Publizierbarer Endbericht

Gilt für Studien aus der Programmlinie Forschung

A) Projektdaten

Allgemeines zum Projekt	
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B) Projektübersicht

1 Kurzfassung

Hintergrund und Motivation

Der Sonderbericht des Intergovernmental Panel on Climate Change (IPCC) über die globale Erwärmung von 1,5°C zeigt, dass die Welt auf dem Weg ist, die 1,5°C-Grenze bis etwa 2040 zu überschreiten. Der Bericht gibt erstmals auch einen Einblick in die harten und weichen Grenzen der Anpassung, von denen einige bereits bei 1,5°C erreicht werden könnten. Die Grenzen der Anpassung und Ansätze für den Umgang mit Risiken "jenseits der Anpassung" stehen im Mittelpunkt der internationalen klimapolitischen Debatte über Verluste und Schäden (Loss and Damage, L&D). Ebenso wie die klimapolitische Debatte zu L&D, bleiben auch politikrelevante Forschungsansätze vage und konzentrieren sich derzeit hauptsächlich auf L&D im globalen Süden.

Projektziele, -struktur und -methodik

Die Ziele des Projektes waren: (1) eine Bestandsaufnahme des internationalen und nationalen politischen Diskurses zu L&D; (2) eine Überprüfung bestehender Methoden und Entwicklung neuer Risikometriken, um die Politik über L&D zu informieren; (3) eine Definition und Bewertung der Rolle des transformativen Klimarisikomanagements (CRM) im Gegensatz zum inkrementellen Risikomanagement, um L&D in Österreich und darüber hinaus zu bewältigen; (4) eine Konsultation österreichischer Stakeholder, um Bedenken hinsichtlich nicht tolerierbarer L&D jenseits der Anpassung zu identifizieren; (5) eine Evaluierung der Anwendbarkeit der Erkenntnisse aus der österreichischen und zweier internationaler Fallstudien, um die internationale Klima-L&D-Forschung und politische Debatte im weiteren Sinne zu informieren. TransLoss ist in sechs Arbeitspakete unterteilt. Unsere Methodik umfasst Literaturrecherche, Expertenbefragungen, Fallstudien und Indikatorenentwicklung.

Ergebnisse und Schlussfolgerungen

Wir führten eine umfassende Literaturrecherche von wissenschaftlicher und grauer Literatur durch und konzentrierten uns dabei auf den internationalen politischen Diskurs zu L&D. Wir erstellten eine Stakeholder-Landkarte, die einen Überblick über die österreichische Stakeholder- und Governance-Landschaft im Bereich CRM gibt, und führten 26 Interviews mit ExpertInnen aus Wissenschaft, Politik und Praxis, um Erkenntnisse über die Anpassungsgrenzen in Österreich zu gewinnen. Unsere Ergebnisse deuten darauf hin, dass Österreich zwar derzeit nicht mit physischen Einschränkungen konfrontiert ist, die zu "harten" Anpassungsgrenzen führen könnten, dass es aber dennoch wichtig ist,

bestehende Anpassungsstrategien für schwerere Klimaereignisse zu verbessern, die "weiche" Anpassungsgrenzen auf lokaler und individueller Ebene auferlegen könnten.

Nicht-ökonomische Verluste und Schäden (NELDs) werden bei der Bewertung von Klimarisiken oft ganz oder zumindest teilweise vernachlässigt, da sie in der Regel immateriell sind und sich nur schwer monetär quantifizieren lassen. Wir schlagen einen konzeptionellen Rahmen zur ganzheitlichen Bewertung potenzieller Verluste und Schäden vor, welcher auf neun verschiedenen Bereichen des menschlichen Wohlbefindens beruht.

Wir haben den konzeptionellen CRM-Rahmen weiterentwickelt, welcher im Kontext von L&D durch frühere ACRP-finanzierte Forschung eingeführt wurde. Insbesondere haben wir den früheren 6-stufigen Ansatz um zwei weitere Schritte erweitert, die nun die beiden eng miteinander verknüpften Elemente des CRM-Rahmens besser hervorheben: (i) die Bewertung des Klimarisikos und (ii) die Entscheidungsfindung, Umsetzung und Überwachung von CRM-Maßnahmen.

Wir haben eine nationale Fallstudie für Österreich, zwei internationale Fallstudien für Peru bzw. Indien und eine ergänzende Analyse der drei Fälle anhand des umfassenden CRM Ansatzes durchgeführt. Wir waren in der Lage, ein breites Spektrum an klimabedingten Gefahren in diesen drei sehr unterschiedlichen ökologischen, sozialen und politischen Kontexten zu erfassen und zu zeigen, wo transformative Anpassung angesichts aktueller und zukünftiger Klimarisiken bereits angewandt wurde oder notwendig sein wird.

Eine gemeinsame TransLoss / SINCERE - ECCA Konferenz Session wurde am 10. Juni 2021 durchgeführt, und TransLoss war Mitveranstalter des INQUIMUS-Workshops 2022, der vom 29. bis 31. März 2022 am IIASA in Laxenburg, Österreich, stattfand. Darüber hinaus fungierte TransLoss als Mitorganisator eines virtuellen COP26-Side-Events für die International Universities Climate Alliance (IUCA) am 11. November 2021. Nationale Expert*innen im Naturgefahrenmanagement und Klimawandelanpassung trafen sich am 11. April 2022 zu einem TransLoss Online-Workshop mit dem Titel "Grenzen der Anpassung in Österreich?

Zusammenfassung

Im Rahmen des TransLoss-Projekts haben wir uns umfassend mit dem Erreichen von Anpassungsgrenzen befasst, die Verluste und Schäden durch den Klimawandel in Österreich auslösen können. Wir haben einen iterativen CRM-Ansatz weiterentwickelt und anhand von drei Fallstudien (Österreich, Peru und Indien) getestet sowie ein Rahmenwerk konzipiert, das die Bewertung von NELD im Kontext klimabedingter Risiken ermöglicht. Die Erkenntnisse und Ergebnisse des Projekts wurden auf verschiedenen nationalen und internationalen Foren präsentiert und diskutiert, und wir haben vier spezifische TransLoss-Veranstaltungen (mit-)organisiert, eine auf nationaler und drei auf internationaler Ebene.

2 Executive Summary

Initial situation / motivation of the project

The special report of the Intergovernmental Panel on Climate Change (IPCC) on global warming of 1.5°C shows that the world is on its way to breaching the 1.5°C limit by around 2040. The report for the first time also presents insight into hard and soft limits to adaptation, some of which would be reached at 1.5°C. Limits to adaptation and approaches for dealing with risk "beyond adaptation" have been the focus of the international climate policy debate on Loss and Damage (L&D). While this debate is currently still broad and contested, research approaches for providing direction for policy remain vague and focus currently mainly on L&D in the Global South.

Objectives of the project, project structure and methodology

Our objective is to provide policy-relevant scientific insights to the L&D discourse from the perspective of Austria. The aims of the projects are: (1) Stock take of the international and national political discourse on L&D, and of L&D channels that directly and/or indirectly affect Austria; (2) Review existing concepts and methods and developing novel risk metrics to inform policy on L&D; (3) Define and assess the role of transformational Climate Risk Management (CRM) in contrast to incremental risk management, to tackle L&D in Austria and beyond; (4) Consult Austrian stakeholders to identify concerns regarding intolerable L&D beyond adaptation; and to define and exemplify transformational CRM; (5) Evaluate the applicability of insights from the Austrian and international case studies to inform international climate L&D research and policy debate more broadly. TransLoss is structured around six interlinked work packages. Our methodologies comprise literature review, expert consultation, case studies and indicator development.

Results and conclusions of the project

We carried out a comprehensive literature review of scientific and grey literature focusing on the international policy discourse on L&D. We created a stakeholder map providing an overview of the Austrian stakeholder and governance landscape in CRM and conducted 26 interviews with experts from science, policy and practice, to derive insights on adaptation limits in Austria. Our results indicate that although Austria may currently not face physical constraints, which could lead to "hard" adaptation limits, it is nevertheless essential to upgrade existing adaptation strategies for more severe climatic events that may impose "soft" adaptation limits at the local and individual level.

Non-economic loss and damages (NELDs) are often partly or fully neglected in climate risk assessments, as they tend to be intangible and are difficult to quantify in monetary terms. We suggest a framework to assess potential loss and damage holistically through the lens of nine domains of human well-being

and discuss the ways in which climate change can negatively impact each by establishing a conceptual link to the risk concept of the IPCC.

We have further developed the conceptual CRM framework that has been introduced in the context of L&D by previous ACRP-funded research. Specifically, we have further extended the previous 6-step approach by two more steps, which now better highlights the two closely interlinked elements of the CRM framework: (i) climate risk assessment and (ii) decision making, implementation and monitoring of CRM measures.

