in mountainous parts of the country, especially in the northeast, livelihoods traditionally revolved around shifting cultivation and non-timber forest products collection. Over the past two decades, settled agriculture has become more prevalent in these regions with the cultivation of perennial crops.

[18] According to the Cambodian Climate Change Committee an estimated 7-8% of total production land area was under full irrigation in 2013. (Royal Government of Cambodia National Climate Change Committee, 2014). Recent estimates also indicated that irrigation systems can cover about 61% of total farmland in the country (Khmer Times, 2022).

Climatic change – risks and impacts

Cambodia is particularly prone to droughts, floods, fires, and heatwaves, and while these hazards have long been present in the country, there are indications that they are becoming more extreme with climate change. At the regional level, there is evidence that climate change is already affecting monsoonal seasonal changes in precipitation and surface temperatures in Southeast Asia (Sentian et al., 2022). In Cambodia, temperatures have increased by 0.18°C per decade since the 1960s, especially during the dry season (0.20°C to 0.23°C), and over the last century as many as 46 days *additional* 'hot days' have been recorded (USAID, 2019). The country already has some of the highest temperatures in the world, with an approximate national average of 64 days annually where the maximum temperature goes above 35°C, and is said to face "a transition to a state of permanent heat stress as a result of temperatures which regularly surpass levels safe for humans and biodiversity" (The World Bank Group & Asian Development Bank, 2021, p. 13).

Cambodia is also amongst the twenty countries most affected by extreme weather events over the period 1999-2018 (Eckstein et al., 2019). Despite varying degrees of uncertainty, recent research points to a continued trend of warming, an expected increase in the frequency and intensity of droughts, increasingly erratic rainfall patterns, with more frequent and intense heavy rainfall events, changes in seasonal periods, and sea-level rise (Murphy et al., 2013; Thilakarathne & Sridhar, 2017; Thoeun, 2015). It is, however, difficult to disaggregate climate projections and uncertainties remain regarding local climate effects, in relation to deforestation in mountainous areas, and localised rainfall events, especially in coastal regions.

More extreme weather, combined with changes in livelihood activities and infrastructure development, are already leading to and expected to aggravate climate-related impacts on rural livelihoods. Projections show that climate change impacts could cause a decrease of 3-9% in GDP by 2050, reverse progress on poverty reduction and development outcomes achieved over the last two decades through negative impacts on crop yields, labour productivity, and food security (Allison et al., 2009; The World Bank Group, 2023). S. Li et al. (2017) find that the country is expected to have the largest decrease in rice yield in the mainland Southeast Asia region due to climate change. In 2015-2016, a severe drought affected 18 out of 25 provinces and over 2.5 million people. Economically poorer regions and groups are expected to experience greater impacts from climate change on agriculture (Chhinh & Poch, 2012; The World Bank Group, 2023). However, differentiating between events and risks related to climate variability, large-scale environmental change, and climate change remains a pertinent challenge. The body of evidence on climate change risks and impacts is characterised by both uncertainty and cautionary observations that point to the role of

other human activities (damming, deforestation, land-use planning) in contributing towards the occurrence of certain types of extreme events, particularly hydrological events, and gradual ecological degradation (Althor et al., 2018; Arias et al., 2012, 2014). This is a situation that partly results from the lack of long-term meteorological data series of sufficiently high quality.

Photo. Landscape in Ratanakiri Province.

Land relations in a changing climate: the cases

The effects of the intertwined processes of financialization and climate change on land and livelihood insecurity in Cambodia are increasingly visible and pervasive, especially in rural areas. Investments in land through ELCs for large-scale agribusinesses and conversion of rural land for real estate and tourism purposes, continue to reduce access to land and natural resources. Meanwhile, there is growing evidence of climate change-related impacts and uncertainties pushing smallholder farmers into various forms of (climate) precarity through microfinance indebtedness and labour migration (Brickell et al., 2018; Jacobson et al., 2019; Natarajan et al., 2019). Selling land is increasingly perceived as the most viable (or only) option to deal with dwindling and uncertain

harvests in a changing climate and to escape over-indebtedness, which in turn can lead to deleterious consequences (see Box 2). While these trends are present across the country, they take different forms and produce geographically and socially uneven outcomes, as illustrated by the two case studies – in Ratanakiri province and Kampot province – presented in this thesis and introduced below.

Smallholder farming, indigeneity, and ethnicity in Ratanakiri Province, northeast Cambodia

The northeastern part of Cambodia, where Ratanakiri province is located, starkly illustrates the uneven socio-ecological dynamics and outcomes of financialization on land relations. Located in a mountainous region, Ratanakiri hosts the majority of the country's indigenous and ethnic minority groups and has been described as located at the 'margins' of the Cambodian economy and state (Baird, 2008; Ironside, 2008). Over the last two decades, the rapid acceleration of investments in land for large-scale agribusinesses and high rates of in-migration from other provinces has transformed its landscape and its inhabitants' lives. Widespread land use and land cover change, have significantly reduced access to land and natural resources, especially forests. About 65% of the land awarded as ELCs in Cambodia, was located in only five provinces mostly in the northeast – Kratie, Pursat, Mondulkiri, Preah Vihar, Ratanakiri – representing "the poorer and more sparsely populated provinces […] which are home to many of Cambodia's remaining indigenous communities" (Oxfam, 2019, p. 27). Unsurprisingly, Ratanakiri featured prominently in scholarship on land grabbing and dispossession (Baird, 2014, 2017; Park & Maffii, 2017). High rates of illegal deforestation have led to a wave of increasingly stringent conservation measures from the state and international NGOs, further restricting communities' access to forests. Such patterns are, however, not random. They reflect complex processes of state formation, territorialisation, and historically rooted patterns of marginalisation (Baird, 2009).

Much like in the rest of Cambodia, for smallholder households who depend on monsoonal rains for agriculture and now microfinance loans to sustain a living, more extreme weather is increasingly problematic. Erratic rainfall and rising temperatures are compounded by the localised effects of deforestation. Changes in access to land and natural resources have led communities to shift away from complex systems of production relying on swidden farming and the collection of non-timber forest products, which many indigenous communities traditionally relied on for their livelihoods, towards perennial cash crop production for markets (especially cashew and cassava). Meanwhile, the media reports that climatic changes have caused a decrease in Cambodia's cashew nut production, which is now the world's largest, by 30 to 40%

(Chhum, 2023). Historically and even today, the province continues to have one of the highest poverty levels in the country and some of the lowest access to basic services and irrigation.[19] Despite being ranked the sixth most vulnerable province to climate change in Southeast Asia out of 530 provinces, Ratanakiri failed to be included as a priority area for disaster risk reduction in Cambodia's Strategic National Action Plan for Disaster Risk Reduction 2008-2013 (IOM, 2009).

Box 2 – Microfinance and the rural debt crisis

The Microfinance Institution (MFI) sector in Cambodia is one of the largest in the world. Many MFIs in the country have been bought by international banks. What started as a poverty alleviation programme is now turning into a very profitable industry, which threatens the livelihoods of the poorest. The Cambodian League for the Promotion and Defense of Human Rights (LICADHO) published a series of reports on the links between indebtedness, land loss and abuses, and migration. The research showed that some families had been subject to coercive measures by certain MFIs (for example pressure to take more loans for which land titles are used as collateral) often conditional on migration to Thailand, leading to catastrophic consequences during the COVID-19 pandemic when labour migration halted in the region (LICADHO, 2020). An estimated 10-15% of land owned by farmers in the country is said to have been lost due to debt and failure to repay (Chandran, 2019). The World Bank is currently reviewing a complaint put forward to the International Finance Corporation compliance ombudsman alleging that microfinance institutions to which it provides financing, have used predatory debt-collection practices, coerced sales of land, and human rights abuses.

[19] For an overview, see data from Open Development Cambodia https://opendevelopmentcambodia.net/layers/

Photo. Traditional communal house in a village in Ratanakiri Province, which is used for meetings and celebrations. The red soil visible in the picture is characteristic of the province.

Sea salt producers in Kampot province, coastal Cambodia

The effects of financialization of land on coastal areas of Cambodia such as Kampot province, are particularly salient and illustrative of Cambodia's economic transformation. Kampot is located only three to four hours away from Phnom Penh (the capital) and part of a coastal area that delimits inland Cambodia from the maritime world. Over thirty years, Kampot, which was once a relatively quiet coastal province, turned into one of Cambodia's most attractive investment locations. Like the rest of Cambodia's coastal areas, Kampot has been transformed by a significant influx of both domestic and foreign investment. The province's economy shifted from a focus on fisheries and agriculture to garment production, real estate development, and international tourism. The Cambodian government also heavily supported the development of a coastal infrastructure, including an international deep-sea port for maritime transport, a tourism port, and the creation of a SEZ. Unsurprisingly, land prices in Kampot have risen considerably, and so has land speculation.

Amid this transformed landscape, remains Cambodia's only (sea) salt production, which has been present since at least the 1860s, and whose future is increasingly uncertain in a changing climate. Salt production in the country is done through traditional methods of solar evaporation on salt flats located on the coast. The sector consists of seven salt production centres, comprising 190 salt producers, both small-medium and large-scale.[20] Sea salt production in Kampot typically reaches 100,000 tons per year and covers national demand for both household consumption and industrial purposes. Kampot's salt production can be characterised as an economy within an economy, providing jobs and income for many in the province while producing a key commodity on a national scale. It is, however, a particularly climate-sensitive practice. Salt production is performed solely during the dry season from January to June when weather conditions allow sufficiently long periods without rainfall to enable salt to form. In recent years, Kampot salt producers have been severely impacted by erratic weather patterns involving increased precipitation during the dry season. These led to a decline in production levels and a range of challenges for the sector, especially small-scale producers. While the Cambodian government is providing support to maintain the sector in the province, the land on which the salt flats lie has become particularly valuable and attracts much interest from investors.

[20] One of the seven is located in Kep province, which is enclaved within Kampot.

Photo. Harvesting salt in a salt field in Kampot Province.

Methodology

Studying emergence through a critical realist lens raises several methodological considerations. First, is the need for a methodological design that reflects the core assumptions of, on the one hand, epistemological relativism – knowledge as situated and fallible – and a 'depth' ontology on the other. Second, the necessity to delineate a "bounded" empirical context to address the complexity of multiple interacting objects, structures, and mechanisms.

In this chapter, I introduce and explain my overall methodological approach. I begin with an overview describing how I use retroduction as a guiding principle and research logic and describe the research process, timeline, and activities undertaken. I then outline the embedded case study and mixed-method design, before providing an overview of data collection methods and data sources for each of the five papers. Finally, I end with overall reflections including on the limitations of the research. Specific details on the data collection process, methods, and analysis are provided in the respective papers.

Retroduction as a research logic

> We choose to study different social problems because we judge them to be problems. How we define problems entails some kind of social values, and addressing such problems requires normative judgements. The methods can themselves be neutral, although the choices of what methods to use are influenced by the way we have defined and framed the research, which is, in turn, normative. Our choices of analytic tools entail assumptions that influence not only the methods we use and the empirical data we gather, but also what causal relationships between factors we expect to find.
>
> Borras Jr & Franco, Scholar Activism and Land Struggles (2023, p. 1)

The overarching aim of this thesis is to better understand and address the emergence of (disproportionate) climate-related loss. I have employed an iterative and largely "bottom-up" approach to address this aim. In line with the methodological principles

of critical realism, my approach reflects a process of iteration between theory, methods, and data collection. The goal is to derive causal propositions and ultimately uncover underlying structures and mechanisms. This logic of retroduction can broadly be divided into two interrelated phases. The first – descriptive phase – involves identifying and selecting the components of the phenomenon under study, as well as considering relevant theoretical frameworks and their value for generating descriptions of the selected phenomenon. The second – retroductive analysis phase – involves deriving hypotheses about structures and mechanisms that generate the phenomena that are being observed or experienced (Zachariadis et al., 2013). An overview of the overall methodological approach is presented in Figure 3.

