



Taxonomy of climate-attributable loss and damage and scalable responses related to DRR, health and human mobility

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This paper provides a comprehensive taxonomy of climate-attributable loss and damage in context of Least Developed Countries (LDC) and Small Island Developing States (SIDS) in Asia and the Pacific. It highlights the need for tailored strategies encompassing demographic, socioeconomic, and political challenges, and suggests a three-pillar approach involving grassroots engagement, collaboration among stakeholders, and evidence-based policymaking to mitigate climate change effects.

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Acronyms

BAU	Business-as-usual
CCA	Climate change adaptation
CPIA	Country Policy and Institutional Assessment
DNCC	Dhaka North City Corporation
DRR	Disaster risk reduction
ENSO	El Niño-Southern Oscillation
GLOF	Glacial lake outburst flood
GNI	Gross national income
HDI	Human Development Index
IIED	International Institute for Environment and Development
ILO	International Labour Organization
IMR	Infant mortality rate
INDCs	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
L&D	Loss and damage
LDC	Least Developed Counties
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
NELD	Non-economic loss and damage
NSSS	National Social Security Strategy
ODA	Overseas development assistance
OECD	Organisation for Economic Co-operation and Development
PDR	People's Democratic Republic (Lao)
PEA	Probabilistic Event Attribution
PKH	Program Keluarga Harapan
PPP	Purchasing power parity
R&D	Research and development
SDG	Sustainable Development Goal
SEADRIF	Southeast Asia Disaster Risk Insurance Facility
SGBV	Sexual and gender-based violence
SIDS	Small Island Developing States
SRHR	Sexual and Reproductive Health and Rights
UHC	Universal Health Coverage
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WFP	World Food Programme

Summary

At the close of 2023, the United Nations Climate Change Conference, COP28, opened with a major agreement on a new global fund to address Loss and Damage that aims to help the world's poorest and most vulnerable countries pay for the irreversible impacts of climate change. This milestone gives new urgency to the need to identify fundamental terms related to loss and damage related to climate change.

This paper aims to present a comprehensive framework for understanding impacts of climate change and consequent loss and damage as they affect widely different countries and regions. The paper categorises and analyses predisposing, precipitating and protective factors for climate change impacts, within the context of Least Developed Countries (LDCs) and Small Island Developing States (SIDS) in the Asia-Pacific region. The aim is to inform the development of context-specific strategies for climate adaptation and resilience.

Predisposing factors

We first analyse the predisposing factors that create vulnerability to climate change impacts by examining demographic, social, economic and political factors across four domains.

Demographic factors: Analysing demographic factors, such as population growth, age distribution, urbanisation and migration patterns helps to assess the scale and complexity of climate-induced loss and damage. Prevailing demographic trends and key facts include:

- High population growth rates in many SIDS and Afghanistan. Many SIDS are due to experience a demographic 'youth bulge'. SIDS have dispersed, smaller populations.
- High urbanisation rates, nearly 100%, in many SIDS, and a proliferation of urban slums in some LDCs.
- Distress migration patterns in some LDCs like Afghanistan and Bangladesh. Climate migration affects Pacific SIDS.
- Progress in education and health, but gaps persisting in primary education access and infant mortality rates.
- Lack of progress on climate action compared to other Asia-Pacific countries.

Social factors: The social domain covers the varied vulnerabilities of specific social groups, including women, children, older people, disabled people and minorities. Careful analysis of these social realities is required to ensure inclusive, targeted interventions that address the needs of specific vulnerable groups.

Key trends and factors include:

- Persistent gender inequality, with continuing challenges such as violence against women, child marriage and uneven access to reproductive healthcare.
- Disparities in women's employment, education and political participation across countries.
- Continuing social exclusion of marginalised groups, including women, children, minorities and disabled people.