We conducted a national level case study for Austria, two international case studies for Peru and India, respectively, and a complementary analysis of the three cases against a comprehensive CRM framework. We were able to encompass a wide range of climate related hazards in three highly diverse environmental, social and political contexts, and show where transformational adaptation has been applied or will be necessary, facing current and future climate risks.

A synergetic TransLoss / SINCERE - ECCA Conference Session has been conducted on June 10, 2021, and TransLoss co-convened the 2022 INQUIMUS workshop ", which took place March 29-31, 2022 at IIASA in Laxenburg, Austria. Moreover, TransLoss acted as co-organizer of a virtual COP26 side event for the International Universities Climate Alliance (IUCA) titled, on November 11, 2021. National experts in disaster risk reduction and climate change adaptation convened at a TransLoss online workshop titled "Grenzen der Anpassung in Österreich?" on April 11, 2022.

Summary

In the TransLoss project we have comprehensively addressed concerns for reaching adaptation limits that may trigger losses and damages from climate change in Austria. We have further developed an iterative CRM framework and tested against three case studies (Austria, Peru and India), and conceptualized a framework that allows for assessing NELD in the context of climate-related risks. Project insights and results where presented and discussed at various national and international fora, and we (co-)organized four specific TransLoss events, one at the national and three at the international level.

3 Hintergrund und Zielsetzung / Background and objectives

Background and motivation

The special report of the Intergovernmental Panel on Climate Change (IPCC) on global warming of 1.5°C (IPCC, 2018) shows that the world is on its way to breaching the 1.5°C threshold by around the 2040s. If current greenhouse gas emission trends prevail and the current nationally determined contributions are not stepped up, this will lead to even further warming. The IPCC report also presents the serious consequences of the current warming of 1°C in the form of significant increases in some weather-related extreme events (such as the frequency, intensity, and/or amount of heavy precipitation in several regions), exacerbated sea level rise, and other effects on important terrestrial and oceanic systems. According to the IPCC, adaptation is essential and needs to be ramped up. However, the IPCC also presents evidence of the significant and irreversible losses and damages projected to occur at higher levels of warming. For the first time, it identifies hard and soft limits to adaptation in natural and human systems, some of which could already be reached at 1.5°C. Limits to adaptation and approaches for dealing with risk "beyond adaptation" has been the focus of the international climate policy debate on Loss & Damage (L&D). This debate is still broad and diffuse, while research concepts, methods and tools, and directions for policy remain vague and contested. TransLoss responded to the need to assess the "potential and challenges for the Loss & Damage Mechanism and Austria's role in the international debate" (ACRP 11th Call for Proposals, p.10).

Objectives of the project

The overall objective of the project was to provide policy-relevant scientific insights regarding the L&D discourse from the perspective of Austria, by highlighting and advancing research from multiple disciplines related to L&D.

To operationalize this overarching objective, the project defined the following aims:

- The first aim of TransLoss was to provide a stocktake of (i) the international and national political discourse on L&D and (ii) to identify how the L&D policy discourse and observed losses and damages directly and/or indirectly affect Austria.
- The second aim of the project was to review existing concepts and methods in physical, social, and economic climate-related science that are applicable in the context of L&D, focusing particularly on the development of novel risk metrics to inform L&D policy and decision making.

- The third aim of TransLoss was to define and assess the role of transformational CRM in contrast to incremental risk management to tackle L&D in Austria and beyond.
- The fourth aim of the project was to consult with Austrian experts, practitioners, and policy makers to discover if they have palpable concerns regarding intolerable L&D beyond adaptation and how these stakeholders would define and exemplify transformational CRM.
- The fifth aim of the project was to evaluate the applicability of lessons learned from the Austrian and the international case studies to inform the international climate L&D research and policy debate more broadly, and to identify how European research can engage with key players in the international L&D debate.

4 Projektinhalt und Ergebnis(se) / Content and results

In the following we describe the project contents and results on a work package and milestone basis.

WP1: The policy perspective on Loss and Damage

M1.1: This milestone embedded the rather novel L&D policy discourse in the broader international climate (mitigation, adaptation), DRR (Sendai Framework) and development (SDGs) policy space. With increasing impacts from climate change and limited progress on the international political stage in the domain of L&D, revisiting the origins of the discourse and its development offered insights into current points of contention and how to disentangle them. In this milestone, we carry out a structured literature review of scientific and grey literature on the L&D policy discourse, based on a comprehensive database search, and critically reflect upon it. Our analysis suggests that gaps persist in the conceptualization of L&D, in particular the delimitation to CCA. Although the aim of L&D is to tackle adverse impacts of climate change, the fundamental questions of who will do this, how this will be done and what subset of impacts shall be tackled, have not been answered in a consensual manner by stakeholders and policymakers. While both L&D policy and research efforts have recently focused on managing sudden onset climate-related risks, we suggest a renewed focus on impacts from slow onset processes, which is where L&D discussions began and for which no effective climate policy strategies exist to date. Where no preventive adaptation measures are feasible, a focus on resilient societies capable of absorbing shocks with transformational measures may offer part of the solution, while international cooperation can enable a more equitable distribution of burdens.

M1.2: This milestone summarizes the assessment of the interviews carried out with Austrian experts regarding L&D aspects in an industrialized country. The results indicate that the main concerns regarding potential limits to adaptation, include increases in precipitation extremes and heat stress, but also greater

socioeconomic vulnerability due to non-climatic factors such as the increased exposure of assets due to wealth increases as well as building and zoning choices. In addition, many of the risks are interlinked and embedded within institutional or legal structures which may no longer be fully adequate for future challenges and conditions, highlighting the importance of a holistic view on these issues. Extreme heat and drought are of particular concern for certain regions in Austria, disproportionately affecting the agricultural and forestry sectors, as well as more vulnerable parts of the population such as the sick and elderly. The loss of forests not only affects livelihoods and leisure, but also the availability of territory and human safety due to the importance of protection forests. Storms and stronger wind also significantly contribute to observed and predicted damages. Risks posed by floods and alpine hazards are mentioned but are not considered to be main sources of concern or potential impacts beyond affected communities' ability to adapt due to the long tradition of technical risk management in Austria. The voluntary relocation of inhabitants in the Eferdinger Becken (Upper Austria) after heavy flooding in 2013, however, is a recent example of a measure with a more fundamental, or transformative impact, highlighting the growing insufficiencies of traditional flood risk management measures. More indirectly, climatic hazards in other countries can also lead to relocation across national borders, thereby increasing pressure on Austria through international migration.

M1.3: To provide clear information on the current governance structures relevant for considering L&D issues in Austria, a stakeholder map was created (Figure 1). The stakeholder and governance map displays the connections between individuals and institutions active in the field of disaster risk management and climate change adaptation, both of which are part of a comprehensive CRM approach and relevant for L&D issues.