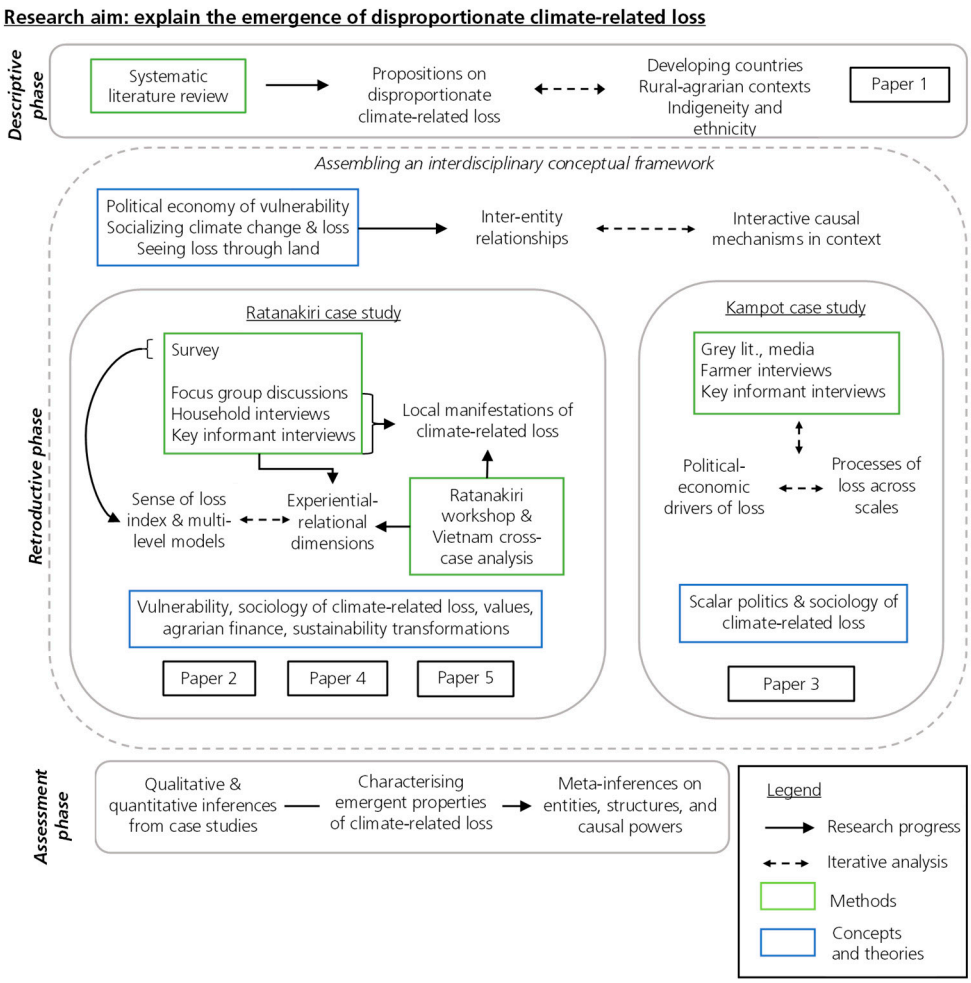

Figure 3. Methodological approach employed in the research
The figure illustrates the various phases and processes of the methodological approach, which follows the logic of retroduction. Author's own based on Persson (2021) and Zachariadis et al. (2013).

In the *descriptive phase,* I combined a literature review with scoping field activities, which helped me to derive propositions on disproportionate climate-related loss (Paper I). By doing so, I identified contexts and conditions relevant to a more in-depth study of (disproportionate) climate-related loss. These included the overwhelming characterisation of developing countries and agrarian contexts on the one hand, and socially and economically marginalised groups (especially indigenous and ethnic minority communities, and smallholder farmers) on the other, which are considered as particularly likely to be disproportionately affected by climate-related loss. In the descriptive phase, theoretical insights from climate risk, vulnerability, and environmental justice literature allowed me to identify key gaps including the limited engagement with scalar dimensions of disproportionality and political-economic drivers of climate-related loss.

In the *retroductive phase*, I explored disproportionality and climate-related loss as interlinked phenomena, both conceptually and empirically. I reviewed existing literature and data from exploratory interviews to derive initial hypotheses on generative mechanisms. I then elaborated and amended them using empirical material derived from case studies in Cambodia. I used an embedded case study design mixing intensive and extensive methods to construct case studies in Ratanakiri (Case 1) and Kampot province (Case 2). The household survey (extensive method) supported quantitative inference to identify demi-regularities or patterns in the data, which helped guide the design of intensive – qualitative – research. I combined intensive primary methods, including semi-structured interviews, focus group discussions and exercises, observations, and document analyses, with ethnographic research conducted by co-authors to derive qualitative inferences. These aimed to ultimately uncover the mechanisms and structures that produce the observable phenomena associated with climate-related loss (Paper II, III, IV). In addition, empirical insights from a multi-stakeholder workshop and focus group discussions with farmers helped to generate a framework that can contribute to better addressing climate-related loss in the research contexts (Paper V).

The retroductive process, in light of the research aims, supports the choice of concepts and theoretical frameworks as well as the design of data collection instruments. Beginning at the surface or empirical level, I focused on how people experience a sense of loss using theoretical insights from climate vulnerability, access, and values in human-environment interactions (Paper II). The next step was to further investigate the structures, mechanisms, and their causal powers at the deeper level. I did this by drawing on insights from scalar politics, vulnerability, agrarian finance, and the sociology of climate-related loss. This helped me better grasp the role of historical configurations that created the conditions under which loss occurs and understand how

processes of loss extend spatially and temporally through land (Paper III, IV). Literature on climate-related loss and damage, anticipatory climate governance, and sustainability transformations underpinned the framework developed to better understand the role of the future visions in rural-agrarian contexts and the representation of smallholder farmers' interests in discussions on transformations towards sustainability (Paper V).

Finally, the research process ended with an *assessment* of the findings of both case studies, not only in relation to each other but also in relation to causal propositions derived in the descriptive phase. To do so, I adopted a 'scalar' lens to move from the local and specific empirical conditions of the case studies to the national and global ones, iterating between them to uncover commonalities and differences. This supported the development of meta-inferences on structure, mechanisms, and their causal powers, which are presented in subsequent chapters. The following sections provide greater detail on the activities and phases of the research.

Research journey

The research is part of a PhD project that started in September 2019 and ran its course during the period of the COVID-19 pandemic that began in February 2020. Practically, the pandemic meant that I was not able to conduct the research in the way – or at the time – that I had intended. My fieldwork was delayed by more than a year and shortened by several months. My ability to engage with people and collaborators was therefore significantly altered. Nonetheless, I was fortunate to be able to conduct my main fieldwork in 2022 and received support from my department through an extension that covered part of the delay and enabled me to finish this work. Overall, the thesis is representative of the research aims and questions formulated at the beginning of the PhD. Such pragmatic considerations aside, this note does not (intend to) do justice to the extent of harm the pandemic has had on the health and well-being of research participants, collaborators, colleagues, and the world.

Throughout the research, I strove to ground my approach, albeit not as extensively as I intended, through a combination of desk-based research, field activities, and collaborations. The research benefitted from several collaborations. I was fortunate to be included as a visiting researcher at the Cambodia Development Resource Institute (CDRI) in Phnom Penh and through this engagement, met some of my co-authors. This PhD research was situated within a broader project at LUCSUS, which allowed me to benefit from discussions on scientific and political debates on loss and damage. Collaborations on the respective research papers emerged through personal networks and connections, often through participation in conferences and workshops. I travelled to Cambodia three times throughout the research for a total of seven months in 2020, 2022, and 2023. The first trip aimed to 'scope' the relevance of the research topic,

identify potential field sites in relation to the themes of interest and establish collaborative networks. The second was longer and involved the 'main' data collection phase. The third trip consisted of dissemination, discussions, and reflections on the research results with participants, as well as some data collection.

In the initial part of the research, I combined *desk-based research* with *scoping field activities* to select the case studies and delineate elements of the overall research design. To identify and select the case studies, I adopted a blended approach. First, I conducted a literature review of peer-reviewed and grey literature, and news articles, which provided an overview of the spatial dynamics of climate risks, socio-economic development, and social differentiation in Cambodia. At the beginning of 2020, I travelled to Cambodia and held interviews and discussions with government authorities, international organisations, and local civil society organisations in the capital (Phnom Penh) and six provinces across the country. I also attended and conducted observations at a multistakeholder workshop on Cambodia's Citizens Climate Budget. I was also familiar with the country context from research activities before the PhD. Through these various activities, I selected Ratanakiri and Kampot provinces as field sites for the research. It was also during this initial period of the research that I conducted a systematic literature review as part of Paper I, which highlighted empirical and theoretical knowledge gaps that informed the design of subsequent papers.

In 2022, after COVID-19 pandemic restrictions had been lifted, I returned to Cambodia for the *main field research activities* of the research. During this time, I worked closely with collaborators to conduct survey questionnaires, interviews, focus group discussions and exercises, and participant observations. The survey was designed collaboratively: some sections were designed with co-authors in Cambodia and others were adapted from a design by collaborators in the wider research project at LUCSUS. The field activities contributed to a mixed-methods case study in Ratanakiri (Case 1) and a multi-method qualitative case study in Kampot (Case 2), which are presented in Papers II, III, and IV.

In 2023, I returned to Cambodia for *dissemination and follow-up field activities*. Co-authors and I organised a multi-stakeholder workshop with district, commune, and village chiefs, provincial authorities, and civil society organisations in Ratanakiri province. The workshop focused on discussing the results of the research conducted in 2022, and an exercise on visions of the future with climate change. This trip also involved follow-up group discussions in two villages, which together with the workshop results provided the empirical basis for Paper V.

Photos. Research sites, Ratanakiri (top) and Kampot (bottom)

Embedded case study and mixed-method design

Case study designs are often used with the intention of disentangling complexity. A case study can be described as "an edited chunk of empirical reality […] a mental, or analytical, construct aimed at organising knowledge about reality in a manageable way" (Lund, 2014, p. 224). I used case studies to engage empirically and analytically with different dynamics involved in the emergence of (disproportionate) climate-related loss through land in agrarian contexts. In the previous chapter, I introduced Cambodia and the case studies and provided what I hope to be an extensive overview of substantive justifications for their relevance to the research. The choice of having two case studies of climate-related loss within Ratanakiri and Kampot province that are embedded in a wider context of Cambodia, rather than a single – more in-depth – one, was deliberate and reflects an embedded case study design.

Embedded case study designs involve several units of analysis *within* a single case study or multiple case studies. Despite the risk of stretching thin, attempting "even a two-case design" can remain a worthy approach, for generalization – and more importantly – if it better aligns with the research aims (Yin, 2018). I thus aimed to reflect on both case studies in relation to Cambodia as a case of climate-related loss in agrarian contexts in a developing country, to derive meta-inferences on a given phenomenon. Naturally, a multi-case study design comes with trade-offs. While each unit of analysis serves a particular purpose in the overall methodology, the case study in Ratanakiri is more substantial as it was developed over three papers (II, IV, V) and the one in Kampot, only in one paper (III).

I consider the two case studies in Cambodia as embedded in one 'critical' case holding "strategic importance in relation to the general problem" (Flyvbjerg, 2006, p. 229). I selected them *purposively* to represent a diversity of key characteristics, processes, and dynamics of interest – related to climate change and financialization – that align with my focus on the emergence of disproportionate climate-related loss. While they share similarities, they also differ significantly in their conditions and types of climatic and political-economic processes involved. The first case study in Ratanakiri focuses on smallholder farmers and focuses on microfinance debt, the impacts of multiple extreme weather events and other processes of environmental degradation. The second on sea salt producers in Kampot province centres on the impacts of erratic precipitation patterns and land speculation for non-productive purposes. Another important consideration was that both empirical sites are relatively understudied in the literature on climate change. Together, they provide a solid basis that allowed me to further elaborate on the structures, mechanisms, and relationships driving climate-related loss, and how these unfold across scales.

Photo. Research participant explaining his livelihood activities during the survey questionnaire in Ratanakiri. Farmers typically engage in a variety of activities including cash crop farming, home gardening, animal raising, and ad-hoc labour work on other people's farms.

Overview of methods

Mixed-method (qualitative and quantitative) and multi-method (multiple qualitative methods) are particularly useful in research aiming to uncover structures and mechanisms underlying a given phenomenon (Bhaskar, 2010). While approaches drawing on qualitative or quantitative methods both aim to produce "valid descriptive and causal inferences", they are rooted in different logic and research cultures, which come with their own sets of goals, norms, and values (Mahoney & Goertz, 2006, p. 228). Mixing qualitative methods, however, benefitted this research in several ways. This includes gaining a more complete overview of a phenomenon and the diverse views that people have of that phenomenon, developing inferences, and compensating for the weakness of specific methods within the study (Zachariadis et al., 2013). In this section, I focus on the purpose of the selected methods and how they relate to each other and the five papers. An overview of research sites, methods, and participants is provided in Table 2. More detailed descriptions of methods and design of data collection instruments are provided in each respective paper.

Literature reviews allow for a comprehensive overview of a specific set of knowledge on a topic of interest. In the research, I used literature reviews to identify case sites and knowledge gaps on disproportionality and climate-related loss that could be further examined empirically (Paper I). Reviewing grey literature also helped me gather secondary data on specific aspects for which primary data could not be collected as part of the research. This includes, for instance, data on precipitation levels and temperatures, which is often not available or challenging to access in Cambodia.

Qualitative methods such as *semi-structured interviews, observations, and document analysis* are useful for examining diverse aspects of social phenomena. These methods helped me investigate perceptions of socioenvironmental change and feelings associated with them. Semi-structured interviews feature a more 'open' design than structured interviews and include both structured and unstructured components. They often allow for interviews to be conducted in a more flexible and potentially less formal way by providing opportunities to prompt new areas of enquiry through discussion. It gave research participants more space to share their thoughts and left room for aspects that were not anticipated beforehand. This helped to grasp how the "interviewee frames and understands issues and events" (Bryman, 2008, p. 439) The structured portion implied that some areas of enquiry were important to prompt during the interview to allow for comparability in the data analysis phase while allowing for flexibility in timing and wording. Analysing documents, especially news articles about salt production (Paper III), as well as policy documents and grey literature on land relations in Cambodia (Papers IV and V) helped me to identify and contextualise discursive tendencies and narratives reproduced in the research contexts, beyond what is said during an interview.