Economic factors: The economic domain focuses on variables like poverty levels, debt structures and industrial dependencies and how they influence a country or community's resilience to climate impacts. Key factors and trends include:

- A high reliance on primary sectors, including agriculture, fishing and forestry — sectors that are highly vulnerable to climate change. Climate change is projected to impact economies substantially by 2050 and 2100. Most countries under review experienced trade deficits.
- Wide variations in poverty levels among LDCs and SIDS. High debt levels constrain investment for some countries.
- Significant variations in debt levels, capital formation, and foreign direct investment. Most SIDS are dependent on overseas development aid. Remittances also play a key role.
- Low spending on science and technology, poor penetration of internet and mobile phones in SIDS, significant progress on energy access across countries.

Political factors: Political stability, good governance and administrative capacity are crucial to nations addressing climate impacts. Key facts and trends in this domain include:

- Fragility, conflicts and corruption remain challenges, especially for LDCs like Afghanistan, Bangladesh and Myanmar.
- Conflict has resulted in displacements in some LDCs, compounding climate vulnerabilities.
- Political stability is a concern in some LDCs and SIDS. Crime is higher in some LDCs.
- Corruption control is better in most SIDS compared to LDCs, which vary widely. Many LDCs have low transparency, accountability and governance.
- Minority inclusion varies across countries.

In summary, the analysis highlights the multifaceted vulnerabilities of LDCs and SIDS, emphasising the need for tailored strategies to build resilience. It highlights the need for multidimensional, context-specific strategies to build resilience, focused on enhancing gender equality, economic diversification, disaster preparedness and good governance.

Precipitating factors

In the next section, we analyse the precipitating factors that cause loss and damage due to climate change.

These factors range from sudden extreme weather events like cyclones and floods to slow-onset processes such as sea-level rise, ocean acidification and desertification. The research looks at how these precipitating factors cause economic and non-economic loss and damage.

Economic impacts typically include loss of property, assets, and livelihoods, while non-economic impacts can range from loss of life and loss of cultural heritage and identity, to psychological stress and other health-related issues.

We cross-reference these precipitating factors with different vulnerable groups — including women, children, disabled people and others — to delve deeper into how varying impacts manifest across these demographics.

This deeper analysis is crucial in understanding the triggers that result in loss and damage, particularly when placed in the context of pre-existing vulnerabilities. It helps to anticipate future impacts and address the links between developmental deficits and losses and damages caused by climate change.

Protective factors

This paper also incorporates a review of protective factors, particularly focusing on policy responses and interventions. We categorised policy responses

based on their effectiveness, scalability and contextual relevance. This helped to identify best practices that are not merely theoretically robust but have also demonstrated real-world efficacy.

Social protection programmes, such as cash transfers, public works and health equity funds, can build resilience through livelihood support and better financial inclusion for marginalised groups. However, coverage gaps exist, especially for migrants who lack portable benefits. Adaptive social protection that integrates disaster risk management is needed.

Financial resilience requires the mobilisation of private capital and supportive policies for risk financing tools like catastrophe risk pools. However, progress is impeded by limited disaster risk reduction funding, data gaps, and a lack of regional coordination.

Overall, policymakers need to address challenges such as siloed institutional arrangements, inconsistent funding, and lack of downscaled climate data for local planning.

We emphasise the need for context-specific, inclusive approaches that build local capacities and align disaster risk reduction (DRR) planning and climate change adaptation. Such approaches must address the pre-existing development constraints and leverage the local capacities of LDCs and SIDS.

The taxonomical approach we have taken provides the basis for more effective and equitable interventions by policymakers and offers a multifaceted lens through which to approach the complex challenges of climate change.

The way forward

To apply this taxonomical framework, we propose a synergistic programme built around three pillars.

The first pillar focuses on **incorporating grassroots experience and insights and establishing multi-stakeholder dialogue** in order to better understand the multifaceted nature of climate change impacts on different communities.

The second pillar is to **establish a community of practice**, a collaborative ecosystem where stakeholders from diverse sectors and regions can exchange insights and foster innovation and learning.

The third pillar involves **planning and policymaking based on the grounded evidence generated by the community of practice** — this is where the insights of the community of practice are translated into actionable policies and programmes.

Implementing this three-pillar approach will ensure that action to address climate change impacts and consequent losses and damages is grounded in the realities of those it aims to serve, and also remains dynamic, adaptive and responsive to evolving challenges and needs.