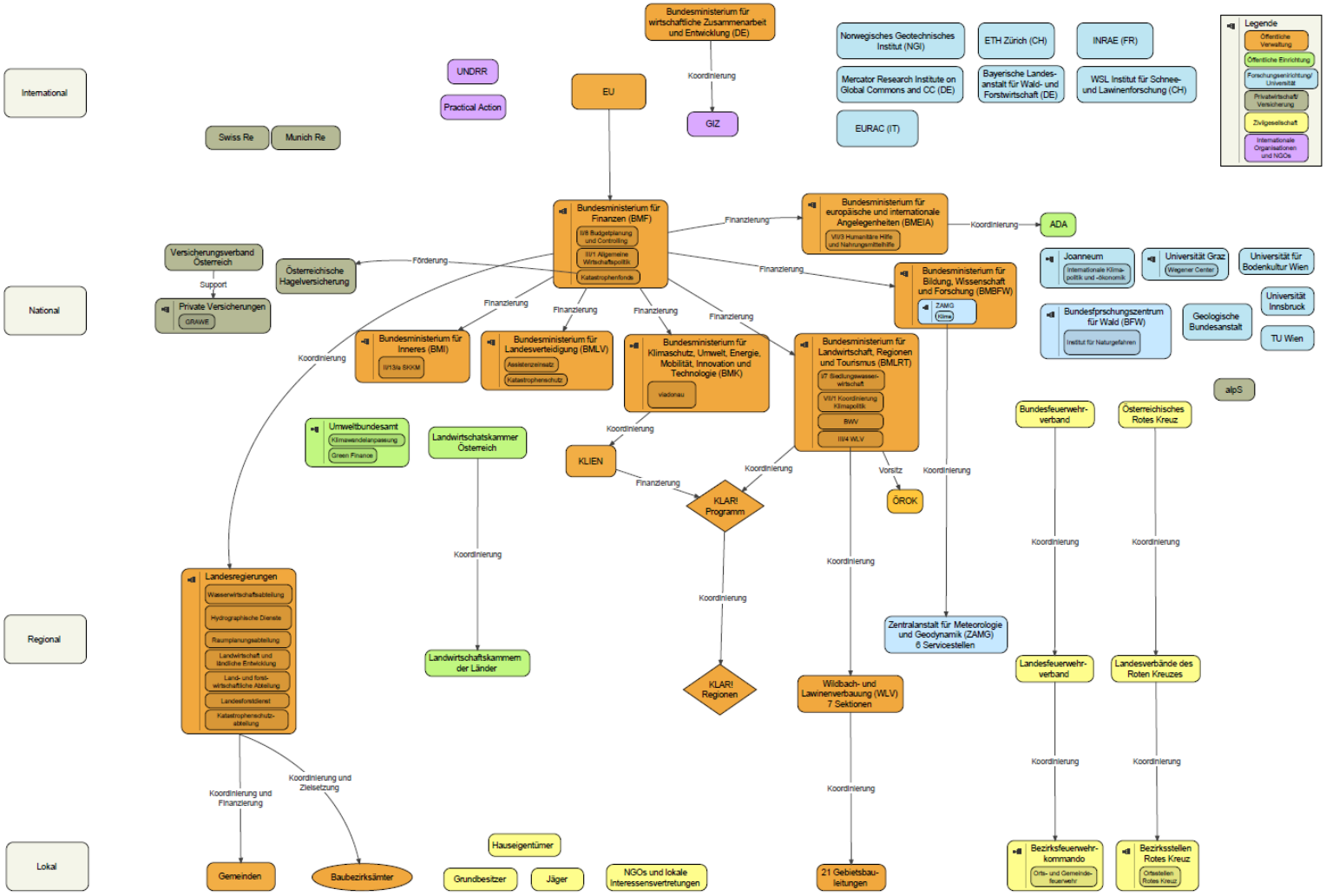

Figure 1: Stakeholder and governance map for Austria

WP1 summary results

Although human adaptation to a changing environment is nothing new, the accelerated rate of climate change and the increased frequency and intensity of climatic hazards raise new questions regarding the effectiveness of prevailing adaptation strategies and potential adaptation limits. The existing literature is largely conceptual and focusses on the Global South, where evidence for reaching adaptation limits already exists. In the manuscript "Potential limits to adaptation and intolerable climate risks in Austria" which is currently under review in the international peer-reviewed journal Mitigation and Adaptation Strategies for Global Change, we aim to uncover whether Austria, a Global North country, faces intolerable risks from climate change that may trigger limits to adaptation. We identify and discuss sources of concern based on semi-structured interviews (n=26) with climate change adaptation and disaster risk management experts. Our results indicate that although Austria may currently not face physical constraints, which could lead to "hard" adaptation limits, it is nevertheless essential to upgrade existing adaptation strategies for more severe climatic events that may impose "soft" adaptation limits at the local and individual level. Many of these perceived adaptation limits are linked to limits of imagination, awareness and knowledge gaps, but also to confining decision-making processes and the locked-in focus on technical adaptation measures, which cannot be scaled up indefinitely. To overcome these barriers and avoid adaptation limits, we suggest more inclusive stakeholder involvement in the design of adaptation strategies by fostering bottom-up or participatory processes, and DRR and CCA more strongly within polycentric risk governance approaches. Since many Global North countries share similar constraints, our insights from Austria are valuable for addressing adaptation limits in other geographical contexts.

<u>WP2: The science perspective on Loss and Damage</u>

In M2.1, we aimed to understand different scientific approaches to define, assess, and predict (potential) loss and damage from climate change, with a careful eye on the less tangible NELD dimension. We reviewed literature that approached L&D from different viewpoints. Articles were focused on loss databases, others on the limits of adaptation or the linkage between L&D and resilience or vulnerability, or on the assessment of NELD. We started with considerations about different factors that could or should be included in L&D assessments, alongside the different approaches to evaluate and compare L&D. We considered data requirements, and next, the translation of data into meaningful information, validity of results and how to translate all this information into action with a socially desirable outcome.

We found that many scholars are aware of the importance of NELD and other intangible L&D for affected individuals and communities. However, as they are difficult to grasp, measure, compare and rank, and are likely to vary among individuals, only a limited number of articles aim to "measure" levels of NELD experienced by a community. There are some attempts in the community to establish and quantify NELD indicators, but the majority of L&D-related data

describes financial losses or other factors that are relatively easy to count (e.g., fatalities). The biggest data collectors in this realm are insurance companies, who have little incentive to assess the NELD-related implications for a community. Thus, despite the agreement over their importance, NELDs are often left out of assessments and quantifications. Many authors strive to counteract suggesting insurance-led disaster loss databases could be adjusted e.g., to integrate data of more qualitative nature or data that are linked to L&D from slow-onset process. Once the data is there, however, ways of conveying their meaning to policy- and decision-makers must be found. Finally, the overall aim is to avoid as much L&D as possible through adaptation or by detecting and eliminating root causes of risk.

In M2.2 we built on theories of human well-being and proposed a conceptual framework for the systematic assessment of loss and damage within the context of climate change risk assessments. Our main aim was to overcome the common dichotomy between market-based and non-market-based loss and damage. We also sought to create a frame within which to visualize loss and damage from climate change in a structured manner so that it can be addressed. We drew on studies that describe loss and damage from climate change and studies that propose holistic sets of determinants of human well-being to reflect values shared by humans throughout space and time and across all levels of wealth.

Taking this extended understanding of loss and damage based on human well-being, we aim to shift the discourse away from domination by monetary evaluation. Using simply cost-benefit considerations, poor and less-privileged communities tend to be deprioritized, and unjust or unsustainable structures tend to be reestablished. Furthermore, monetary evaluations provide the false impression that all loss and damage can be reversed if only enough money is allocated.

Starting with a framework to collect data into is supposed to counteract the absence of data and knowledge that currently prevails. While one risk is that attempts to formalize and quantify harm in an indicator-like manner could overshadow factors that cannot easily be quantified (Tschakert et al., 2017), we argue that collecting qualitative and quantitative data on harms to well-being could support sustainable development and decarbonization efforts, offering an evidence base for decision-making that would avoid a primarily monetary focus. A robust and structured evidence base is crucial for policy and decision makers who seek to justify transformative risk management strategies that are not limited to gradual adjustments, but which seek to fundamentally alter systemic structures that lead to loss and damage (Deubelli and Mechler, 2020; Kates et al., 2012; Roberts and Pelling, 2020). Viewed through this lens, prospective assessments of potential market- and non-market-based loss and damage from climate change constitute "an opportunity to scrutinize and address the root causes of vulnerability" (Roberts and Pelling, 2020).

WP2 summary results

Current scientific discourse on the assessment of potential impacts and related loss and damage from climate change focuses primarily on what is straightforwardly quantifiable, such as monetary value, numbers of casualties, or destroyed homes. However, the range of possible harms induced by climate change is much broader than that, particularly as regards residual risks that occur beyond limits to adaptation. In international climate policy, this has been institutionalized within the Loss and Damage discourse, which emphasizes the importance of NELD. Nevertheless, NELDs are often partly or fully neglected in climate risk assessments, as they tend to be intangible and are difficult to quantify in monetary terms. This has led to a situation where, to date, no systematic concept or indicator framework exists to enable a holistic, prospective risk assessment, including market-based and non-market-based loss and damage from climate change. We suggest that potential loss and damage be assessed holistically through the lens of nine domains of human well-being and discuss the ways in which climate change can negatively impact each by establishing a conceptual link to the risk concept of the IPCC (see Figure 3). Conceptualization and systematic assessment of the full spectrum of imminent loss and damage allows a more comprehensive anticipation of potential impacts on human well-being, identifying the most vulnerable groups within society and providing an essential evidence base for transformative CRM.