Focus group discussions and *household surveys*, allowed me to investigate collective experiences and perceptions and how these differed across villages and sites. Focus groups and exercises are particularly useful in capturing shared perceptions of lived experiences and the dominant power dynamics within a particular social context (Liamputtong, 2011). The group discussions and exercises on changes in land use and local climate (Paper IV) were useful for observing collective reflections about past events and future expectations. Research participants expressed their perceptions of causal linkages between social and environmental changes that they have observed in their surroundings and lives. The household survey, meanwhile, helped to capture indicative patterns of relationships between socio-economic and demographic changes, livelihood activities, assets, experiences with and impacts of extreme weather events on crops and livelihoods, and non-economic values attached to land (Paper II). The quantitative survey data was subjected to descriptive statistical analysis and multivariate regression in SPSS to explain a sense of climate-related loss and thereby derive insights on potential indicative patterns expressed in the local context.

The *stakeholder workshop* (Paper V) gathered representatives from local civil society organisations, provincial ministerial departments, and leaders at district, commune, and village levels to discuss the research results and conduct an exercise about visions of the future with climate change. The purpose of the workshop was to grasp the perspectives of various groups and the potential disconnects between them. As a method, participatory workshops put greater emphasis on research participants' roles and relationships, and the in-situ observation of power dynamics. Finally, throughout the research, I also relied on *thematic qualitative analysis and coding* using software (NVivo) for processing much of the qualitative data. Except from the systematic literature review, the process involved deriving initial codes from existing theory and conceptual frameworks and revising those codes during the coding process, to identify indicative patterns in the empirical data subject to analysis (Fletcher, 2017).

Table 2. Overview of research sites, methods, and research participants for each of the case studies.

Case/level/location	Method	Number of participants
National		
Phnom Penh	Key informant interviews with g*overnment officials, representatives of* civil society organisations*, and journalists.*	17
	Participant observations at a workshop	
Bangkok	Key informant interviews with representatives of international non-governmental organisations	4
NA	Review of peer-reviewed and grey literature	
Ratanakiri		
Ban Lung (provincial capital)	Key informant interviews with g*overnment officials and representatives of* civil society organisations*.*	7
	Workshop with district, commune, and village chiefs, provincial authorities, and civil society organisations	26
Villages	Survey questionnaire	295
	Semi-structured interviews with farmers and village chiefs.	21
	Focus Group Discussions (8) including only female (2), male (2), youth (1), elder (1), mixed (2)	75
NA	Document analysis (peer-reviewed and grey literature)	
Kampot		
Kampot city (provincial capital)	Key informant interviews with g*overnment officials and other stakeholders.*	7
Salt fields	Semi-structured interviews *- Salt producers* *- Salt labourers*	23 *16* *7*
NA	Document analysis (news articles, policy documents, and other grey literature)	

Reflections and limitations

Positionality vis-a-vis research

My positionality – who I am and how it influences the topic, design, process, and participants in this research – is something that I reflected on and struggled with across the PhD journey. Though my life has been mostly disconnected from land-based lifestyles, I grew up listening to stories of farming and life on the land in close and faraway places. Issues of inequality are central to my personal and professional experiences and perceptions. Together, these animate my interest in and engagement with the themes of the thesis. But they also underpin my approach to conducting this research, including the limitations, blind spots, and faults that come with it and that I seek to – at least partially – expose here. The choices made in this research largely reflect my position as a PhD researcher in a Western European academic institution. My initial engagement with loss and damage was in the domain of climate policy through my role in an international organisation working on climate governance, adaptation, and development. My professional experience and education in environmental policy meant that I came to this topic with preconceptions of what loss meant and how to understand it.

Entering the world of research and sustainability science reoriented my thinking and led me to adopt what could be described as a friendly-critical eye approach. This inevitably created some challenges, especially trade-offs between producing use-oriented knowledge *for* policy and critical knowledge that *challenges* policy. I tried to balance these considerations to the best of my ability, guided by the goal of providing a platform for perspectives and experiences that are typically neglected in the global climate governance regime. Hence, my focus on distant and under-researched contexts, social groups, and forms of climate-related events and loss. As a sustainability PhD researcher, I often felt like I was always "in-between" and even outside longstanding and established academic fields and disciplinary boundaries, with a foot in different areas but never really "at home" in any one of these. This was certainly challenging, but it also motivated my attempts to bring research on climate-related loss and damage into constructive dialogue with other fields and bodies of theory and to make a place for it within sustainability science. I strove to maintain a collaborative approach to the research and an 'openness' in the research design whenever possible.

Fieldwork and Ethics

Inevitably, questions of positionality extend to the 'field'. My engagement with Cambodia began in 2015, with research for a master's thesis project. As a PhD researcher at a university in Sweden, I am external to the Cambodian context. Though I spent 1.5 years learning the Khmer language through online classes from a school in Phnom Penh and reached a low-intermediate level, which allowed me to understand a significant portion of discussions with research participants, I was not able to conduct them myself. This meant that I worked *with* and *through* co-authors and research assistants. Positive working relationships emerged through this approach and were sustained over time, gradually turning into friendships that continue until today. Nevertheless, the privileges and limitations associated with my positionality inevitably influenced many aspects of the research.

Though it is not possible to know how people perceived me, my presence was not neutral. Being introduced as a PhD researcher from Europe automatically signals a certain status, which often prompted people to accommodate my presence. As a relatively young woman with a mixed-ethnicity background, however, my presence seemed somewhat less disruptive. For one of the research sites, my closest collaborator was a Cambodian female researcher, with whom I co-led a team of both male and female enumerators who worked as extension staff from local provincial administration and civil society organisations. This likely contributed to our ability to engage and establish positive relationships with research participants of different genders. My role as an instigator of the research project placed me in a position of authority within the team, which I tried to mitigate by emphasizing the collaborative nature of the research from the start. I tried to emphasize my position as someone who is learning while encouraging open communication about various aspects of the field activities. I strove to not reproduce dominant power relations in the research approach, specifically with regard to ethnicity in the Cambodian context, but this proved to be challenging in Ratanakiri. I worked with field enumerators who had experience in and knowledge of the communities in Ratanakiri, but very few extension staff in the region come from the ethnic minorities and indigenous groups that inhabit the region. A much longer engagement in the field would have allowed me to assemble a research team with more enumerators who belong to these communities.

My positionality also influenced choices in the process of knowledge production. In Ratanakiri, the research took place in a context where land relations are a particularly sensitive topic. Considering my constrained ability to ground myself in the context for an extended period, I chose to not collect quantitative data on occurrences of debt-driven land loss and dispossession directly. Instead, I put a greater focus on more neutral topics of risks of land loss and broader land relations in the context of climate change.

I collaborated with a PhD researcher, Ms Phasy Res, who has engaged deeply with and has extensive knowledge of debt-driven land loss through her long-term ethnographic research in the province. In addition, I continuously reflected on the way research participants were represented in written material and the data collection process. Given that specific groups and communities are frequently misrepresented in knowledge material on climate change, I placed much emphasis on avoiding essentialising certain groups and formulations that might misrepresent research participants. I did this, for example, by attempting to not reproduce dominant narratives of "vulnerable people" and being particularly attentive to racialised discourses in research materials. By choosing to take a nuanced view of criticality, co-authors and I strove to ensure methods and research approaches accommodated the diverse views of research participants (and co-authors) and represented them as accurately as possible without compromising their positions.

Finally, I would like to discuss and stress the importance of some more pragmatic aspects and considerations of field-based research that are often taken for granted: working conditions, material resources and health and well-being. My PhD position meant that I had access to funding through the research project that I was part of at LUCSUS. To enable the type of research design I had envisaged, I also continuously sought additional funding from independent foundations to ensure I would be able to conduct this research collaboratively with researchers and extension staff who are knowledgeable about the local research context while providing good working conditions both in terms of remuneration and time. My collaborators and I took measures to ensure the well-being and safety of collaborators (such as no research was conducted after sunset, and context-specific consideration of gender and safety during the research process for female enumerators). We also provided necessary items (including for example masks and alcohol gel) to the research team and all villagers who participated in the research. I continuously sought advice from collaborators to ensure that appropriate measures were followed despite the removal of restrictions related to COVID-19 in the country at the time of data collection.

A note on procedural research ethics

Activities of this research are conducted in Cambodia primarily and partially in Sweden. Hence, the research is subjected to ethics and good research practice guidelines and requirements applicable in both countries. The research does not involve the types of activities or data (i.e., personal sensitive or biological material) that require formal ethical permission from the Swedish Ethics Review Authority, which does not regulate research that takes place outside of Sweden. The data and research fall under the purview of relevant authorities in Cambodia. In Cambodia, no specific regulations or

guidelines on research ethics exist or apply to research in social sciences. A standard and operating procedure from the World Health Organisation exists, but it only applies to medical research. I have received training on research ethics at Lund University, which was complemented by knowledge and guidance from research collaborators in Cambodia.

While there are no official regulations that require permission to conduct research in Cambodia, it is however common to seek approval from local authorities (district and commune offices) to conduct surveys. Such approval is not required for other research methods. Approval from local authorities in the relevant provinces and districts was obtained prior to the beginning of the research. My host institute in Cambodia (CDRI) issued official request letters that were delivered to commune and district offices in the province where the survey was to take place. A research brief describing the overall research, responsible contact persons, and the purpose and survey questions, were delivered along with the letters of approval. As per custom in Cambodia, the research team also met in person with the village chiefs of each village before conducting any survey and provided a letter and a research brief. Only upon approval from relevant authorities could the research begin. Oral or written informed consent was obtained from research participants prior to any research activities taking place. Research data collected for empirical papers (Paper II, III, IV, V) was processed – either anonymous or pseudonymised, translated, and transcribed – in Cambodia.

Methodological limitations

There are many ways one can go about studying climate-related loss. The approach I have adopted for this research inevitably comes with several limitations pertaining to the overall methodological approach and the data collection process.

Following an interdisciplinary and retroductive approach typically implies a large degree of *influence of the researcher* on the theoretical choices and conceptualisations of the phenomenon under study. I chose to engage with climate-related loss through the process of emergence using a critical realist lens and using an embedded case study design. As I have discussed in earlier sections, having two research sites inevitably limited the amount of time and attention that could be allocated to each. An alternative design could engage more deeply with the experience of loss through a more phenomenology-oriented approach, which could be a valuable path in some contexts. A transdisciplinary approach that would involve knowledge co-production with affected groups would also be particularly valuable to research on climate-related loss, particularly regarding ways to address its effects. I have tried to mitigate the limitations of the adopted methodological approach by ensuring that it aligns with the theoretical

ambitions of the research aim – to better understand and address – and its focus on the emergence of climate-related loss. One limitation remains that while I use land as a lens, I have focused more on the human relationships centred on land, rather than on the biophysical and environmental aspects of changes in land. I have not collected primary data on changes in land conditions, which could be a valuable addition to the overall approach.

A *mixed-method design* involves specific *trade-offs* and issues emerging from differences in values and norms, which can lead to epistemological and ontological inconsistencies and significantly influence the communication and applicability of the research (Mahoney & Goertz, 2006). Mitigating such issues generally requires careful selection and application of methods, for instance by distinguishing the role of each type of method and their combinations within the overall methodological design. I have clarified how extensive and intensive methods helped me derive quantitative and qualitative inferences, respectively. Nevertheless, method-specific constraints and biases are always present. For instance, some documents and data could not be accessed, especially meteorological data, which is a common issue in Cambodia (L. Parsons, 2022). Similarly, the use of Likert scale questions within household surveys always runs the risk of bias due to statement wording and design, and risks of inaccurately representing the respondents' feelings about a particular phenomenon. Interviews, meanwhile, can also involve call and confirmation bias and strategic omissions from research participants. I strove to mitigate these various biases and limitations through triangulation and reaching saturation – when collection from additional participants or sources did not add substantially to the data (Creswell, 1999).

The *process of data collection* is also subject to *constraints* and *biases* that can influence the validity of data. This includes the sampling process, collaborative field research, and access. In Ratanakiri, purposive sampling was used to determine the districts and communes to be included in the study. The sampling criteria aimed to provide a diversity of socio-economic and geographical conditions in the province. The villages were randomly sampled but due to the absence of up-to-date households' lists, a random approach could not be followed for the selection of households. Random sampling had to be approximated by randomly selecting households in different geographic clusters within the villages. For the semi-structured interviews, we strove to engage with a broad range of actors through purposive sampling – and managed to do so to an extent. However, time and availability constraints led us to combine this with a snowballing approach where potential subsequent participants were revealed during interviews. Working collaboratively during data collection can inevitably induce biases and inconsistencies due to differences in collaborators' and enumerators' interview approaches and inconsistencies related to translation from Khmer to English and vice

versa. My collaborators and I mitigated these issues through training, encouraging open communication about challenges encountered with the survey design and adopting an iterative approach to the design of the data collection instruments in the piloting period.