1

A taxonomy approach to understanding loss and damage impact

1.1 Why climate change is an urgent challenge to address

Climate change is a significant global challenge that is reshaping our world. The ongoing rates of climate change are causing shifts in the frequency, severity, spatial extent, duration and timing of extreme weather and climate-related events. Changes in climate extremes are indicative of the impact of both human-induced climate change and inherent natural climate variability (IPCC, 2021a).

The challenges of rapid climate change are more pronounced for Least Developed Countries (LDCs), Small Island Developing States (SIDS) and developing countries across the Asia-Pacific region owing to the region's vulnerability to a diverse range of climate stressors. Extreme weather events like heatwaves, typhoons, deluges and prolonged dry periods are escalating in both frequency and magnitude. From 1970 to 2022, the Asia-Pacific region faced nearly ten weather, climate, water and seismic disasters every month, resulting in an average monthly economic loss of approximately US\$3.8 million (Srivastava et al., 2023).

Additionally, the Intergovernmental Panel on Climate Change (IPCC) reports that the global average sea level has risen by approximately 20cm since pre-industrial times and continues to increase at 3.3mm annually. The Asia-Pacific region is particularly vulnerable to rising sea levels and other coastal impacts of climate change,

such as storms, coastal erosion, seawater inundation, and flooding owing to high dependence on the natural resources and agriculture sectors, densely populated coastal areas, and poverty among a considerable proportion of the population. The risks for SIDS are existential, with predictions suggesting that 150 million people may be displaced by submerging landscapes by mid-century. In the Indian Himalayan region, temperature increases are projected to exceed 2.5°C by the end of the 21st century, even under low greenhouse gas emission scenarios, with consistent increases in monsoon precipitation and a rise in extreme phenomena like floods (Dimri et al., 2021). Parts of the Asia-Pacific region, especially East, Northeast, South, Southwest and Central Asia and the Pacific, are also highly affected by sand and dust storms accompanied by droughts exacerbated by climatic conditions (UN ESCAP, 2018).

These impacts are not uniform and may occur on a variety of temporal and spatial scales. A distinction is often made to refer to these differences as 'rapid-onset' and 'slow-onset' events. A rapid-onset event is a single, discrete event that occurs in a matter of days or even hours, whereas slow-onset events evolve gradually via incremental changes occurring over many years or from an increased frequency or intensity of recurring events. Owing to the differences in impacts, the challenges posed by rapid-onset events and slow-onset events vary and require different approaches for mitigation and adaptation.

The consequences of climate change are multifaceted and far-reaching, encompassing food and water instability, population displacement, deteriorating public health, and the disruption of livelihoods and educational systems. Additionally, climate-related challenges threaten a severe setback to development goals, intensifying existing obstacles and risking a retreat into poverty. Research warns that a continuation of current trends could plunge an additional 100 million individuals into extreme poverty by 2030 (Hallegatte et al., 2016). The brunt of these impacts disproportionately affects vulnerable populations in LDCs and SIDS, who often lack the resilience and resources to recover. The World Health Organization (WHO) states that climate change is currently accountable for roughly 150,000 annual deaths and forecasts an additional quarter of a million deaths yearly from 2030 to 2050 due to heat stress, undernutrition and infectious diseases like malaria and diarrhoea (WHO, 2023). Added to this is the harmful influence of climate change on air quality, with The Lancet estimating that 4.2 million premature deaths each year are attributable to worsened air pollution (WHO, 2021). The IPCC also foresees that up to 3.2 billion people could be afflicted by water shortages by 2050, while the Internal Displacement Monitoring Centre has noted 30 million climate-induced displacements in 2020 alone. By 2050, this number could swell to 250 million internally displaced persons (IPCC, 2023). The International Labour Organization (ILO) projects a devastating loss of 72 million full-time jobs by 2030 due to climate-linked disasters (ILO, 2017).