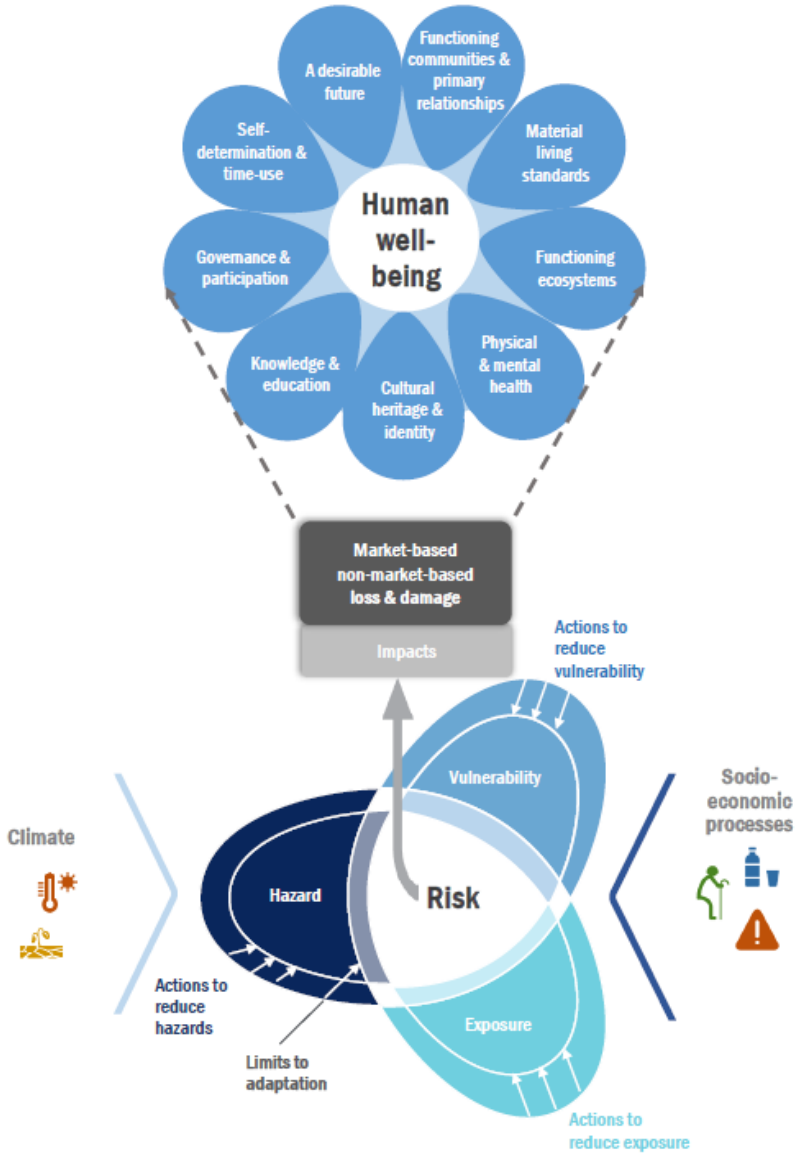

Figure 2: Human well-being as an approach to identify market-based and non-market-based loss and damage from climate-related risks. Climate-related risks manifest through a combination of three domains: hazard, exposure, and vulnerability. In all three dimensions, risk reduction measures may be taken, but simultaneously there may be limits to adaptation.

<u>WP3: Testing and Synthesis: The role of transformational risk management for tackling climate Loss and Damage</u>

M3.1: The existing literature suggests that loss and damage from climate change beyond the limits of adaptation can be averted, minimised and addressed by adopting a comprehensive CRM approach (e.g. Schinko et al., 2018). CRM aims to manage risk along the entire risk spectrum, from sudden-onset extreme events such as storms and floods to gradual slow-onset processes such as sea-level rise and desertification. We further developed the conceptual CRM framework that has been introduced in the context of L&D by Schinko et al. (2018). Learning from the experiences since the first introduction of the CRM

framework for Austria in 2015 (Schinko et al., 2016, based on the ACRP-funded PACINAS project), we have further extended the previous 6-step approach by two more steps (Figure 3). This allows for better highlighting that a CRM framework consists of, broadly speaking, two closely interlinked elements: (i) climate risk assessment (Steps 3-6) and (ii) decision making, implementation and monitoring of CRM measures (Steps 1-2 and 7-8). The CRM approach is designed as dynamic in nature and embedded in a learning framework that allows for the update of decisions over time based on new evidence.

M3.2: This milestone applied applications of the conceptual CRM framework (Figure 3) to three cases (Austria, India, and Peru), as set out in WP 4, to understand its applicability in different contexts. Results are described in the following section on WP4 results.

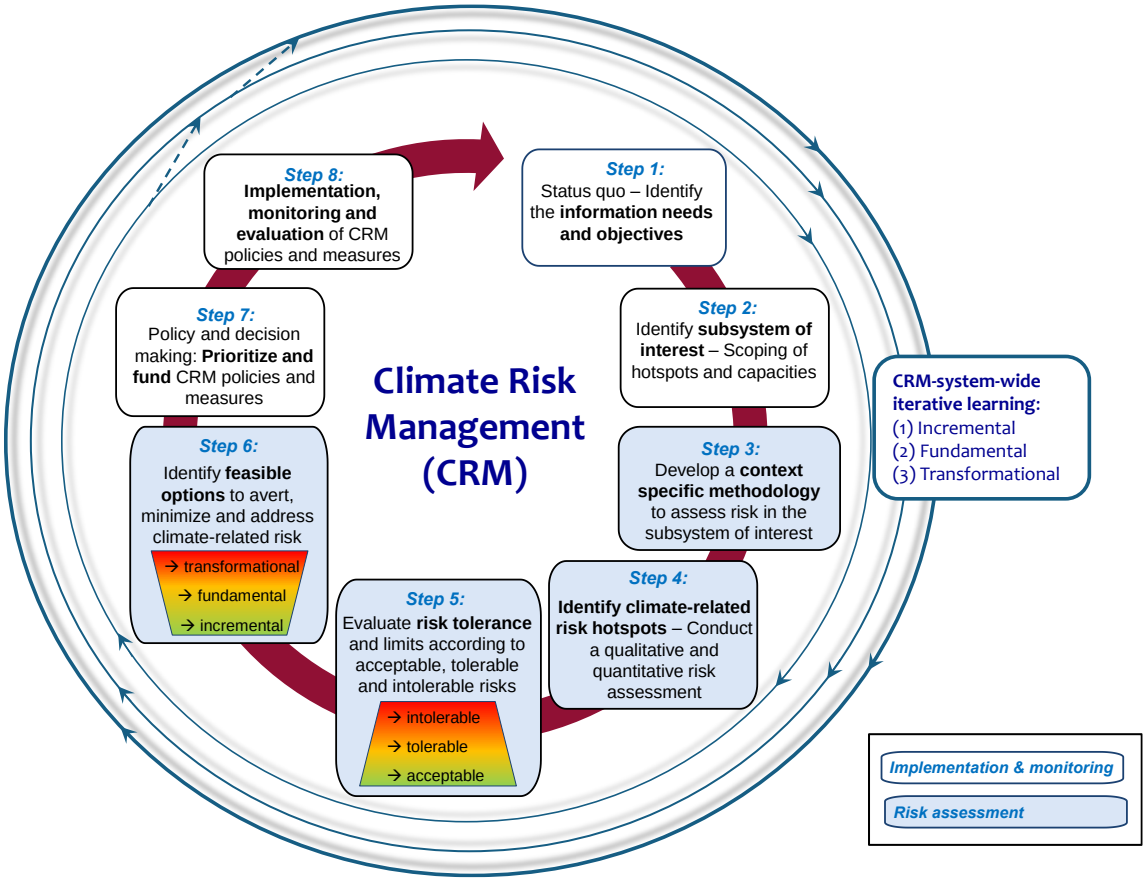

Figure 3: Conceptual TransLoss CRM framework. Source: Own conceptualization based on Schinko et al. (2015, 2018) and Mechler et al. (2019)

M3.3: A paper (Mechler et al., 2020) has been published in the international peer-reviewed journal Sustainability Science, which reveals novel insights in the context of limits to adaptation and transformational risk management for tackling the resulting residual risks. There is emerging evidence on hard and soft adaptation limits in certain systems, sectors and regions (Table 1). This holds the

potential to further build momentum for climate policy to live up to the Paris ambition of strict emission reductions and to increase efforts to support the most vulnerable. L&D policy should consider actions to extend soft adaptation limits and spur transformational, that is, non-standard risk management and adaptation, so that limits are not breached. Financial, technical, and legal support would be appropriate for instances where hard limits are transgressed.

Table 1: Evidence on climate-related risks and adaptation limits synthesized from the IPCC's SR1.5. Source: Mechler et al. (2020)

System/sector (RFC*)	Regions	1.1 °C (current warming)	1.5 °C	2 °C	Adaptation options	Scope for adaptation-type of limit (system)
Coral reefs (1)	Tropics	50% Loss	70–90% Loss	99% Loss	Artificial reefs, water clean-up	Very limited Hard limit (natural)
Terrestrial and wetland ecosystems (1)	Global	Species ranges have started to shift to track climate space (no estimate)	Climatically determined geographic range losses: 6% of insects, 8% of plants, 4% of vertebrates lose over 50% of their ranges	18% of insects, 16% of plants and 8% of vertebrates with range losses of over 50%	Water and vegetation management, increased connectivity	Limited Hard limit (natural)
Human health (2, 3, 4)	Global, part. tropics	No estimate	+350 million people exposed to deadly heatwaves in megacities by 2050	Annual occurrence of heat-waves similar to deadly 2015 heat-waves in India and Pakistan	Hydration, cooling zones, green roofs	Medium—low in tropics. Soft and hard limit (e.g. for outdoor work) (technological)
Coastal livelihoods and islands (2, 3)	Global, Asia, SIDS in Pacific and Caribbean	No estimate	31–69 million people at risk. Sea level rise and increased wave run up, increased aridity and decreased freshwater availability leave several atoll islands uninhabitable	32–79 million people at risk	Coastal defences, ecosystem-based adaptation, reef restoration	Low-medium Soft and hard limit (technological, socio-economic)

WP3 summary results

Recent evidence shows that climate change is leading to irreversible and existential impacts on vulnerable communities and countries across the globe. Among other effects, this has given rise to public debate and engagement around notions of climate crisis and emergency. The L&D policy debate has emphasized these aspects over the last three decades. Yet, despite institutionalization through an article on L&D by the United Nations Framework Convention on Climate Change (UNFCCC) in the Paris Agreement, the debate has remained vague, particularly with reference to its remit and relationship to adaptation policy and practice. Research has recently made important strides forward in terms of developing a science perspective on L&D. An article (Mechler et al., 2020) developed within TransLoss WP3 reviews insights derived from recent publications by the IPCC and others, and presents the implications for science and policy. Emerging evidence on hard and soft adaptation limits in certain systems, sectors and regions holds the potential to further build momentum for climate policy to live up to the Paris ambition of stringent emission reductions and to increase efforts to support the most vulnerable. L&D policy may want to consider actions to extend soft adaptation limits and spur transformational, that is, nonstandard risk management and adaptation, so that limits are not breached. Financial, technical, and legal support would be appropriate for instances where hard limits are transgressed. Research is well

positioned to further develop robust evidence on critical and relevant risks at scale in the most vulnerable countries and communities, as well as options to reduce barriers and limits to adaptation.