Access and relationships play a central role in the research process. Engaging with research participants meaningfully and respectfully relies heavily on building relationships of trust and continued engagement in the research context. Both of these can be significantly hampered in the midst or aftermath of a pandemic. Normal practices for enhancing trust such as staying in the villages or sharing meals with research participants were not possible and this inevitably influenced relationship-building. Beyond health and safety-related measures, the political context in Cambodia also played a role, especially in Ratanakiri province. Access to one of the districts was granted but limited to three days only, because of the long history of land conflicts and the presence of many economic land concessions. This meant that the number of household questionnaires and interviews had to be adapted. During the PhD process, I was fortunate to be associated with CDRI, which enabled access to various research participants, especially in governmental organisations. Similarly, collaborating with staff from local organisations in Ratanakiri made it possible to interact with villagers who might have otherwise refused to do so. However, affiliation with a particular organisation can also induce biases in the way people respond to the research. Being transparent about the research content, aim, and anonymity conditions, as well as the researchers' intentions and relationships with authorities, was crucial to mitigate these biases and establish rapport with participants.

Finally, consideration needs to be given to the role of *research 'ghosts'* (Beban, 2021). These are groups and people who were not captured in the research and whose voice is not explicitly represented, but who are nonetheless present in discussions with interviewed individuals. In this research, this mostly includes actors who sit in higher-level positions and were described as "powerful" people by interviewees, including, for instance, large-scale landowners and wealthy individuals. Not being able to represent their perspectives in the research constitutes a significant limitation. This is where triangulation and saturation became particularly necessary and useful as a means to enhance the validity of claims made regarding the role of these groups.

Findings

The main research question in this thesis centres around explaining the emergence of disproportionate climate-related loss in agrarian contexts. To do so, I focused on two case studies in Cambodia that illustrate commonly identified characteristics and dynamics of disproportionate climate-related loss. To study emergence, I used critical realism as a meta-theory and an interdisciplinary approach derived from the fields of climate science, sociology, critical agrarian studies, and political ecology. This framework and logic interconnect the five papers included in the thesis.

Paper I is a systematic literature review that assesses how "disproportionality" is conceptualised and operationalised in scholarship on loss and damage. It identifies and characterises the limitations of the use of the term and the methods employed to operationalise it, and pays particular attention to the treatment of scale in the analyses. Paper II focuses on experiences of climate-related loss in contexts of rapid agrarian change amongst smallholder farmers and indigenous and ethnic minority communities in Ratanakiri province. It centres on the relationships between people's sense of loss from extreme weather events, climate vulnerability, and relational dimensions based on diverse values associated with land. Paper III focuses on salt producers in Kampot and the reworking of land relations in Cambodia's sole salt production site, to understand what disappears, persists, and for whom in a changing climate. Paper IV takes a historical lens to examine the production of vulnerability through land and livelihood insecurity, climate-related loss, and debt-driven land dispossession amongst indigenous and ethnic minority communities in northeastern Cambodia. Paper V engages the role of representation by proposing a framework to better integrate smallholder interests and perspectives in visions of the future under climate change and related sustainability transformations.

This chapter presents findings relevant to the three sub-research questions: how disproportionality in climate-related loss is conceptualised, empirically analysed, and experienced (Papers I and II); the processes underpinning climate-related loss through land (Papers III and IV); and the role of representation, visions, and futures in the emergence of climate-related loss (Papers I, II, III, IV, V). Each section pertains to each research question, with additional subsections elaborating on specific findings.

Disproportionality in climate-related loss and damage

Research question 1: How is disproportionality in climate-related loss and damage conceptualised, empirically analysed, and experienced?

Research question 1 is addressed through Papers I and II. The findings show that although disproportionality has become an important term in discussions on loss and damage, with significant normative implications, empirical analyses struggle to grasp the experiential dimensions of climate-related loss.

1. *Disproportionality is increasingly used in science and policy discussions on loss and damage, but despite its strong normative implications, it remains poorly defined (Paper I).*

The systematic review (Paper I) shows the increasing popularity of disproportionality in peer-reviewed academic scholarship on loss and damage. Out of 205 articles, nearly half (99) mentioned disproportionality, illustrating the importance of the concept in framing research. Disproportionality was, however, mainly deployed with limited conceptual, methodological, and empirical grounding. 33% of the 99 articles mention disproportionality anecdotally, 46% embed disproportionality within a broader conceptual framework or discussion and 21% empirically research or demonstrate it by integrating it into the related methodological approach. Reviewed articles have very limited theoretical engagement with earlier work on disproportionality in other scholarly fields such as disaster studies and environmental justice.

2. *Conceptually, disproportionality serves to direct attention to the normative dimensions of uneven exposure to, capacity to deal with, and responsibility for causing climate-related losses and damages (Paper I).*

Knowledge about disproportionality in loss and damage predominantly comes from scholarship focused on questions of justice, ethics, and law (69% of articles). It thus has important normative underpinnings. As a concept, it is used to refer to and describe climate change-related processes taking place at multiple levels and scales and the differential effects these have on people and places. Specifically, it is used to bring forth the question of responsibility and the role of structural marginalization and unequal development as central to the creation of disproportionate burdens of loss and damage affecting certain groups and places. Empirical cases covered by the review most often use disproportionality to emphasize differential responsibility for climate change. They also use it to emphasise unequal capacities to deal with the current and expected impacts of climate change at the national level, commonly formulated as those who are least responsible for climate change are most disproportionately affected by it. Results also

showed that methods commonly used to determine causality and attribute responsibility for emissions and assess changes in climate risks (in terms of exposure, vulnerability, and hazards) are often unable to capture the diversity of experiences across contexts. For instance, the lack of availability of meteorological data in many countries of the Global South limits the value of certain methods attributing extreme weather events, leading to significant geographic disparities in evidence on climate change.

3. *In scholarship on climate-related loss and damage, the likelihood of being disproportionately affected by climate impacts is often equated with climate vulnerability (Paper I).*

Analytically, studies conceptualise and operationalise disproportionality mostly through climate risk and differentiated vulnerability. Disproportionate loss and damage at the national scale is explained by high levels of vulnerability and is associated with broad categorizations such as low-income, poor, or developing countries, and places with high economic dependence on natural resources. Empirical studies emphasize disproportionate risk as resulting from relatively subtle weather changes, as well as combined and spatially concentrated hazards and climate drivers, also called compound events. They also stress cases or "hotspots" involving sites exposed to combinations of environmental hazards and where regional and local environmental conditions exacerbate vulnerability to climate impacts. At the local scale, vulnerability due to differentiated resource access conditioned on gender, age, and ethnicity features prominently. Scholars identify people living in conditions of poverty, agrarian settings, women, and indigenous and ethnic minorities as particularly likely to disproportionately experience loss and damage from climate change. Other contributing factors to disproportionate loss and damage include dependency on the environment and natural resources for socio-cultural well-being. Lastly, the risk of epistemic injustices from climate change is also emphasised.

4. *Empirically, the overwhelming use of climate vulnerability frameworks limits empirically capturing (disproportionate) climate-related loss as distinct from climate change impacts (Papers I and II).*

Findings from the review in Paper I indicate that broad characterizations of people and places as 'vulnerable' can potentially obscure complex processes occurring at different scales. For instance, while the discourse of disproportionality in loss and damage as resulting from differentiated vulnerability is largely embedded in a logic of Global North versus Global South at the international level, social groups identified as vulnerable to climate impacts are found in local contexts in countries all over the world. Empirical findings of Paper II highlight some of the limits of climate vulnerability as a framework to explain differentiated experiences of loss amongst smallholder farming

households in a rural-agrarian context in Cambodia. The analysis of statistical and qualitative data revealed how characteristics that are commonly identified as critical determinants of vulnerability to climate impacts – and relatedly, the likelihood of experiencing disproportionate loss and damage – such as gender, age, or wealth play a limited role in explaining the differentiated sense of loss amongst research participants.

5. *Relational and temporal dynamics are significant dimensions to understanding differentiated experiences of climate-related loss (Paper II).*

Integrating experiential and relational dimensions such as intrinsic, instrumental, and symbolic values related to land and perceptions of changes in the climate improved explanations of differentiated sense of loss amongst smallholder farmers in Ratanakiri in the statistical analysis. For instance, results showed that a higher score on values attached to land, stronger perceptions of changes in weather and climate, and experiences of more significant impacts in relation to well-being are associated with a higher sense of loss amongst research participants.

Combining analysis of the survey results with data from interviews and focus group discussions revealed that a sense of loss from climate extremes amongst participants was strongly based on a fear of losing land. Losses and damages took on a range of material and nonmaterial forms, with the most reported ones being the loss of agricultural products and income, as well as a strong sense of loss or grief over environmental damage and destruction. Nonmaterial forms of loss intertwine with material losses such as lost agricultural produce and income, which made the likelihood of debt failure and land sale greater. Past experiences of loss appear to mediate the boundary between material and immaterial forms of climate-related loss. Research participants experienced a sense of loss even in the absence of material losses, simply in the apprehension of materialising loss of land, which they often expressed as an absence of hope. Such feelings result from a combination of experiences related to socio-environmental change in the region, including land conflicts and injustices, which were still vivid in participants' memories.

Processes of climate-related loss through land

Research question 2: What processes underpin climate-related loss through land?

Research question 2 is mainly addressed through the findings of Papers III and IV, which illustrate the diverse processes and dynamics through which land-based climate-related loss occurs, and how these are shaped by relationships across local to national scales. Both papers adopt a historical lens to examine the relationship between financialization, climatic change, and land relations – relationships of access, ownership, and use of land – in agrarian contexts. The findings of Paper II further illustrate the role of value in experiences of climate-related loss.

1. *Repetitive and cumulative extreme weather events disrupt dynamics and relations of production on the land (Papers III and IV).*

The empirical work in both cases shows that extreme weather events and their cumulative effects over time destabilize established relations and dynamics of production. This is especially the case for increasingly erratic rainfall, including more frequent rain episodes during the dry season and late rains, because of the reliance on rain-fed farming and practices of solar evaporation for sea salt production. Importantly, the sequencing of weather events plays a significant role, both in the combination of events and their temporal successive occurrence. In both cases, farmers described microclimatic effects of very localised rainfall episodes and temperature differences. Their usual techniques and cumulative experiential knowledge to predict weather patterns and events were increasingly inadequate.

In Kampot province (Paper III), extreme weather events described as "late" rain, "early" rain, or even "unseasonable weather" have forced salt producers to change their harvesting practices and have led to increased variability in production levels. Salt production is very time-sensitive and particularly dependent on weather, labour availability and skills. Producing salt requires dry conditions for solar evaporation and fast labour mobilisation to collect the salt before any rainfall occurs. The availability of workers for salt collection has decreased in recent years because of a combination of expanding opportunities for factory work in the province and extreme weather that has made salt collection less reliable and attractive. This limited supply of labour has led to decreased salt production levels, in turn reducing the amount of capital available to salt producers to sustain operations during poor harvests. Combined with erratic rainfall, over time this leads small producers further into debt and closer to economic failure.

In Ratanakiri (Paper IV), successive extreme weather events intertwined with increased environmental degradation from the land-use changes that have taken place exacerbate

the risks of crop failures. Group exercises on changes in land use and climate revealed that farmers across the villages perceived a severe decrease in forest cover, livestock, and soil fertility, intensified soil erosion, and increased pest outbreaks. These drivers are compounded by the effects of extreme weather events such as delayed or low rainfall, dry spells, and irregularities in temperatures. Interviewees reported that heat episodes were affecting their crops during the flowering season, leading to the death of the fruits (especially cashew nuts) and a severe decrease in production levels. Many farmers are responding to this by increasing their use of pesticides and fertilisers. Crop failures gradually increase the dependency of smallholder farmers on precious off-farm sources of income such as ad-hoc cashew collection and microfinance loans.

Photo. On the left is a salt field where salt is being produced by solar evaporation. On the right, is a salt labourer in a storage warehouse.

2. *Climate change exacerbates the effects of financialization, especially on collective arrangements (Papers III and IV).*

The salt sector in Kampot (Paper III) has a long history dating back to at least the 1860s. While a contemporary salt producer association organised 190 small, medium, and large-scale producers under one banner, this form of organisation contains elements of collectivised arrangements from the Khmer Rouge era that remained after the newly elected government took over production in the 1980s. This largely collective form of land arrangements coexists with expanding external investments in land for non-productive purposes and state investments in infrastructure development in the province. Consequently, land prices have soared. The salt fields lie on very economically attractive and commercially valuable coastal land. The impacts of extreme weather

events on salt production levels through the dynamics described above are gradually pushing small-scale salt producers to economic failure which often ultimately results in the sale of their land to external investors and large-scale salt producers. This leads to a process of land concentration with a few actors. The analysis revealed how the climate-related impacts accelerated the breakdown of the association through the intertwined processes of financialization, land speculation, and changing small-scale farming practices.

In Ratanakiri (Paper IV), smallholder farmers, indigenous people, and ethnic minority communities relied on common open access and complex farming systems that closely depend on forests. The acceleration of economic land concessions and forestland conversion in the province spurred a scramble for land that significantly reduced their access to natural resources. Combined with the expansion of the cash economy and the shift from open access to private land tenure, communities gradually moved from systems of shifting cultivation with subsistence crops to the production of cash crops such as cashews and cassava. This reverberated at the household level by increasing the reliance on microfinance loans to access cash for necessary inputs and to cover expenses. As discussed under the findings of research question 2, impacts from extreme weather events compound these issues by altering relations of production and increasing the risk of crop failures. In turn, this exacerbates the need for individual land titles, which are used as collateral for microfinance loans, rendering collective forms of land tenure less desirable and feasible since Indigenous Communal Land Titles (ICLTs) do not allow individual members to access microfinance loans. Taken together, the findings of both papers show the importance of examining the intertwined processes of political economic and climatic changes through a historical perspective, to grasp their cumulative effects on collective (tenure) arrangements.