The Asia-Pacific region is more vulnerable to climate change risks compared to other parts of the world. This is primarily due to its heavy reliance on natural resources and agriculture, densely populated coastal areas, weak institutions, and a significant portion of the population living in poverty. It is, therefore, necessary to safeguard vulnerable sectors and fortify resilience in anticipation of looming challenges. Failing to implement proactive measures could impede development, especially in countries that rely on natural resources. Incorporating anticipatory action into development planning for the most vulnerable sectors requires active participation by a range of stakeholders such as government agencies responsible for policy, research organisations, private businesses and community organisations. The effectiveness of initiating anticipatory adaptation strategies in a cost-efficient manner varies depending on the specific circumstances of the problem under consideration (Anbumozhi, 2012).

1.2 Intricacies of averting, minimising and addressing climate-related loss and damage

During COP19 in Warsaw, Poland, the Warsaw International Mechanism for Loss and Damage was instituted to address loss and damage associated with impacts of climate change, including extreme events (such as hurricanes, heatwaves, etc.) and slow-onset events (such as desertification, sea-level rise, ocean acidification, etc.) in countries that are particularly vulnerable to the adverse effects of climate change. The concept of loss and damage (L&D) stems from a growing recognition that there exists a residual realm beyond the limits of mitigation and adaptation efforts, as these are not sufficient to avert or minimise all climate change effects. Residual risks stem from historical emissions, causing irreversible ecological and societal changes. L&D also occurs when mitigation and adaptation have not been optimally implemented, because they are unaffordable, socially difficult to implement or physically and technically not viable (Bharadwaj et al., 2021c).

Climate change brings various adverse impacts such as slow-onset effects (for example, sea-level rise) and extreme weather events, resulting in infrastructure damage, loss of agricultural productivity, and population displacement. Economic losses, healthcare costs and social consequences strain resources, and as climate change continues, these losses are expected to grow, even if future mitigation and adaptation measures are implemented. As the frequency and intensity of climate impacts keep increasing, certain countries find themselves at risk of suffering L&D, even when facing relatively mild climate stress. This vulnerability to climate impacts could result in an earlier breach of their ability to withstand such stresses compared to other countries (Bharadwaj et al., 2021b). This discrepancy can be attributed to factors such as the state of their infrastructure, levels of socioeconomic development, fiscal capacity, and other considerations such as geographical conditions. Meanwhile, some countries may possess the capacity to endure climate risks to a greater extent. Similarly, certain communities, social groups or Indigenous Peoples situated on the lower rungs of the social ladder may be at a higher risk of adverse consequences of climate impacts and may experience L&D because of other exacerbating factors such as existing poverty, social marginalisation or poor access to essential services, which can limit their capacity to cope with climate impacts (Bharadwaj, 2021c). New levels of uncertainty are intertwining to

form an unprecedented complexity of uncertainty in human history. Beyond the familiar uncertainties that individuals have grappled with throughout time, we find ourselves in unexplored territory, entangled in three tumultuous crosscurrents: the perilous global shift of the Anthropocene era, the quest for transformative societal changes comparable to the Industrial Revolution, and the fluctuations of polarised societies. The challenge of navigating this fresh uncertainty complex is hindered by enduring deficiencies and disparities in human development (UNDP, 2022a). Geographical factors play a significant role in determining the extent and nature of climate-related impacts in various regions. Furthermore, the geography of a region affects the social and economic dynamics, which, in turn, shape vulnerability to climate change. In low-lying coastal regions, densely populated urban areas may face higher risks, while remote rural communities in mountainous areas could encounter distinct challenges. Additionally, the geographical diversity of a country can lead to varying climate impacts and adaptation strategies, making it complex to devise a one-size-fits-all solution.

These intricacies of climate-related L&D make it difficult to develop universal solutions. For example, vulnerable populations like women, children and disabled people are often the hardest hit. For instance, according to United Nations Women, women make up 80% of people displaced by climate change, highlighting the gendered impact of environmental changes. Similarly, the United Nations Children's Fund (UNICEF) estimates that by 2040, almost 600 million children will be living in areas with extremely limited water resources, revealing how climate change disproportionately affects children. The differing coping capacities of nations further complicate matters. According to the Global Climate Risk Index, low-income countries are among the most affected by extreme weather events but have far fewer resources for mitigation and adaptation compared to wealthier nations. Additionally, cultural and social complexities, such as local traditions and long-standing inequalities, mean that no single remedy can effectively address L&D across all communities. The International Organization for Migration points out that even within a single country, diverse migration patterns exist due to cultural factors, which complicates L&D policy implementation.