WP4: Comparative Case study analysis: The Austrian case in the light of international Cases

M4.1: The first milestone in WP4 consisted of a national level case study for Austria, which included a literature review on limits to adaptation and transformational risk management in Austria, semi-structured interviews with key L&D stakeholders in Austria, and a workshop with key Austrian L&D stakeholders. The work was done in close collaboration with WP1 and led to the jointly written manuscript "Potential limits to adaptation and intolerable climate risks in Austria" which is currently under review in the international peer-reviewed journal Mitigation and Adaptation Strategies for Global Change.

M4.2: The second milestone covered an international case study, where the case study from Austria was complemented with cases from Peru (M4.2.1) and India (M4.2.2). It included lessons learned from recent work on CRM assessments in Peru, India and Austria, regarding the applicability of a comprehensive CRM framework and research and policy recommendations for an achievable CRM in practice (4.2.3). In contrast to a comparative case study approach, the reasoning behind selecting complementary cases was to encompass several different sudden and slow-onset risks, socio-economic conditions, and experiences in approaching CRM, in order to provide a thorough discussion of CRM practices.

M4.3: The third milestone (M4.3) synthesized the national and international case study insights according to the 8-step CRM framework presented in Figure 2, which resulted in a research paper titled "A reality check for the applicability of comprehensive climate risk assessment and management: Experiences from Peru, India and Austria" submitted to the journal Climate Risk Management. The results are summarized in Table 2.

Table 2. Case studies summarized according to the 8-step CRM framework (Figure 2). The white rows represent the decision making, implementation and monitoring steps, and the blue rows the climate risk assessment steps.

	Peru	**India**	**Austria**
Step 1. Status quo- Identify the information needs and objectives	**1988** - **2010** Clarification of needs together with local municipality and state and non-state actors through workshops and meetings.	Identify stakeholders and information needs through stakeholder mapping and desk-based review. Target group is decision-makers at district level. Overall findings also relevant at state level.	Identification of relevant CRM actors and governance structures through desktop research and structured qualitative interviews (n=14) (Leitner et al. 2020).
Step 2. Identify subsystem of interest - Scoping of hotspots and capacities	**1988** Lake mapping and assessment in Cordillera Blanca. Annual control of GLOF risk for Lake 513 by UGRH. **2010** Subsystem of interest already identified when project started.	Risk hotspots, data coverage and availability, as well as needs and expectations of stakeholders identified, through desk-based review, inception workshop and focus group meetings.	Two stakeholder maps, one for floods, one for droughts. Stakeholder-activity matrix (Leitner et al., 2020).
Step 3. Develop a context specific methodology to assess the risk in the subsystem of interest	**2010** Community based assessment, geographical boundaries of catchment, which processes to include.	Developed methodology based on information retrieved in step 1 and 2. Climate risk analyses for current and future projections, considering also future changes in population.	Development of a Stochastic fiscal debt model Further developing the CRM circle.
Step 4. Identify climate-related risk hotspots -	**1988** GLOF assessment	Indicator-based risk assessment based on 54 indicators for	Risk- and vulnerability assessment

Conduct a qualitative and quantitative risk assessment	by experts. **2010** Community workshops using CVCA tool, ethnographers stayed with community, fieldwork, numerical modelling, hazards and risk mapping.	hazard, exposure and vulnerability. Soil and Water Assessment Tool (SWAT) modelling for water/drought stress and floods. Temperature and precipitation projections from CORDEX regional climate model. Projected cyclone activity from Yoshida et al. (2017). Exposure from satellite imagery and Census India (Census, 2011) data, with population trends extrapolated from 1991-2011 to mid-21st century. Vulnerability assessment data (sensitivity and adaptive capacity) (Census, 2011), focus group meeting and community field-surveys.	(spatially explicit, 14 primary and 35 sub-indicators, (Leis & Kienberger 2020). Application of a probabilistic model (Schinko et al., 2016) and a stochastic debt assessment (Mochizuki et al., 2018) for fiscal flood risk assessment.
Step 5. Evaluate risk tolerance and limits according to acceptable, tolerable and intolerable risks	-	System's capacity to reduce and adapt to risks was evaluated through: - Focus group meeting to learn from past experiences and losses.	Evaluation of fiscal flood risk projections against the Austrian disaster fund.

		- Expert judgement and evaluation.	
Step 6. Identify feasible options to avert, minimise and address climate-related risk	Several short-term and longer-term measures were identified and implemented, often in relation to lake outbursts.	Evaluation of a wide range of incremental and transformational adaptation options. Focus group meetings helped identify community perceptions and needs. A variety of adaptation measures were undertaken at farm and household-level.	Suggestion to implement a varied portfolio of instruments, each applicable for a certain layer of climate-related risk (Schinko et al., 2016), combining short-term and long-term responses and adaptation (Leis & Kienberger, 2020) and aligning DRR and CCA (Leitner et al., 2020).
Step 7. Policy and decision making: Prioritise and fund CRM policies and measures	**2010** Part of budget of municipality to maintain EWS.	Various agencies are working to prioritise and fund CRM policies and measures.	Role-play simulations for identifying a feasible portfolio of CRM measures at the local level in Austria (Schinko & Bednar-Friedl, 2022).
Step 8. Implementation, monitoring and evaluation of CRM policy and measures	-	Various government agencies are responsible to implement CRM policy and measures.	Role-play simulations for identifying roles and responsibilities in Austrian CRM (Schinko & Bednar-Friedl, 2022).

WP4 summary results

Despite a multitude of conceptual frameworks developed for CRM, there are to date very few applications of CRM frameworks on real-world cases. In WP4 we built on a comprehensive CRM framework and discussed applications to three real-world risk cases in Peru, India and Austria. The research paper titled "A reality check for the applicability of comprehensive climate risk assessment and management: Experiences from Peru, India and Austria" submitted to the journal Climate Risk Management summarizes the insights of this exercise. The strength of utilizing the three cases was that they operate on different geographical scales and socio-economic contexts, allowing for an extensive examination of the CRM framework under distinct circumstances. The risks range from glacial lake outburst floods, sea level rise, salinization and cyclones, to riverine flooding and agricultural droughts. We were able to evaluate the applicability of the proposed conceptual CRM framework in real world circumstances, present evidence on the extent to which comprehensive management of climate-related risks has been achieved in the three cases, and (3) synthesize policy and research recommendations towards an achievable comprehensive CRM in practice. Difficulties were related to developing a common framework structure that allowed us to examine three entirely different climate risk cases in a way that sensible and useful conclusions can be drawn for risk management and transformational adaptation.