Photo. Cashew nuts in a cashew field in Ratanakiri. Cashew yields have been severely impacted by weather changes across the country over recent years.

3. *The relational outcomes of climate-related loss – who loses out and who benefits – are contingent upon processes of land control and state formation (Papers III and IV).*

The two cases illustrate the interplay of power relations in processes of climate-related loss. Specifically, they highlight the role of the state and the control over land and natural resources in its making. In both cases, regulatory changes were introduced to facilitate an inflow of investment and capital in land as an economic resource. However, these took different forms. On the one hand, the 2001 Land law and related policies enabling and incentivising the allocation of economic land concessions for large-scale agribusinesses in northeastern provinces; and on the other, a decree that opens the use of salt fields for other purposes than salt production in Kampot province. These regulatory shifts can only be understood as embedded within broader historical processes of state formation in Cambodia, where control over land and natural resources played a prominent role in its economic transformation (see Chapter 3). Struggles related to these processes manifest in land-climate relations quite differently across the research sites and are underpinned by distinct discourses, actor networks, and institutions.

In Kampot, Paper III shows how discourses construing the status of salt from a local product into a strategic commodity of national importance to Cambodia's economy

are associated with processes of state formation at multiple levels. This includes, for instance, the government-driven creation of a producer association, representations of the traditional and artisanal practice of salt production in Kampot as the only salt-producing province, and the salt fields in Kampot being the sole source of domestically produced salt. These notions were reproduced in the narratives justifying the behaviours of some producers, who felt that they were "providing for the nation". Moreover, faced with the negative impacts of repetitive rainfall episodes on their production and uncertainties around future effects of climate change, small-scale producers who felt that they could no longer produce sufficiently decided to sell to larger producers who could better conform to those expectations, for the "good" of the sector and the nation. For others, the sale of land is increasingly perceived as the most viable or only option, considering the rising prices of land in the province. Some producers would thus sell their land to other salt producers but others to external actors who invest in non-productive sectors such as real estate development or speculate on the future value of the land. By promoting the efficiency of and need for production on the national scale, while enacting regulatory changes that permit the partial use of the salt fields for other purposes in the context of increasingly erratic weather patterns, the state unintentionally enables and precipitates a reconfiguration in the salt sector that may ultimately lead to its disappearance.

Photo. Bag of salt in a warehouse labelled with "Product of Cambodia, Finest quality, Cambodia sea salt".

Government discourses have progressively constructed Ratanakiri province and northeastern Cambodia more broadly as attractive for large-scale agribusiness, natural resources extraction and nature conservation efforts. These discourses and associated capital flows have strongly exacerbated land and livelihood insecurity amongst indigenous and ethnic communities (Paper IV). Such patterns are rooted in historical patterns of marginalisation based on ethnicity and processes of territorialization (see Chapter 3). Ratanakiri is also one of the few provinces that is mainly inhabited by indigenous people and ethnic minorities and has some of the highest rates of poverty and lowest levels of access to services in the country. In many of the research sites, farmers indicated that they mostly relied on the support of non-governmental organizations for basic public goods such as building schools or wells. Much like in the rest of Cambodia, moreover, there is limited state support for overindebted borrowers. The dynamics of extreme weather events described above exacerbate the risk of crop failures for smallholder farmers, thereby gradually reducing their ability to repay microfinance loans, pushing them further into debt and ultimately selling land. While the 2001 Land Law also introduced the possibility of obtaining ICLTs, which could prevent the transfer of land rights to external actors, the implementation of this measure has been very limited with only a few approved cases over two decades. In the case of forced land sale due to over-indebtedness, microfinance institutions, intermediaries, large landowners, and investors benefit economically from the sale. In both Ratanakiri and Kampot, there are also indications that the act of selling land was sometimes prompted through pressures and coercive measures, including predatory methods in loan provision and debt collection.

4. *Climate-related losses are partly expressions of values that manifest across scales (Papers II, III and IV).*

The two cases illustrate how values associated with land and related livelihoods influence experiences of climate-related loss. In Ratanakiri, Paper II shows how integrating values related to land and the degree of negative impacts on wellbeing and livelihoods helped deepen understanding of the role of histories of land struggles in people's sense of loss from extreme weather events. A higher degree of value attached to land was associated with a higher sense of loss from climate change. In addition, the analysis in Paper IV demonstrates the diverse ways smallholder farmers in indigenous and ethnic communities in northeastern Cambodia view land as more than an economic resource. In particular, it highlights the role of shifts in values in how the intertwined effects of climate change and financialization are experienced. This includes, for instance, compounding effects of reduced access to resources, indebtedness, and climatic impacts affecting how people view their relationships as guardians of forests and the spirits that inhabit them. Such values are minimally

recognized in regulatory arrangements for land access. Instead, these favoured more instrumental uses of land, underpinned by a logic of agricultural development through large-scale economic concessions to agribusinesses, as outcomes of embedded value struggles. Related value struggles are reproduced at the local level, through disagreements within villages between those who prefer to maintain individual land tenure for economic reasons (such as the sale of land or use as collateral for a bank loan) and those who favour obtaining collective land title as one way to protect their communities land and practices.

In Kampot (Paper III), the diverse values and related struggles associated with the salt fields and land in general underpinned the reconfiguration of the salt sector. Attachment to salt production and its history reinforced beliefs in its continued existence despite climatic impacts and was instrumental in the outcomes of changes in land relations. Emotions and memories related to salt production were often invoked by salt producers, who had a strong attachment to the activity both for their livelihood and as a symbol of Kampot province. It also influenced some of them to sell their land to other salt producers, as a way to ensure the continuity of salt production. Interviews with government officials in provincial departments and at the ministerial level also show how actors value salt production instrumentally, as an economic resource (i.e., strategic commodity and employment sector), *and* symbolically as a part of Cambodia and Kampot's cultural heritage. At the time of the research, the government was actively trying to rebuild the association and develop a new support strategy for the sector. In the strategy, the government announced plans to create a museum on salt production to attract tourism. Despite the state's interest in maintaining and supporting salt production in the province, other actors' interests seem to conflict with this goal. For example, there were reports of land being purchased by 'powerful' people from the capital for speculative purposes. These value struggles and underlying power dynamics are illustrated by the Land management minister recently calling on the provincial governor of Kampot to protect the salt fields by preventing their use for real estate development.

Photo. Photo exhibition on salt production in Kampot.

5. *Uncertainty and anticipation co-produce climate-related loss (Papers II, III, and IV).*

In both cases, extreme weather events and the impossibility of predicting future climate change influenced how different actors anticipate and envision a future on the land. In Kampot (Paper III), the analysis revealed how the possibility of loss itself, as the disappearance of salt farming from the province due to climate change, influenced the actions and choices of producers and authorities in ways that may unintentionally precipitate undesirable outcomes. Some salt producers had experienced repeated poor harvests and decided to sell their land in anticipation of deteriorating salt farming conditions. Some actors external to the salt sector had already purchased salt farming land, in the *expectation* of further regulatory changes allowing the use of land for other purposes and the potential disappearance of the salt industry. In Ratanakiri (Papers II and IV), indications suggest that smallholder farmers experiencing the effects of combined extensive land-use change, mainly deforestation, and less predictable weather patterns increasingly, perceived life on the land as less of a viable future, especially for their children. These findings emphasize the importance of engaging with questions of the future in a changing climate, to grasp both processes *and* outcomes of climate-related loss.

On representation, visions, and futures

Research question 3: What role does representation of smallholder farmers' interests in visions of the future with climate change play in the emergence of disproportionate climate-related loss?

The findings relevant to research question 3 mostly come from Paper V, which proposes a framework to pluralise and politicise visions of agrarian climate futures. I also draw on the results of the systematic review (Paper I) and findings of the case studies (Papers II, III and IV) to illustrate some of the dimensions of representation in scholarship on loss and damage and the empirical contexts. The findings presented below demonstrate how enhancing the representation of smallholder interests in discussions about and visions of the future with climate change is necessary to engage with the transformative potential of climate-related loss.

1. *The disconnect between local and global notions of responsibility hampers addressing climate-related loss (Papers I, II, III, IV, and V).*

The systematic review of scholarship on loss and damage (Paper I) shows that disproportionality has strong normative underpinnings that are often rooted in diverse notions of justice and responsibility. Largely, the focus is on distributive and procedural forms of justice, with few considerations of intergenerational and interspecies justice. These are mostly implicit in many of the reviewed articles and are formulated at the global level and in relational terms – between countries. Responsibility is closely intertwined with causality, as a matter of current and historical contributions to climate change through emissions. Some, however, refer to broader structural drivers, linking responsibility to global processes of unequal development and their role in causing climate change. These include the domination of certain knowledge systems (i.e., modern Western) over other systems of knowledge and associated power imbalances, as underlying drivers of unsustainable development and therefore responsible climate change. Others highlight the need for greater attention to differentiated responsibilities at the subnational level.

For the most part, research participants in my case sites referred to more proximate forms of responsibility for agrarian-climatic changes rather than global climate change processes and responsibilities of nations (Papers II, III, IV, and V). While national policy documents did include global framings of responsibility, the analysis in Paper V reveals the presence of highly diverse forms of responsibility embedded in narratives on climate change. For instance, as formulated in the need to support the development of private insurance schemes and improve microfinance access as a response to climate-related loss and damage. Such forms of embedded responsibility were also rearticulated

by different subnational actors. Specifically, responsibilities for dealing with the impacts of climate change were largely placed on smallholder farmers who are expected to adapt through new techniques, while receiving inadequate support to do so. Narratives of blame framed farmers' presumed unwillingness to change farming techniques as an 'obstacle'. However, smallholders explained that new technical solutions were often inaccessible due to high capital investments and that they were reluctant to adopt new techniques due to the livelihood risks when interventions lacked market support measures such as price thresholds for certain crops. Farmers suggested more collective forms of responsibility-sharing with a stronger emphasis on systems of integrated support for farming. There were overall little if any mentions of discourses related to global climate justice amongst research participants.

2. *Making explicit how various actors perceive what constitutes desirable and viable futures in a changing climate can help illuminate trade-offs, obstacles, and possibilities (Papers II, III, IV, and V).*

Across the research sites, questions of desirability and viability were often present in people's understandings of and responses to climatic impacts on the land and related livelihoods. Taken together, the findings of the case studies show that constructing viability needs to be understood as a political and discursive practice. In Kampot (Paper III), this is exemplified in the ways various actors expressed their struggles to maintain salt production in the province and hopes for the future of the salt sector. Crucially, various actors' visions of the future are underpinned by questions on the viability of salt production under conditions of climate change. The analysis revealed how expectations of scalability and production levels contributed to discursively and materially construe salt production as viable for some (large producers) but not others (small producers). However, many small producers contested these assumptions of viability by choosing to hold on to their land.

In Ratanakiri, viability was illustrated through discussions around different forms of land use and shifts in livelihood activities (Papers II, IV, and V). On a national level, policies emphasize intensified agricultural production through climate-smart agriculture, rice exports, and the expansion of the forestry sector for carbon market mechanisms. Smallholder farmers, meanwhile, described how certain activities, especially rice cultivation and livestock rearing had become increasingly unviable due to reduced soil fertility and yields, increased incidence of pests and diseases (which they attributed to extreme weather events, e.g., increased temperatures, changing precipitation patterns), and forestland conversion. This illustrates the contrast between visions formulated at the national level and local realities where livelihood activities are increasingly narrowing. The findings of Paper V also show how assumptions about what constitutes a desirable future under climate change vary significantly between

actors. Expressions of desirable futures ranged from national economic development objectives to more 'modest' aspirations of basic development and ecological restoration formulated in intergenerational terms. National policy documents on climate change mostly referred to the notion of climate resilience and the need to prioritise low-carbon pathways in economic development. Smallholder farmers in Ratanakiri described improved access to basic services (e.g., healthcare, education, water) as necessary for a future with climate change. This illustrates the need to integrate locally formulated visions of desirable futures with climate policy at various levels of governance. After decades of large-scale deforestation and resource extraction in the province, farmers highlighted the need to maintain and recover forests and trees, to help recover intergenerational ecological knowledge.

3. *Heuristic knowledge of climate change is closely related to expressions of resistance to and contestation of climate-related loss (Papers I, II, III, IV, and V).*

The results of the systematic review highlighted the limited applicability of certain approaches and methods to capture climate change effects and related risks in specific locations (Paper I). This is especially the case in the Global South where the availability of meteorological to track weather and climate changes at the local scale, and attributing extreme weather events, is an issue. This translates into a geographically uneven representation of the evidence of climate-related loss and large uncertainties in asserting the relationship between the hazard at the global level and its localised manifestations. Experiences across the research sites reflect these patterns. For instance, key informant interviewees in provincial meteorology departments lack the financial resources and equipment necessary to capture and record meteorological events at the local level. In Ratanakiri, only one weather station for the whole province was available until 2021, after which several stations were built in some of the districts. Similarly, in Kampot, the quality of the precipitation measurement devices does not allow accurate measurements. In addition, the department has been unable to build a new station in the necessary location since it requires a significant land area and land prices were too high. Consequently, as highlighted by several interviewees, farmers do not receive location-specific information about weather and climate events, apart from warnings of severe floods.