Cross-border issues add another layer of complexity. For example, rising sea levels in the Bay of Bengal have repercussions for both Bangladesh and India, raising complicated jurisdictional and governance issues. According to the Internal Displacement Monitoring Centre, over 30 million people were displaced due to climate events in 2020, but there is still no international legal framework for cross-border climate migration. Finally, the paucity of comprehensive and localised data on climate change impacts hampers efforts to understand the full scope of L&D. While global models, such as those from the Intergovernmental Panel on

Climate Change (IPCC), provide a broad overview, they often lack the granularity required for local policymaking. These variances in impact, coupled with differing coping capacities, cultural considerations, cross-border complications and data inadequacies, make addressing L&D an exceedingly complex challenge that requires a multifaceted, tailored approach.

Moreover, the loss and damage challenge is not isolated — L&D often intensifies pre-existing vulnerabilities, including poverty, inequality and social exclusion. Compounding the problem are a severe lack of resources and inefficient public systems and infrastructure in LDCs, SIDS and other developing countries, hampering efforts to implement effective mitigation or adaptation measures. To make matters worse, policy responses are lagging and are not yet commensurate with the scale and speed of the problem, making the need for action more urgent than ever (Bharadwaj et al., 2021b). It is, therefore, necessary to understand clearly what forms L&D impacts are likely to take, who is likely to be impacted, and how, so that responses can be designed to address the specific vulnerabilities of the countries, regions, communities and households that are most at risk. (Bharadwaj et al., 2021c)

1.3 Why a 'taxonomical' approach to addressing loss and damage is important

Diverse country and community contexts require tailored responses for delivering climate resilience.

Existing responses predominantly focus on financial aspects, neglecting the diverse impacts on informal economies and settlements where many vulnerable communities live. The vulnerability of informal livelihoods, prevalent in areas with high climate risk, is frequently excluded from formal economic statistics like gross domestic product (GDP). Consequently, conventional loss and damage estimates miss the profound consequences for marginalised populations, whose tangible economic losses may seem minimal but lead to significant wellbeing impacts. For instance, if a flood, landslide or storm surge devastates a section of an informal urban settlement, as witnessed in recent years in locations like Freetown (Voskoboynik & Thanki, 2017), Lagos (Adegun, 2023) and Rio de Janeiro (Hanna, 2019), the calculated economic loss may appear minimal when contrasted with the destruction of government infrastructure or upscale housing. However, the repercussions for the inhabitants of these informal settlements are far-reaching and severe, profoundly affecting their homes, possessions, livelihoods, health, sense of community, social connections, access to essential services, personal identity, and more. Failure to account for these informal losses results in the undervaluation of the true costs of loss and damage, particularly in contexts where informal livelihoods prevail. Recognising and

addressing these varied forms of losses and damages is crucial for a more comprehensive understanding and effective response (Addison et al., 2022). This requires an integrated, multisectoral approach that transcends the traditional boundaries of sectors and disciplines and unpacks how the impacts of climate change L&D are being felt across various domains, including health, social development, education, sanitation and more, and among different vulnerable groups. Taxonomy offers a useful approach in this context. Furthermore, it is important to address the compounded gender disparity when planning resilience-building efforts and response interventions.

Significant advances have been made in recent decades in comprehending the risks and resultant impacts of climate change. A solid understanding exists regarding overarching climate alterations under diverse emission scenarios in the forthcoming decades. However, on a more localised scale, uncertainties are pronounced for certain climate phenomena and specific regions. In some cases, projections of climate impacts carry a high degree of uncertainty, to the extent that the anticipated direction of change may vary among different climate models. The precision of estimates related to the sensitivity of the climate response — that is, the extent of global surface temperature change — is hindered by the inherent intricacies and internal variability of the climate system. Beyond the physical uncertainties, there is a compounded challenge stemming from uncertainties surrounding socioeconomic factors. Additionally, the poorly grasped and non-linear responses of various human and natural systems to a shifting climate further contribute to the complexity. An understanding of the likelihood and timing of triggering tipping points is even more elusive. To effectively mitigate and manage the risks associated with losses and damages from climate change, it becomes imperative to enhance comprehension not only of the projections themselves but also of the uncertainties enveloping these projections (OECD, 2021).