WP5: Outreach and dissemination to national and international levels

The following milestones have been achieved within WP5:

- A dedicated project outreach package (TransLoss Communication and Outreach Plan (M5.2)) including a website (transloss.net, M5.3) plus promotional project information material (flyers in English and German language, M5.1), presenting the project background, research results and identified networks and contacts, are supporting the dissemination and outreach of TransLoss. The project website acts as a one-stop-shop for all information on the project and its results, and has been continuously updated throughout the project.
- A dedicated Sustainability Plan (M5.8) has been developed to ensure the dissemination and use of the knowledge and tools/methodologies produced within TransLoss after the project ended in June 2022.
- The products (Working papers, journal articles, policy briefs) of TransLoss have been actively shared with the major L&D actors and stakeholders identified nationally and internationally, and within the SINCERE Task 4.3 network in general.
- A workshop/event in collaboration with WP4.1 for key Austrian stakeholders active in the nexus between DRR and CCA has been organized on April 11, 2022 (M5.6). The workshop insights were

eventually translated into a policy brief for Austrian stakeholders (Schinko et al., 2022)

- Within M5.5 and in close collaboration with WP (M4.3) a manuscript has been submitted to the peer reviewed journal *Climate Risk Management*, which applies lessons learned from the case studies in Austria, Peru and India to more broadly inform the international CRM research and policy debate.
- A draft paper on L&D in the PICTs has been developed (M5.7).
- While the proposal planned for one co-organized international workshop, we eventually hosted and co-hosted three international workshops in the L&D context:
    - TransLoss co-organized with SINCERE and the Loss and Damage Network a webinar ("Building back better - COVID recovery, resilience building and societal transformation") within the 5th European Climate Change Adaptation (ECCA) conference, June 10, 2021, with international actors/experts (also from the PICTs) to increase awareness for the L&D topic in general and to support the dissemination and outreach of both projects' (intermediate) results (M5.4).
    - TransLoss also co-convened the 2022 INQUIMUS workshop "Transformational risk management and Loss & Damage - What are suitable approaches for assessing climate-related (residual) risks?", which took place March 29-31, 2022 at IIASA in Laxenburg, Austria.
    - Moreover, TransLoss acted as co-organizer of a virtual COP26 side event for the International Universities Climate Alliance (IUCA) titled "Tackling adaptation limits through transformational change", on November 11, 2021.
- TransLoss has fostered the dissemination of the project results at international meetings (such as ECCA, Adaptation Futures, EGU, SRA-E, IDRC) and national meetings (such as Österreichischer Klimatag) as well as international workshops (e.g., SBSTA) for stakeholders and practitioners to highlight the results and their applicability in a wider scientific and practice-oriented arena.

<u>WP6: Project Management</u>

The milestones of WP6 were regular project team meetings at which intermediate and final results were discussed (M6.1), subcontracting of the international project partner (M6.2), and preparing the interim as well as final activity and publishable reports (M6.3 and M6.4, respectively). Concurrent project management and controlling was implemented as of the start of the project; five project team meetings were held over the course of the project; and the interim and final reports were submitted.

5 Schlussfolgerungen und Empfehlungen / Conclusions and recommendations

In the following we describe on a work package level the conclusions and recommendations that can be drawn from the TransLoss project.

WP1: Although Austria may not be faced with physical constraints such as sea level rise or desertification, which could lead to "hard" adaptation limits, it is nevertheless essential to proactively prepare strategies for more severe climatic events and impacts that may impose "soft" adaptation limits at the local and individual level in Austria, as our results indicate. A backwards-looking approach relying on past events, historical data and existing DRR measures will not be sufficient as climate change is already changing the magnitude and frequency of hazardous events and will continue to do so in the future. Especially systemic risks should be at the core of both research and policymaking, with participatory processes ensuring that existing limits of imagination can be overcome, and that the needs of many are considered in the design and implementation of comprehensive CRM measures and strategies. This is not only true for adaptation limits in Austria, but other countries across the globe. Both climatic and non-climatic factors are at the root of adaptation limits and necessitate the involvement of stakeholders and the consideration of values in order to be identified and successfully addressed. As research on adaptation limits is becoming more widespread, it is now essential to begin with the identification of potential losses and damages beyond adaptation by policymakers and the practical implementation of potentially transformational CRM measures and strategies to ensure tolerable levels of risks under climate change.

WP2: By reviewing the literature, it became apparent that a number of terms used in the context of L&D so far remain without fixed definitions and relations to each other. In order to develop a conceptual framework that is designed to enable a holistic assessment of losses and damages, we used several existing concepts, such as loss and damage, human well-being, limits to adaptation or residual risks, and defined relations for them. We furthermore integrated our final framework with a well-known risk concept used by the IPCC. The literature review showed, that without such a structured approach, assessments and evaluations of losses and damages, especially the non-material kind, are difficult to compare and associate with any research community.

A robust and structured evidence base is crucial for policy and decision makers who seek to justify transformative risk management strategies that are not limited to gradual adjustments, but which seek to fundamentally alter systemic structures that lead to loss and damage. Evidence of avoided loss and damage through mitigation and adaptation may even function as a performance indicator that could complement the fixation on the Gross Domestic Product.

Furthermore, our results are relevant and interesting for the wider CRM, CCA and DRR communities. Because the IPCC risk concept is widely applied in climate change risk and vulnerability assessments, and we expand it by opening up another dimension of risk. The concept thus far was primarily focused on the factors that constitute risk (hazard, vulnerability, exposure), and not so much on the implications that the manifestation of a risk could entail. By offering a comprehensive set of dimensions of risk implications, we enable more nuanced and targeted risk assessments.

WP3: Climate research, such as the TransLoss project, has responded to demands for evidence-based insights relevant to the L&D debate. The IPCC and other recent publications present a broadening body of scientific literature on concepts, perspectives, methods, and evidence relevant to L&D. TransLoss, for example has developed a novel 8-step CRM framework that can be readily applied in the context of L&D. Such advances in research inform the complex and contested L&D policy debate and provide an opportunity to further stimulate mutual understanding of the remit of L&D among negotiation parties. Clearly, this is a major challenge as the policy discourse remains characterized by substantial controversy as witnessed again at COP25 and COP26.

While more work is essential, research has increasingly become capable of providing evidence-based insight through detection and attribution analysis, risk assessment, and the identification of diverse response portfolios for avoiding and managing losses and damages. A domain of research that is critically relevant for L&D is the systematic assessment of lived experiences of losses and damages across the globe (see e.g., Tschakert et al. 2019) as a rigorous basis for a global synthesis on non-economic and intangible harm. With the TransLoss focus on a global North country, namely Austria, we are adding a new dimension to this literature that has currently been focusing heavily on global South context.

In addition to informing L&D policy, improved scientific understanding of the broad range of losses and damages would be of use in economic, insurance, and legal actions to ensure greater and urgent accountability for climate change and its consequences. There is also increasing engagement of researchers in WIM expert groups to support consensus and compromise-seeking among negotiators, representatives of international organizations.

WP4: The complexity of the three cases analysed allowed us to gain a deeper understanding where our proposed comprehensive CRM framework is more and less applicable, which elements of the framework are important across the cases, and which elements are case specific. The Peru case made it clear when and where a CRM framework is implemented. The climate-events of this case kick-started initial risk management, which is the case for multiple other risk-prone regions, regardless of CRM being advised to be proactive rather than reactive.

Also evident from the Peru case was that risk management in practice will not always follow all steps of the framework, nor will all steps always be necessary. Future CRM frameworks will benefit from being flexible enough to follow a structure which can start at any given step, while still providing adequate guidance to successfully implement comprehensive CRM to the best of its ability.

Moreover, risk tolerance levels are evidently both context specific and subjective and assessments of risk tolerance will need strong consideration in CRM, including transdisciplinary research approaches and a wide range of stakeholders. CRM should be participatory from beginning to end, accounting for the knowledge, needs and desires of all affected partners, in order for implementation of policies and measures to be successful.

We recommend CRM and adaptation measures to consider future risk projections, in order to avoid residual risks and losses and damages also in the long-term. Along the same lines, a combination of incremental and transformational adaptation measures is likely to be needed due to increasing levels of intolerable risks and losses and damages in the future. Transformational change, such as planned relocation, should be equitable, just and sustainable.

Future research may focus on further extending the knowledge and experience basis of CRM application and feasibility in different climate hazard, environmental, social and political contexts, internationally, and how the need for transformational adaptation can best be analysed and then also implemented. It would be advisable to facilitate exchange on CRM and L&D experiences and expertise between Austria and other countries.

WP5: The synergetic TransLoss / SINCERE - ECCA Conference Session (June 10, 2021) has resulted in the following takeaway message: „The crisis affects populations very differently and emphasizes existing inequalities and injustices. We call for participatory bottom-up initiatives as a means to foster a sense of a global common good to tackle multiple objectives and empower people." This take away messages is very important for the global L&D debate (COP participants, L&D negotiators, DRR and CCA practitioners and policy makers) and was further communicated in the ECCA 2021 high level event on June 22nd, 2021 in Brussels.

An online workshop organized for Austrian experts working in the field of DRM and CCA discussed the insights generated within TransLoss regarding potential adaptation limits in Austria. Based on the workshop insights and the TransLoss results, we developed a policy brief (Schinko et al., 2022) summarizing the project highlights and insights, which will hopefully become relevant for the Austrian provinces, and Austria as a whole, in developing and updating their climate and energy strategies.

C) Projektdetails

6 Methodik

To meet the project objectives, TransLoss was structured around six work packages, which were strongly interlinked and arranged in an order that ensured a smooth and logical workflow (Figure 4). TransLoss first set out to contextualize the international policy discourse on L&D from the perspective of Austria in order to identify the different direct and indirect channels through which Austria may be affected by L&D and to map the Austrian stakeholder landscape (WP1). In the second, closely linked, work package, the project synthesized the scientific discourse on L&D and identify what scientific methods, frameworks, and metrics are relevant and required to inform the L&D debate. A strong focus was placed on the assessment of existing and future development of novel risk indicators for informing policy and decision makers about potential L&D effects (WP2). WP3 synthesized the insights gained in the previous two foundational work packages and motivated a strong role for transformational CRM in the context of L&D. WP4 then employed the theoretical and methodological knowledge gained to date in three case studies, one at the local level in Austria and two international cases, India and Peru. WP5 linked the case study insights to the broader international CRM decision context so as to synthesize information towards a more generic approach informing L&D policy and practice also in other decision contexts as well as to disseminate the project results to ensure that the knowledge produced in the project is made publicly available, in the long-term and beyond the project's regional focus. WP6 was dealing with project management and communication activities.