The empirical papers demonstrate that research participants' knowledge of climate change is mostly derived experientially (Papers II, III, IV, and V). People largely relate their understanding of climate events by describing how their techniques to predict weather, memories, and bodily experiences of weather events, rather than through a scientific depiction of climate change. Smallholder farmers and salt producers had very detailed understandings of the relationships underpinning ecological change in their

environment and referred to various heuristic techniques of predicting weather events, for instance by observing flowers, insects, and the direction of winds.

Paper V highlighted the need to engage with the political nature of climate knowledge. Specifically, to integrate diverse heuristics and knowledge forms with scientific knowledge for greater representation of smallholder farmers' perceptions and experiences of climate-related loss. Across the research sites, expressions of hopelessness in the face of climate impacts also coexisted with expressions of agency and resistance to land loss (Papers II, III, IV, and V). Uncertainties regarding the current and future impacts of climate change made it difficult for some smallholders to anticipate these and act on them. People also described that they lacked the necessary knowledge, which impedes their ability to engage with and contest the content of discussions related to climate change.

Photo. A farmer walking through a field of cashew trees. "I think we should grow more kinds of trees like Thnong, Kro Nhoung, and Kor Koh for the next generation to know what these kinds of trees look like." (Village chief at the workshop, 2023).

Discussion

The thesis provides conceptual, methodological and empirical insights that advance our understanding of – and ability to address – the emergence of disproportionate climate-related loss. By critically reviewing scholarship on climate-related loss, and examining processes of loss in agrarian contexts in Cambodia, I showed that it is necessary to employ an interdisciplinary approach to capture the distinctive character of experiences of loss through land in agrarian settings and thereby, understand how loss comes to be. This focused on: understanding the diverse values embodied in the objects and phenomena that are lost; unearthing the cross-scale processes that induce shifts in land relations; and more critically engaging with the representation of smallholder farmers' interests in visions of the future.

This chapter presents the thesis contributions. First, I propose a conceptualisation of climate-related loss by linking together the findings with the overarching conceptual framework centred on access and value. I then describe how climate-related loss comes to be by drawing on a critical realist conceptualisation of *emergence*. Using a relational and scalar lens, and employing Cambodia as an illustrative case, I explain how climate-related loss can be characterised as disproportionate.

Finally, I ground the analysis in notions of *relational justice* to outline pathways towards better addressing the emergence of disproportionate climate-related loss. I argue that it is valuable to rethink dominant framings of the relationship between climate change, uneven development, and loss as more than a question of vulnerability. I then situate this proposal within broader debates and literature on sustainability transformations. I end with reflections on the policy implications of the research for both global and national processes of climate governance related to Loss and Damage.

Understanding climate-related loss and its emergence

This thesis began with a focus on land and livelihood security to characterise the objects and phenomena of value that are being 'lost'. I employed an interdisciplinary framework to investigate how climate change and financialization intertwine to reconfigure access to – or ability to derive benefits from – land. I examined the conditions that produce vulnerability to climate impacts – as the potential for loss – and used value as a way to understand how loss arises from such conditions.

I argue that climate-related loss can be understood as an emergent phenomenon and defined as *losing the ability to derive benefits from objects or phenomena of value, as a result of climatic and socio-economic drivers*. This conceptualisation is illustrated in Figure 4. In the following sections, I substantiate this argument by combining research findings with theoretical insights to identify and describe the objects, structures, and mechanisms that interact and reconfigure access and values. Together, these underlie the emergence of climate-related loss. Starting from the *empirical* level with the intertwined manifestations of extreme weather, indebtedness, and land loss, I then move to the level of the *actual* and describe the role of access and value, before turning to the deeper level or the *real* with generative mechanisms related to climate change and financialization.

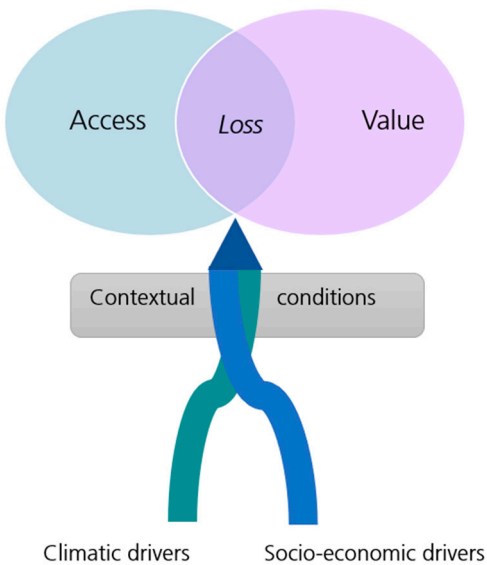

Figure 4. Illustration of climate-related loss as an emergent phenomenon
Climate-related loss as losing the ability to derive benefits from objects or phenomena of value as a result of climatic and socio-economic drivers.

Climate-related loss is a surface phenomenon at the empirical level that is experienced, produced, and reproduced through a combination of social practice and natural phenomena. It emerges out of *underlying* social and biophysical structures and mechanisms. Climate-related loss must therefore be understood through the workings of these underlying mechanisms.

Arguably, a climate-related loss is not necessarily something that can be directly observed in the every day; there may be no universal criteria to determine whether an event can be characterised as a climate-related loss. Most often, experiences and observations are – in critical realist terms – events or traces of events. These are constitutive of a given phenomenon whose causes may or may not be tangible or directly observable. If we take examples from the two cases presented in this thesis, the events include changes in precipitation, temperature, and seasonality on the one hand, and the act of selling land on the other. The effects of these events manifest in various ways, for example, through lower yields, the inability to access or use one's land, or even feelings of hopelessness (Paper II, III, IV). The sale of a plot of land or the effects of changes in temperature or precipitation on crop yields, do not necessarily constitute a *climate-related* loss in themselves. Land is being sold daily and these sales are not necessarily climate-related or perceived as a loss by those who sell it. This poses the question of under what conditions, and in what ways, would a land sale or the effects of changes in weather patterns be considered a loss. To explain this, I argue that we need to move analytically towards uncovering the entities and mechanisms that underlie changes in conditions of access and value.

The role of access and value in loss

While a loss is often broadly associated with material and tangible change – something that was is no longer – it also holds an inherently experiential and intangible component. Experiences of loss are inextricably linked to the notion of value. Smallholder farmers in Ratanakiri who sell their land to pay off their debts might experience this sale as a loss because of the value that they ascribe to that land or its properties as a crucial element for their livelihoods and identity (Paper IV). Similarly, government representatives in Cambodia might view the discontinuity of salt production as a loss because it has significant economic and cultural value. Loss is dependent upon the value systems within which individuals are embedded and more specifically, the value trade-offs that a loss or simply its potential generate. The decision to sell land typically involves an ongoing evaluation of the benefits that can be derived from keeping it vis-a-vis selling (or abandoning) it. The increasing economic value of land ascribed to the land, therefore, plays a role in influencing this evaluative process.

Here, it is necessary to make a distinction that further specifies what changes and value trade-offs may be constitutive of loss. I posit that using access – as conceptualised by Ribot & Peluso (2003) – being the ability to derive benefits from objects or phenomena of value helps us grasp a broader spectrum of experiences of loss. To illustrate, part of the decision of salt producers in Kampot to sell their land to larger-scale producers in response to lower production from erratic weather changes was motivated by the knowledge that the person they sold to would continue producing salt (Paper III). Despite losing the ability to use the land to make a living, they expressed the continuing ability to derive benefits from knowing that the land would be used to perpetuate salt production in the province, which is something that they value as an important element of their personal histories and Cambodia's cultural heritage. Hence, the ability to maintain the land for intrinsic and relational purposes thus factors into the evaluation of climate-related loss. Loss can thus be experienced even before any material change has occurred – as shown in Paper II – but also not experienced or mitigated even when a change in access has occurred. The land itself does not disappear but the ability to use the land may disappear or change because of interactions between socioeconomic and climatic drivers, which may or may not be considered a loss. Furthermore, framing access as ability to derive benefits helps to account for the voluntary sale or act of letting go of something that is valued as opposed to under coercion, which can often be the case, as shown in the research contexts. To summarize, the ability to derive benefits from an object or phenomenon is dependent on the varied forms of value that are associated with it.

Entities underlying ability to derive benefits from objects or phenomena of value

In this section, I focus on the entities – objects and structures – that underlie the ability to derive benefits from valued objects or phenomena. I focus on the ability to produce on the land, the ability to sell land, and the ability to use or maintain the land for intrinsic and relational purposes and illustrate this with examples from the cases.

As shown in the cases, climatic events in combination with socio-economic, political, and other environmental drivers affect relations of production in ways that reduce some people's ability to sustain a living from the land. Something needs to be produced for erratic rainfall to lead to crop failures and lower yields. This implies resources, practices, and relations that together make up a system of production. Although not the focus of the thesis, it is necessary to acknowledge the entities that underlie climatic and local environmental changes that condition the land and what people (can) do with it. Humans depend on a liveable climate to be able to live and cultivate crops and produce food. Crops rely on light, water, heat, and nutrients to grow, which are in turn related to entities that constitute the climate system, ecosystems, and the land.

The ability to sell land, similarly, requires a set of entities and relationships that together make it possible for the sale of land to materialise and be legitimized. This can only occur if rights to that land are transferrable between individuals or entities under a legal or customary framework that embodies specific notions of what constitutes access and for whom. In addition, a value framework that attributes value to the land is also necessary. In other words, various entities and relationships that can determine how and by whom resources or objects, such as land, can be distributed, used, exchanged, and traded. The state as a political entity has the power to enforce rules, laws, policies, and regulations that influence the conditions under which such a transfer occurs. These powers are typically conditioned on relationships of authority and accountability with citizens. Other political-economic entities that constitute a market, such as financing institutions or companies, can also influence the conditions of such an exchange. States, markets, and other political actors thus mobilise material and ideational resources to influence relations of production. Individuals as consumers, citizens and political agents can influence these processes through practices that may reproduce, challenge, and at times transform them. Relationships between the state, markets, and people in agrarian contexts often manifest changes in land, and the production of property, authority, rights and citizenship (T. M. Li, 1999; Lund, 2011, 2016, 2022).

Similarly, how people value diverse objects and phenomena is also dependent on sociocultural entities. While market actors can, for example, put a price on an object such as land, non-economic values are necessarily involved in the trade-offs that people make. The family unit and other community, religious and spiritual entities underlie the values people ascribe to things through sets of norms, beliefs, behaviours, customs, and notions of identity. For instance, in Ratanakiri, many of the communities' cultural practices are connected to the land through relationships of spirituality and guardianship. In this case, spirits also are entities that underlie the ability of people to use and relate to the land in ways that are more oriented by intrinsic and relational forms of value.

Causal mechanisms underlying the emergence of climate-related loss

From a critical realist perspective, it is the relationships within and interactions between entities that underlie the climate, relations of production, and value systems that cause the emergence of climate-related loss. Anthropogenic activities interact with and influence the climate system in ways that induce climate change – long-term shifts in weather patterns – primarily through emissions of carbon dioxide into the atmosphere. While climatic events have always caused various forms of losses in agrarian contexts, it is necessary to account for the distinctive influence of anthropogenic drivers of climate change both quantitatively and qualitatively. Anthropogenic forcings on the climate system are leading to an acceleration of changes in weather events that erode

soil, yields, and consequently livelihoods. These interact with and can disrupt established socioeconomic configurations. As shown in the cases, successive extreme weather events – in combination with other socio-economic drivers – disrupt the relations that underlie production to the extent that some livelihood activities that have been present for decades or even centuries may ultimately disappear. Successive impacts from climatic events do not occur in a vacuum; they often interact with and exacerbate historical processes and outcomes associated with broader socioenvironmental changes. In the cases presented in this thesis, particularly those related to financialization.

Changes in systems of production reconfigure relations of production on the land. In Ratanakiri, this manifested as a turn from systems of swidden cultivation primarily for rice cultivation combined with the collection of forest products toward perennial cash crop production and sale to the market. In Kampot, meanwhile, salt fields gradually turn from a means for traditional salt production to an object of speculation by various actors. The findings also highlight the role of the state in legitimizing certain forms of use of land over others, such as ELCs in Ratanakiri and the use of the land of the salt fields for non-productive purposes in Kampot. This was done via regulatory changes that facilitated shifts from open access to private land tenure systems in Ratanakiri and the opening for the possibility of selling land for other purposes than salt production in Kampot. In Kampot, the concentration of land in the hands of large-scale producers or external investors and the breakdown of collective arrangements for salt production were also precipitated by discursive representations of salt production as a strategic national commodity.

Changes also occur in how people value certain phenomena, attributes, and objects. This includes shifts from multiple forms of values associated with land (intrinsic, instrumental, relational) to predominantly instrumental – and monetary – value, and consequently political efforts to retain and protect non-instrumental forms of value. In Ratanakiri, this manifested in the change in benefits people derive from the land from predominantly consumption to cash crops. More broadly these shifts are illustrated through practices reflecting the use of land predominantly as an economic and financial asset rather than a living entity to which people are related, or a central element of a cultural heritage. As non-instrumental values became eroded through changes in relations of production, however, political efforts to retain intrinsic and relational values through protecting land for specific uses were present in both cases through the interests in indigenous land titles and investments in sustaining the salt producer association, albeit with questionable success. The cases demonstrate that climatic and socioeconomic drivers interact to make climate-related loss more prescient and limit the effectiveness of such measures.

In particular, financialization affects relations of production by reconfiguring who gets to access the land and for what purpose which, in interaction with climate change, causes detrimental effects on the land and ability to produce. In turn, these affect the ability to derive benefits from various objects or phenomena of value. As I have illustrated, anticipatory decision-making is based on expectations of future changes (primarily loss) in abilities to derive benefits and can engender climate-related loss. Access to knowledge on the implications of climate change (for instance, sea level rise in Kampot or continuing episodes of draught in Ratanakiri) also factors into how climate-related loss manifests. This was often expressed as a sense of hopelessness when describing perceptions of a future with climate change or an inability to foresee how they could make a living from land under such conditions. In other words, the uncertainty and perceptions of what might or might not be possible in the future under conditions of climate change can already induce experiences of loss and precipitate material forms of loss.

The preceding account of how climate-related loss emerges in agrarian contexts shows how climate-related loss cannot be reduced to climatic events alone, nor changes in relations of production or value. It is only through their interaction that they cause climate-related loss. And while climate-related loss emerges out of their interactions and relations, it cannot be reduced to them; its properties are more complex than those of its contributing parts. I do not claim that this explanation is exhaustive as I have chosen to focus on components that are specific to the case of land and agrarian contexts. However, at some level, it can be a valuable approach to explain other forms of climate-related loss than those presented in this thesis. Thus far, I have discussed at length what constitutes climate-related loss and why it needs to be considered as an emergent phenomenon. Next, I turn to how climate-related loss can become characterized as *disproportionate*.

Disproportionate in relation to what? Cambodia as a case

There is no universal baseline to determine what constitutes a (dis)proportionate climate-related loss. I posit that disproportionality in climate-related loss needs to be understood as relational – the loss of ability to derive benefits in relation to the ability to influence the conditions that lead to this loss. To illustrate my argument, I draw on the notion of scale and apply the explanation of emergence presented above to the case of Cambodia.

It is necessary to begin with taking stock of *who is losing what,* when changes occur in the ability to derive benefits from objects and phenomena of value – in this case, the land. At the level of households or individuals, smallholder farmers are losing the ability to derive benefits from the land in several ways. As shown in the papers (II, III, IV), for many this constitutes a loss of ability to derive an income or produce food from their cultivation. A loss of income in turn affects, among other things, their ability to repay their loans, ultimately increasing the risk of losing their land altogether. The effects have implications for the way farmers relate to and perceive a future on the land (Papers IV and V). Climatic impacts reverberate on the overall economy at regional and national levels. For instance, lower salt production levels in Kampot lead to loss of work and income opportunities for day labourers and reduce the overall contribution of salt production to the local economy. These also lead to economic losses at the national level and a greater need for salt imports, which negatively affect Cambodia's trade balance and increase its dependence on external imports for food security. This has considerable implications for Cambodia as a nation where 22.2% of the economy relies on agriculture, forestry, and fisheries, and 63% of households are involved in agricultural activities. The Cambodian government has an objective of reaching upper-middle-income country status by 2030 and within this vision, agriculture is expected to play an important role. The current and future burden of climate-related loss, therefore, jeopardizes such a vision. This can, in turn, have detrimental prefigurative effects. Moreover, the implications are not only economic. As I have discussed in previous chapters, in many agrarian contexts in Cambodia and Southeast Asia more broadly, land is embedded in the fabric of social and cultural relationships.

I next turn to *who has the ability to influence* the conditions or mechanisms that lead to climate-related loss and attempt to identify the structures and entities that have the greatest influence on changes in the climate, systems of production, and values. The findings demonstrate how climate-related loss is produced and reproduced through practices of various social actors within and outside Cambodia. Those who can influence debt-driven land sales include institutions with the resources to buy the land from those who can no longer keep it, such as microfinance institutions (MFIs), large-

scale landowners, agribusiness, and other investors who seek to speculate on land. It is important to consider how the powers embodied by actors to influence locally specific events of land sale relate to processes at the national scale. Across Cambodia, land is constitutive of state power and therefore embroiled in struggles over control of resources at different levels of governance (Beban, 2021; Diepart & Dupuis, 2014). Similarly, the wave of reforms that "commercialized the microfinance sector and promoted industry self-regulation" and gradually positioned microfinance debt as core to financing agriculture and the livelihoods of many is consequent of a broader neoliberal turn in Cambodia's governance (Green, 2020b, p. 1429). However, one can question how much influence countries such as Cambodia, which lie in the so-called "periphery" have over the global political-economic apparatus (Ferguson, 1990; Wallerstein, 2004).

The ability to influence the processes of financialization and climate change that underlie the emergence of climate-related loss lies largely outside of Cambodia. The anthropogenic influence over the planet or the climate system does not come from homogenous humanity. There is ample evidence that climate change and other socioecological changes are embedded in the structures and systems of production of countries that control a disproportionate share of resources at the expense of others – in the Global North (Agarwal & Narain, 2019; Sealey-Huggins, 2017; Singh et al., 2023). Recent scholarship shows how structural discrimination, and political and economic policies that have led to accrued debt in Global South countries diminished their economic power and capacities to respond to climate-related impacts (Deivanayagam et al., 2023). This is particularly relevant in the case of Cambodia, which has been at the receiving end of development agendas and associated interventions since the 1990s. Many of Cambodia's MFIs are owned by large international banks based outside the country and/or financed through loans provided by international financial institutions such as the World Bank and International Finance Corporation (personal communication, February 6, 2020).

Similarly, with regard to climatic drivers, the largest share of greenhouse gas emissions originates from countries in the Global North. Actors in these countries thereby have the greatest influence over anthropogenic drivers of climate change, but the ability to influence is differentiated within countries. Even if Cambodia eliminated all its emissions, it could not escape the effects of global climate change. Furthermore, reducing emissions, for instance, by transitioning away from a fossil-fuel-dependent pathway, would require significant economic resources and trade-offs. This has been discussed at length in the negotiations, with the case of countries in the Global South that are essentially faced with a dilemma of forsaking their right to development to be able to mitigate and adapt to climate change, and that are already diverting economic

resources from budgets to deal with the effects of extreme weather events (Benjamin & Thomas, 2023; Eckersley, 2015).

To conclude, disproportionate climate-related loss occurs when people who lose the ability to derive benefits from objects and phenomena of value, also have the least ability to influence the conditions that lead to this loss. Two qualifications are necessary. First, it is necessary to consider the extent to which the ability to derive benefits from objects and phenomena of value is altered now and in the future, from the individual to collective entities like the nation-state. Second, it is necessary to examine the cross-scale nature of the relationships that cause climate-related loss vis-à-vis those influencing the conditions that lead to loss. This understanding builds upon and expands other framings of disproportionality in scholarship on loss and damage. For instance, those that frame disproportionality as a matter of responsibility through contributions to climate change and empirically assess disproportionality through a capability approach (Boda et al., 2021; Bullard et al., 2016; Diouf Sarr, n.d.). The relational approach undertaken in this analysis can be taken one step further to consider *who benefits from loss*. Recognising that these are often the same as those who have the ability to influence directs our attention to questions of justice.

A path towards relational justice?

This research departed from the premise that a disproportionate burden of climate-related loss affecting certain people and places was a sustainability problem and a matter of justice. To address (disproportionate) climate-related loss, I argue that it is necessary to move towards approaches that can account for the *totality of relations* that constitute it and challenge its political and economic roots. I suggest that this could be done through a *relational justice* lens, which would enhance the representation of those affected in order to address the relations that constitute disproportionate climate-related loss. In other words, between those who suffer the loss and those who control the conditions that lead to loss. This lens would foreground approaches that can account for the plurality of knowledges and experiences in climate-related loss, bridge notions of responsibility across scales, and highlight the agency of those affected.

Relational approaches to justice are used and developed in several domains, most notably in Indigenous scholarship and legal studies. Relational justice refers to justice produced through *repairing relationships and greater recognition of the relational nature of harm* (Burnside & Baker, 1994; Pillsbury, 2019; Szende, 2022; Wielsch, 2013). That relations form the basis of life and ways of being has long been central in various cultures, particularly amongst Indigenous peoples. For many communities, well-being,

as Parsons (2023) describes "requires the maintenance of reciprocal, balanced, and respectful relationships with their kin (both human and more-than-human)" (p. 289). The harms and losses wrought by various forms of oppressive forces (e.g., colonialist, capitalist), are thus seen through the multiplicity of relations that connect people to place, one another, and other entities. Relational approaches to justice grounded in Indigenous principles are situated practices that exist in their own right, and should not be reproduced instrumentally across contexts (Vieille, 2012).

At its heart, a relational justice approach to climate-related loss calls for recognizing the many ways people experience and know climate (change) and loss. Framing loss as an emergent phenomenon implies coming to terms with the centrality of multiple entities – social and biophysical – that constitute it and, more importantly, their relations. The cases in the thesis showed how access to – or the ability to derive benefits from –land is often conditional on the operation of mechanisms that favour specific knowledges and ways of valuing land over others. Activists and organizations have long emphasized the lack of recognition of how climate change affects links between the environment, biophysical processes, cultural practices, and identity in global climate governance (Johnson et al., 2021; Sawatzky et al., 2020).[21] As Schlosberg (2012) describes, "It is the undermining of the relationship between people and place that threatens a number of basic needs and rights, and it is the lack of recognition of that relationship that causes the status injury faced by vulnerable communities" (p. 451). Understanding loss implies firmly grounding other ways of being, living, and knowing in a changing climate, as valid, legitimate, and respected as any other forms of climate knowledge. This arguably renders a dichotomous framing of climate-society relations difficult, if not impossible, to maintain. There lies a transformative potential in transcending the dichotomies that nurture technocratic approaches to climate change and other sustainability issues (Nightingale et al., 2020; West et al., 2020). However, realising such potential requires extending this recognition to relationships of accountability and responsibility.

Responsibilities in processes of climate-related loss need to be understood as *layered* and *situated*. As shown in this thesis, processes of climate-related loss are historically contingent and unfold across scales. The cases highlighted the role of various actors and institutions in driving climate-related loss and conditioning the ability of those affected to influence underlying socioeconomic and climatic drivers. The allocation of responsibility for climate-related loss therefore becomes more than merely a matter of distributing risks and impacts between Global North and Global South countries *and* more than a question of climate. As Forsyth (2014) argued nearly ten years ago

[21] See also Anchorage Declaration (Indigenous Peoples' Global Summit on Climate Change, 2009)

"distributive justice is only possible when there is something to distribute" (p. 232). It is hard to fathom what a 'fair' distribution of climate-related loss would be. However, it is possible to conceive a renewed understanding of justice that would provide "a basis to sufficiently upset the underlying forces and abiding structures of global inequality" (Okereke, 2010, p. 471). This implies recognising the various forms of responsibilities that can adequately support the ability to both address and prevent climate-related loss. Such considerations reflect normative accounts of climate change as questions of burden-sharing and harm avoidance (Caney, 2014). It does not mean obscuring the responsibility of countries that have disproportionately contributed to climate change but rather emphasising that responsibility for the causes of a problem should not be conflated with abilities to address it. This also means rethinking where agency lies and identifying leverage points to challenge the discursive and structural relations that hinder the representation of the experiences and values of those affected in decision-making processes.

Recognizing the *power in* loss and the *power of* loss as relational is a necessary pre-step to nurturing the agency that can challenge its underlying structures and mechanisms. It might be valuable to rethink our understanding of the relationship between climate change, loss, and development less as a question of vulnerability and more as a question of *rights*. The findings of the thesis illustrate how prevailing relations of power shape the relational outcomes of processes of climate-related loss – who loses and who benefits – and how loss is not only precipitated but also *anticipated* and *contested* in various ways. In turn, the possibility of loss itself has implications for how various actors perceive and enact certain visions of the future in a changing climate, but the ability to act upon such visions can be hampered through discursive framings. For instance, some civil society representatives have criticized vulnerability discourses in L&D as portraying Indigenous People and other affected communities solely as victims rather than right-holders and 'partners', thereby contributing to further entrenching unequal power relationships in climate governance (UN Climate Change - Events, 2023). Therefore, a discursive reorientation from vulnerability to right-based approaches has important implications. People in certain places do not experience disproportionate climate-related loss because they happen to be particularly vulnerable but because their rights are – repeatedly – undermined. The need to reorient power relations has long been identified as central to more effective and transformative approaches to address climate change and loss and damage (Ciplet et al., 2021; Gonda, 2019; Roberts & Pelling, 2019). A relational justice lens offers a framework to further ground the agency and political capacities of those affected in challenging the power relations that co-produce climate-related loss within and beyond the realm of global climate governance.