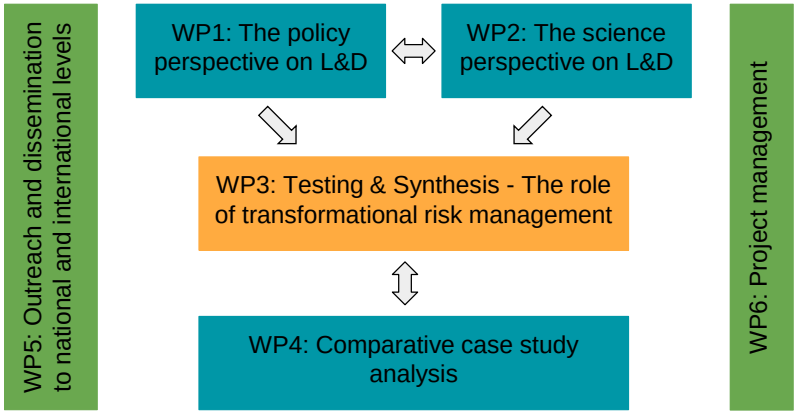

Figure 4: Project and WP structure of TransLoss – project components and their interaction

For each work package we will now describe in more detail the implemented research approach.

WP1: The policy perspective on Loss and Damage

The first activity in WP 1 was to carry out a stocktake of the L&D policy discourse in Austria and to position the L&D discourse in the broader international climate (mitigation, adaptation), Disaster Risk Reduction (DRR) (Sendai Framework) and development (SDG) policy space. This was achieved by carrying out a comprehensive literature review based on a structured search of two databases (Web of Science and Scopus), to which grey literature (UNFCCC documents and reports, NGO policy briefs) were added. The publications were discussed to provide an overview of the historical developments of the L&D discourse as well as current points of contention from different disciplines.

The second activity in WP1 was to identify direct and indirect channels through which the L&D discourse and losses and damages directly and indirectly affect Austria. Semi-structured interviews were carried out with 26 experts from policy, research and practice to gain insights into the relevance of the L&D discourse, as well as potential material or immaterial losses and damages due to climate change. The interviews were analyzed with Qualitative Content Analysis (QCA) in order to extract relevant information from the transcripts. The interviews were evaluated along predefined categories of interest to allow for a structured assessment of the relevant factors of concern including types of climatic hazards, applicable spatial and temporal scales, and impacts on and changes within society and different sectors.

The third activity in WP 1 was to provide clear information on the current governance structures relevant for considering L&D issues in Austria. Existing work from the ACRP-funded RESPECT project (published in Leitner et al., 2020) was built on to draw an initial stakeholder map of individuals and institutions within climate change adaptation (CCA) and DRR, which was used to identify potential interviewees in a later step. The update of the stakeholder map was completed after all interviews were assessed.

The insights gained from the activities undertaken within WP1 were summarized in a manuscript "Potential limits to adaptation and intolerable climate risks in Austria" which is currently under review in the international peer-reviewed journal Mitigation and Adaptation Strategies for Global Change.

WP2: The science perspective on Loss and Damage

To identify novel risk metrics for informing L&D discussions at the science-policy interface, we have carried out a semi-structured literature review on scientific approaches to loss and damage assessments, with a focus on Non-economic Loss & Damages (NELDs) in particular. The review consisted of the following steps:

(i) Consolidating a methods plan (for specifying key terms to query scientific databases, inclusion and exclusion criteria, etc.);

(ii) Querying the scientific databases "Web of Knowledge" and "Scopus" based on keywords;

(iii) Screening abstracts against a list of inclusion and exclusion criteria;

(iv) Coding the included texts for attributes like objectives, policy information requirements, challenges and opportunities.

The query resulted in 136 matches for Scopus, 30 for Web of Knowledge, and totaled to 143 articles after duplicate removal (April 2020). We included texts that focused on the scientific perspective on L&D. The abstract screening resulted in the inclusion of 45 and the exclusion of 98 texts. Of the 45 included texts, 42 were retrieved as full text and coded in order to extract characteristics like type of article, objectives, challenges and suggestions. The coding process revealed three additional texts that did not fit the inclusion criteria, which were consequently removed.

The semi-structured literature review revealed the absence of a common conceptual framework for comprehensive loss and damage assessment. It further sparked the perception that such a concept must start with the definition of what it is that we want to protect from climate change impacts. Therefore, we designed a conceptual framework that sees loss and damage from climate change as any impact that negatively affects the well-being of a society or an individual.

To connect the concepts of human well-being and loss and damage, we derived nine well-being/loss and damage categories from the literature by comparing review studies on NELD (Fankhauser and Dietz, 2014; Tschakert et al., 2019) with human wellbeing concepts (Gough, 2017; Verma, 2017). To design the conceptual framework as application-oriented as possible, and to allow for the seamless integration with already well established concepts, we suggest integrating it with the IPCC's risk framework (IPCC, 2022; Pörtner et al., 2019). This Milestone's results were summarized in a scientific publication titled "Placing human well-being at the center of risk assessments of loss and damage from climate change" by Menk et al. (2022), which is currently under review in the international peer-reviewed journal Frontiers in Climate.

WP3: Testing and Synthesis: The role of transformational risk management for tackling climate Loss and Damage

The first activity within WP3 was to further develop the generic CRM framework that has been introduced in the context of L&D by Schinko et al. (2018). An extended 8-step CRM framework was developed, building on lessons learnt from our experiences since the first introduction of the CRM framework for Austria in 2015 (Schinko et al., 2016, based on the ACRP-funded PACINAS project), and based on a screening of the recent international peer-reviewed and grey literature on CRM as well as bilateral discussions with other researchers and practitioners working on this topic.

In response to the overarching objective of WP3, namely assessing the role of transformational CRM in contrast to incremental CRM and curative policy measures to tackle loss and damage beyond adaptation in Austria and globally, the paper "Loss and Damage and limits to adaptation: recent IPCC insights and implications for climate science and policy" (Mechler et al., 2020) has been published in the international peer-reviewed journal Sustainability Science. Building on our extensive international research networks and our involvement in the work by the IPCC, we provided a synthesis of the most recent scientific knowledge in the field. The paper reveals novel insights in the context of limits to adaptation and transformational risk management for tackling resulting residual risks.

WP4: Comparative Case study analysis: The Austrian case in the light of international Cases

The activities conducted in the context of WP4.1, i.e., the national level case study, comprised a literature review and semi-structured stakeholder interviews. They were conducted in close collaboration with WP1 and resulted in the manuscript "Potential limits to adaptation and intolerable climate risks in Austria" which is currently under review in the international peer-reviewed journal Mitigation and Adaptation Strategies for Global Change.

In the context of WP4.2, we applied the theoretical and methodological knowledge from the previous work packages. In particular, we built on the comprehensive 8-step CRM framework that had been further developed in WP3, and operationalized the framework on three case studies: in Austria, India, and Peru. The GIZ framework follows a 6-step process, integrates DRR, Climate Change Adaptation (CCA) and policy and actions against residual risk, includes both incremental and transformational interventions and combines top-down expert approaches with bottom-up information through participatory methods. The 6-step process is meant to operationalize CRM while allowing for adjustments and improvements to the framework over time with increased insights. The 6-step CRM framework was extended with two more steps (steps 7 and 8), for better coverage of decision making, implementation and monitoring of CRM measures. See figure 1 for our 8-step CRM framework.

We tested the structure and individual steps of the proposed CRM framework against actual CRM practices in the three case studies. The cases were based on distinct socio-economic and geographical contexts and scales, local in Peru (Carhuaz), district in India (Nagapattinam) and national in Austria. Moreover, the three cases encompass several sudden and slow-onset risks and provide a wide variety of CRM practices.

In WP4.3, the insights generated within the national level case study (WP4.1) and the synthesis thereof in the context of the international case study (WP4.2) were presented to and discussed with national experts in DRR and CCA at a

TransLoss online workshop (organized with support by WP5) titled "Grenzen der Anpassung in Österreich?" on April 11, 2022.

WP5: Outreach and dissemination to national and international levels

WP5 was structured around two main tasks, the development of a dedicated TransLoss project outreach package (Task 5.2.) to streamline TransLoss outreach and dissemination activities, and the evaluation of applying lessons learned in TransLoss in an international setting to instrumentalize and expand on ongoing work with the "Loss and Damage Network" and the JPI Climate - Coordination and Support Action: SINCERE activities (Task 5.1.).