Finally, achieving relational justice for climate-related loss is dependent upon alliances between diverse movements that seek to disrupt, redefine, and re-envision relations. Climate-related loss in agrarian contexts unfolds through prevailing political, economic, and social relationships underpinning access to resources. This emphasizes the importance of alliances between movements that aim to address various forms of injustices associated with socioenvironmental change by disrupting the political-economic status quo. This includes movements that call for restitution and reparation such as movements that call for restitution of land to dispossessed communities or construe bottom-up political visions of energy transitions (e.g., Manifesto from the Peoples of the South: For an Ecosocial Energy Transition). But it also includes demands from civil society activists and policymakers from the Global South who call for debt cancelling as a measure to deal with climate-related loss under the L&D framework. These eclectic body of actors and demands have been eloquently framed by Borras Jr & Franco (2018) as Agrarian Climate Justice; a framework that calls for "deep social reforms" that "can only be accomplished through fierce, relentless and disruptive resistance within and/or against capitalism" (p. 1319). Achieving such reforms, however, will require building and strengthening both vertical and horizontal networks from local to national and international levels that can bridge the disconnect between global claims and local political realities of climate change in agrarian settings (Sekine, 2021). In sum, a relational justice lens can expand efforts to understand how loss compounds, challenges, and contributes to broader development struggles (Roberts & Pelling, 2019), by connecting climate justice with other normative agendas emerging from grassroots movements.

From losses and damages to Loss and Damage: implications for policy and practice

Loss and damage is arguably a boundary object.[22] This makes the task of drawing implications for policy and practice particularly complex. The goal in this section is thus not to provide a long or exhaustive list of recommendations, but instead, to suggest what this new understanding of disproportionate climate-related loss implies for policy and practice. First, conceptualising climate-related loss as a matter of access and value emphasizes the importance of understanding *what is of value and to whom*, and identifying what disables or enables people's ability to derive benefits from these objects or phenomena of value. Then, addressing the emergence of climate-related loss requires *broadening* our understanding of *responsibility* as well as adopting a relational justice-inspired and multi-pronged approach to *prevent, minimize, and redress* (disproportionate) climate-related loss. Much of what is presented below will be framed within current discussions on operationalising Loss and Damage policy mechanisms, with some reference to the Cambodian context.

Understanding what loss is and for whom

As loss and damage research grows distinct from but alongside the fast-moving L&D political process, an eclectic bundle of conceptualisations of loss and damage and approaches to address them has arisen (Boyd et al., 2017; Hartz, 2023). For the most part, these attempts to characterize the various forms of harm that people and societies face via dichotomous categorizations such as economic/non-economic and tangible/intangible losses and damages. While some degree of standardisation is necessary to enable effective assessment, reporting, and policymaking on loss and damage, it would be valuable to move beyond and work across such categorizations.

Reframing climate-related loss not only as an outcome but also as a *process* that is both *material* and *experiential* can help capture a wider range of manifestations and experiences and thereby, provide opportunities to *identify loss ex-ante*. Understanding loss as a reconfiguration of conditions of access that can be sudden or gradual would direct attention to the cumulative effects of slow, small-scale events. In science, practice, and policy, there has so far been a heavy focus on the outcomes of more extreme and visible 'catastrophic' events (for example, typhoons or the disappearance of an island). This thesis demonstrates some of how loss can occur slowly and in less directly observable ways, as a process involving successive small weather events, the loss of

[22] An entity that can be interpreted differently across communities of knowledge or practice but also facilitates the translation of an idea or phenomenon across them (Star & Griesemer, 1989).

income, increasing indebtedness, loss of access to land, and feelings of distress. Similarly, it shows how people may experience a loss even before any material changes occur. There is a subjective and experiential component to loss that is not grasped in current policy categories and frameworks. As argued elsewhere, the different forms of losses and damages that occur in such processes are inextricably intertwined, and viewing economic and non-economic losses as distinct may hamper more situated and appropriate understandings of the needs of those affected (Boda et al., 2021; van Schie et al., 2023). Together these considerations underscore the need and potential for hybrid approaches that can recognize and better account for the multiplicity of dimensions constituting climate-related loss, thereby revealing the processes that underlie its emergence and consequently an improved potential for intervention.

More participatory and inclusive approaches to knowledge production on climate-related loss are necessary to reorient how and by whom loss is defined and how it becomes construed in various arenas of science, policy, and practice. Broadening the space for plural forms of knowledges in climate governance processes requires building upon and expanding current platforms for the inclusion of knowledge of civil society and other actors. For instance, much can be learned from the experiences of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, which has improved the integration of a diversity of knowledges in its assessments. Practitioners, civil society actors, and scientists alike can contribute to expanding the evidence base of climate-related loss through closer collaborations and transdisciplinary approaches. Co-production and plural approaches to knowledge would help capture and recognize a fuller spectrum of understandings and lived experiences of loss. The conceptualisation of climate-related loss proposed in this thesis, therefore, does not aim to define what loss is and for whom, but rather provide a frame that can allow for a strategic diversity of understandings of and approaches to address climate-related loss (Derman, 2022).

Broadening responsibility to prevent, minimize, and redress

Broadening responsibility by considering the *ability to influence* the conditions and mechanisms of climate-related loss is necessary to address its emergence. The analysis presented in this thesis shows how intertwined processes of climate change and financialization underpin climate-related loss as a phenomenon. In doing so, it highlights the role of several actors who (can) influence and – though often indirectly – also often benefit from such processes. Specifically, financial actors and institutions such as banks, MFIs, insurance companies, and investors, that condition the ability of states and people in many parts of the world to deal with the effects of climate change. As demonstrated in the thesis, the financial burden of climate-related loss is often borne by those affected by climate-related loss who are also often marginalised, through

increased indebtedness and other short-term coping mechanisms. This has been described as a process of "responsibilising" those affected by climate change and reflects a broader neoliberal turn in climate governance (Dehm, 2020). Much of the discussions on responsibility for climate impacts in global climate governance revolve around contribution to climate change in terms of emission levels (García-Portela, 2019; Lees, 2016; Williams, 2019). While this is a necessary part of the puzzle, it omits critical dimensions of responsibility and accountability. In particular, the extent to which notions of responsibility are construed in relation to historical and contemporary harms wrought by extractive forms of development upon marginalised communities around the world. Such processes compound the effects of climate change in ways that cannot be accounted for through emission calculations.

Achieving climate justice and relational justice will thus require *polycentric* and *decentralized* approaches that reflect and align with this broadened understanding of responsibility. First, it is worth repeating that any approach that seeks to *prevent* climate-related loss should at the minimum aim for mitigation – reducing emissions levels to prevent climate change. Since much has been said about the need for industrialised countries to decarbonize their societies, I will focus on possibilities that lie beyond these considerations. Specifically, measures to *minimise* climate-related loss. These could include supporting reforms of policy frameworks and regulations in relation to land, microfinance, and indebtedness. For instance, there are ongoing processes of reforms of the Land Law in Cambodia; as suggested by other scholars, these should be accompanied by reforms in the microfinance sector, increasing safeguards and debt relief measures for borrowers (Baird, 2023; Res, 2021). The findings of the thesis add to evidence of the risks that financial instruments such as microfinance loans can represent for marginalised groups in a changing climate. I therefore echo calls for veering away from insurance as the predominant mechanism within the L&D support architecture and the need for approaches for greater inclusion of a diversity of knowledges and practices of values of affected communities to deal with climate-related loss (Nordlander et al., 2020; Reyes-García et al., 2024).

With regard to *redressing* climate-related loss, a mosaic of approaches should be considered. The current mosaic of sources to finance the L&D fund proposed would need to be combined with a renewed approach to disbursement (Warner & Weisberg, 2023). Research has shown how a very small portion of adaptation financing reaches local communities (Omukuti et al., 2022; Soanes et al., 2017). Mechanisms that allow for greater autonomy of those affected by climate-related loss would be necessary to avoid repeating similar patterns with L&D funding. This is particularly relevant in contexts where significant disparities in access to basic services and resources persist, especially for social groups that are subjected to various forms of discrimination. This

could involve the disbursement of funds to grassroots movements and non-governmental organizations working on a variety of issues beyond climate change, including land rights, and more broadly rights-based approaches and equal treatment under the law. Regarding criteria for access to funding, the findings of this thesis reinforce evidence of the shortcomings of vulnerability as a framework to grasp the multiple facets of climate-related loss. It also raises concerns about the use of event attribution science to inform L&D spending which, considering the significant disparities in the availability and quality of climate data within and between countries, risks exacerbating injustices (King et al., 2023). Allocation of financing should *at the very least* not be dependent on placing the burden of proof on those affected.

Finally, the experiential and subjective dimensions of climate-related loss call for both monetary *and* symbolic forms of compensation. Recognising responsibility for the harm, implementing processes of mediation, or even engaging in restorative dialogues, would complement monetary compensation (Robinson & Carlson, 2021). In agrarian contexts, such processes could involve the restitution of access to land and territories to affected communities. More broadly, as eloquently argued by André (2024), compensation to future victims of cultural losses should be provided ex-ante "when they are still capable of making meaningful comparisons between alternative life plans, rather than *ex post*", and aim to rebuild the "autonomous agency" of those affected through approaches that foster hope. To summarize, adopting a relational justice lens to L&D policymaking and practice would aim to shift away from "the safer domain of one-off economic impacts" (Wrathall et al., 2015, p. 279) towards greater recognition of the grievances of those affected and co-constructing visions and solutions that are rooted in people's everyday realities (Elliott, 2018; Sultana, 2021).

Ways forward

While we may disagree about what loss is or what it means and for whom, it is difficult to think of how it would not become more present in a changing climate. What has been described as a climate crisis is nurturing a renewed urgency to address some of the most profound and entrenched injustices that *un*sustainability brings about. In particular, the starkly unequal or *disproportionate* burden of climate-related loss that affects some people and places. The causes and consequences of which are neither uniform nor predictable, and need to be reckoned with if we are to address them.

The thesis engages with climate-related loss as a phenomenon and as a scientific and political object, and in doing so makes several contributions. A focus on loss as a distinct phenomenon extends conversations on climate justice and sustainability science beyond climate mitigation and adaptation. Combining an interdisciplinary conceptual framework and mixed-method approach, the thesis unearths the causal mechanisms of climate change and financialization through which climate-related loss emerges. The findings provide empirical evidence of climate-related loss through land in agrarian contexts in Cambodia and contribute to an expanding body of scholarship on the relationships between climate change, agrarian struggles, and climate justice in the Global South. Specifically, the research contributes to discussions on financialization, microfinance debt, and dispossession in rural-agrarian contexts. Through a critical realist lens, the analysis challenges existing conceptualisations of climate-related loss as an outcome of climate-society interactions, to reframe it as an emergent phenomenon constituted by a multiplicity of entities and relations that reconfigure the ability to derive benefits from objects and phenomena of value. I position the power-laden and scalar relations of access as central to explaining what constitutes disproportionality in climate-related loss and propose a relational justice approach to addressing it. In doing so, I suggest several leverage points for policy and practice to prevent, minimize, and redress climate-related loss. This is done by broadening notions of responsibility and identifying actors that can influence the conditions for and mechanisms of climate-related loss. These contributions are situated within scientific and political debates on Loss and Damage and a growing body of knowledge on the science of loss and relational approaches in sustainability science (Barnett et al., 2016; West et al., 2020).

There is, however, much work left to do. The work presented would benefit from being expanded, critiqued, and refined. A few avenues for further research are highlighted. One would be to assess the value of the approach presented here in understanding climate-related loss in other geographical, political, and economic contexts. Relatedly, another is to expand the empirical evidence base of disproportionate climate-related loss. For instance, through inter- and transdisciplinary collaborations that would more cogently integrate the ecological dimensions of climate-related loss through land or develop approaches for co-producing knowledge on climate-related loss and relational justice *with* the affected people and communities. More extensive and quantitative assessments of cases of debt-driven land sales arising through agrarian-climatic change in Cambodia and beyond are also needed. Such work could involve a focus on integrating the roles and perspectives of various financial actors and institutions, to obtain a more comprehensive understanding of the problem.

This research journey comes to an end and I hope that the reflections presented here provided – at the very least – food for thought. While much of this thesis focuses on loss, it is also about hopes and possibilities for a better future.

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Seeing loss through land

In an unequal world, a changing climate makes loss more present for some than for others. Policymakers, scientists, and civil society actors alike are increasingly describing the uneven burden of climate-related loss as disproportionate and calling for justice. But how can we make sense of climate-related loss? And in what ways is it disproportionate?

In this thesis, I use an interdisciplinary approach focused on land to explore processes and experiences of climate-related loss, among smallholder farming communities in Cambodia. I outline pathways grounded in emergence and relational justice to better understand and address (disproportionate) climate-related loss and thereby, contribute to more sustainable futures.

KELLY DORKENOO is an interdisciplinary scientist interested in understanding the uneven outcomes of socio-environmental change at the intersection of climate change and development. She has a background in environmental policy, international development, and sustainability.

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