A project outreach package (including a project website, promotional project information material (flyers and poster), and a detailed TransLoss Outreach Plan has been developed. Results from the various TransLoss activities conducted in within and across the different WPs have been presented at national and international conferences (see section 4 below on utilization of project results).

A synergetic TransLoss / SINCERE - ECCA Conference Session has been conducted on June 10, 2021, and TransLoss co-convened the 2022 INQUIMUS workshop "Transformational risk management and Loss & Damage - What are suitable approaches for assessing climate-related (residual) risks?", which took place March 29-31, 2022 at IIASA in Laxenburg, Austria. Moreover, TransLoss acted as co-organizer of a virtual COP26 side event for the International Universities Climate Alliance (IUCA) titled "Tackling adaptation limits through transformational change", on November 11, 2021.

WP6: Project management

The objective of WP6 was to ensure a timely, target-oriented project management and coordination of activities, information management, subcontracting to partners, communication with the Austrian Energy and Climate Fund, coordination of interim and final reports, and accounting.

WP6 facilitated cooperation among national partners and the international subcontractor, thereby ensuring smooth workflow between all partners, deadline management, financial management, and reporting. Concurrent project management and controlling with respect to objectives, costs and timeline was implemented as of the start of the project; four (virtual) project team meetings plus numerous bilateral virtual meetings were held throughout the project; and the interim and final reports were developed and submitted. Methods employed: Project management; subcontracting; concurrent project control with respect to objectives; costs, and timeline; management of reporting; workshop didactics and virtual meeting moderation.

7 Arbeits- und Zeitplan

	2019		2020												2021												2022					
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
WP1: The policy perspective on Loss and Damage																																
Task 1.1								M1.1																								
Task 1.2														M1.2																		
Task 1.3														M1.3																		
WP2: The science perspective on Loss and Damage																																
Task 2.1																																
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Task 2.3															M2.1																	
Task 2.4																											M2.2					
WP3: Testing and Synthesis: The role of transformational risk management for tackling climate Loss and Damage																																
Task 3.1												M3.1																				
Task 3.2																											M3.2					
Task 3.3																														M3.3		
WP4: Comparative Case study analysis: The Austrian case in the light of international cases																																
Task 4.1.1														M4.1.1																		
Task 4.1.2																		M4.1.2														
Task 4.1.3																		M4.1.3														
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Task 4.2.2																												M4.2.2				
Task 4.2.3																														M4.2.3		
Task 4.3																															M4.3	
WP5: Outreach and dissemination to national and international levels																																
Task 5.1						M5.1	M5.3	M5.2																M5.5								M5.7
Task 5.2																				M5.4										M5.6		M5.8
WP6: Project management																																
	M6.1			M6.2				M6.1					M6.3		M6.1						M6.1			M6.4					M6.1			M6.4

8 Publikationen und Disseminierungsaktivitäten / Publications and other dissemination activities

Presentations were given to various audiences:

Schinko, T. (2020). Transformational risk management to tackle climate Loss and Damage (TransLoss). ACRP Qualitätssicherung 2020, Online Event, September 4, 2020.

Schinko, T., Karabaczek, V., Kienberger, S., Menk, L., Haindl, M., Mechler, R., Worliczek, E. (2020). Transformational risk management to tackle climate Loss and Damage in Austria and beyond. Disaster Research Days 2020, Webinar Series, October, 13-14-15 / 20-21-22, 2020.

Menk, L., Karabaczek, V., Hagen, I. (2022). TransLoss: Transformational risk management to tackle climate Loss and Damage. INQUIMUS 2022, Poster presentation at Workshop, March 31, 2022.

Hagen, I., Menk, L., Schinko, T. (2021). Tackling adaptation limits and residual risks through transformational change. International Universities Climate Alliance, Online Panel Discussion, November 9, 2021.

Karabaczek, V., Schinko, T., Kienberger, S., Menk, L., Mechler, R., Haindl, M., Worliczek, E. (2021).
Loss and Damage from climate change and limits to adaptation in Austria. In: Österreichischer Klimatag 2021, 12-13 April 2021.

Karabaczek, V., Schinko, T., Menk, L. & Kienberger, S. (2022). Perceptions on intolerable climate-related risks and potential limits to adaptation in Austria. In: Österreichischer Klimatag 2022, 20-22 April 2022.

Karabaczek, V., Schinko, T. , Menk, L., & Kienberger, S. (2022). Perceptions on intolerable climate-related risks and limits to adaptation in Austria. In: EGU General Assembly 2022, 23-27 May 2022, Vienna.

Karabaczek, V., Schinko, T. , Menk, L., & Kienberger, S. (2022). Perceptions on intolerable climate-related risks and limits to adaptation in Austria. In: ESEE 2022, 14th conference of the European Society for Ecological Economics, 14-17 June, Pisa.

TransLoss project members participated in external workshops:

Schinko T. (2020). Climate Risk Management in Austria. Lernwerkstatt Klimawandelanpassung, Webinar, October 21, 2020.

Mechler, R., Schinko, T. (2020). SOEs and associated systemic and compound risks. What to expect and how to prepare? GIZ Working Meeting: Resilience through Climate Risk Management: the case of Slow Onset Events. October 22, 2020, Webinar.

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Schinko, T., Menk, L. TransLoss / IUCA – COP26 Online Panel Discussion (November 09, 2021): Tackling adaptation limits through transformational change

In addition, **TransLoss has been linked up to the JPI Climate - Coordination and Support Action: SINCERE**:

Ongoing exchange with SINCERE: A webinar series on L&D in preparation of ECCA 2021 co-organised by TransLoss and SINCERE is currently being planned. The webinar series is planned to lead up to the high-level conference meeting in June 2021 and is reflecting different themes that jointly comprise the process that is needed to turn climate change data and knowledge into clear pathways for climate action. The topic of Loss and Damage is directly related to one of the proposed conference themes: Climate Resilience & Climate Risk Management (PREPARE).

The following peer reviewed publication have already been published:

Mechler, R., Singh, C., Ebi, K., Djalante, R., Thomas, A., James, R., Tschakert, P., Wewerinke-Singh, M., Schinko, T. et al. (2020). Loss and Damage and limits to adaptation: recent IPCC insights and implications for climate science and policy. Sustainability Science DOI:10.1007/s11625-020-00807-9.

Further scientific publications are in the review process or under preparation:

Karabaczek, V., Schinko, T., Menk, L., Kienberger, S. (under review). Potential limits to adaptation and intolerable climate risks in Austria. Submitted to *Mitigation and Adaptation Strategies for Global Change* on August 5, 2022.

Menk, L., Schinko, T., Karabaczek, V., Hagen, I., Kienberger, S. (submitted). Placing human well-being at the center of risk assessments of loss and damage from climate change. Submitted to *Frontiers in Climate* on August 31, 2022.

Hagen, I., Allen, S., Bahinipati, C. S., Frey, H., Huggel, C., Karabaczek, V., Kienberger, S., Mechler, R., Menk, L., & Schinko, T. (under review) A reality check for the applicability of comprehensive climate risk assessment and management: Experiences from Peru, India and Austria. Submitted to *Climate Risk Management* on August 1, 2022.

A synthesis policy brief has been published:

Schinko, T., Karabaczek, V., Kienberger, S. & Menk, L. (2022). Grenzen der Anpassung in Österreich? TransLoss Policy Brief. International Institut for Applied Systems Analysis (IIASA); Paris-Lodron-Universität Salzburg , Laxenburg & Salzburg.

TransLoss outreach workshops have been implemented:

March 29-31, 2022: INQUIMUS Conference: „Transformational risk management and Loss & Damage: What are suitable approaches for assessing climate-related (residual) risks?" IIASA, Laxenburg, Austria

December 1, 2022: INQUIMUS Pre-event Online Workshop: „Transformational risk management and Loss & Damage: What are suitable approaches for assessing climate-related (residual) risks?"

November 11, 2021: Tackling adaptation limits through transformational change. Co-organizer of the virtual COP26 side event for the International Universities Climate Alliance (IUCA).

Press coverage:

April 15, 2021: BMK, Kategorie Klima- & Umweltschutz: "Wie sich Gemeinden besser vor Klimawandelfolgen wappnen könnten", https://infothek.bmk.gv.at/wie-sich-gemeinden-besser-vor-klimawandelfolgen-wappnen-koennten/

April 13, 2021: Die Presse: "So können sich Gemeinden besser vor Klimawandelfolgen wappnen" – https://www.diepresse.com/5964822/so-konnen-sich-gemeinden-besser-vor-klimawandelfolgen-wappnen

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Diese Projektbeschreibung wurde von der Fördernehmerin/dem Fördernehmer erstellt. Für die Richtigkeit, Vollständigkeit und Aktualität der Inhalte sowie die barrierefreie Gestaltung der Projektbeschreibung, übernimmt der Klima- und Energiefonds keine Haftung.

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