Taxonomy (see Box 1) traditionally helps in organising and understanding the diversity of life on Earth, aiding in species identification, conservation efforts, evolutionary studies and biological research. The same approach to taxonomy can be used to understand climate-attributable loss and damage and serve as a valuable tool in climate research. A taxonomical approach can provide a standardised framework for data collection, categorisation and analysis and offer a multifaceted framework to unpack vulnerabilities in diverse contexts and communities and work out viable solutions to address them.

A well-structured taxonomy can support prioritisation by identifying the most vulnerable areas, communities, and their exposure to the typology of climate risks. With a comprehensive and structured taxonomy of climate and weather events, researchers and policymakers can better understand and communicate the nuances of various impacts. Decision makers can identify the most pressing needs and most promising interventions, thereby directing funds and other resources to where they will have the greatest impact. Given the limited resources and the immediacy of climate threats in LDCs and SIDS, a framework to identify where interventions would be most needed is crucial for effective action.

Climate change impacts and the capacity to cope with them can vary widely between different communities and even within the same community. Understanding the interplay between different types of losses, damages and possible responses becomes more manageable with a taxonomy. The significance of the concept of taxonomy lies in providing a structured approach to comprehend, assess and tackle the various dimensions of losses and damages resulting from climate change. Such a classification can reveal synergies and trade-offs among various adaptation and mitigation strategies, enabling policymakers to make informed decisions. A taxonomy can help in designing nuanced, context-specific solutions that consider these local vulnerabilities and capacities. For instance, while

BOX 1. WHAT IS TAXONOMY?

Taxonomy is generally defined as “the science of classification according to a pre-determined system, with the resulting catalogue used to provide a conceptual framework for discussion, analysis, or information retrieval”. (This definition comes from the Merriam-Webster Dictionary.)

The Cambridge Dictionary defines taxonomy as a system for naming and organising things into groups that share similar qualities.

Another definition of taxonomy, often cited in academic contexts, is: “the branch of science concerned with classification, especially of organisms; systematics.” (This is according to the Oxford English Dictionary.)

Taxonomy can be applied across various fields, from biology, where it is commonly used to classify living organisms, to information science, where it is used to categorise and organise data or concepts.

seawalls might be effective in one coastal community, mangrove restoration could be more suitable for another. The alignment between on-ground realities and policy is often the key to successful implementation. Systematic classifications of vulnerabilities and responses can be integrated into national and international frameworks based on taxonomy, making policy response more agile and responsive to real-world complexities.

Measuring loss and damage resulting from climate change is a complex task, primarily due to its context specificity and the varying temporal and spatial scales involved. Losses and damages are often not confined to specific time frames; their socioeconomic and ecological impacts can unfold over several years or persist for decades following an event. While estimating immediate economic losses after extreme events remains challenging yet accessible with available methods, the same cannot be said for non-economic losses and damages, often deemed incommensurable. Quantitative research on loss and damage has predominantly focused on potential climate risk and attribution, considering the hazard event, exposure, and vulnerability. However, there hasn't been enough emphasis on empirical data on L&D during specific climate events that has been attributed.

Measurement and documentation of loss and damage are crucial steps in a global empirical assessment of impacts, providing insights to guide climate change governance (Boyd et al., 2021). The use of a taxonomy can aid in identifying critical variables related to climate-induced loss and damage and in selecting appropriate measurement tools.

1.4 Domains for a taxonomical approach to assessing loss and damage

In this research, we have used taxonomy to understand climate-attributable loss and damage with a particular focus on disaster risk reduction (DRR), health and human mobility impacts within the context of LDCs and SIDS and other countries vulnerable to climate change in Asia and the Pacific. The intention of this research is to guide evidence-based policymaking, foster interdisciplinary collaboration, and support the development of climate-resilient policies and scalable responses.

To realise these aims, our research framework will use the taxonomy of 'predisposing factors', 'precipitating factors' and 'protective factors' to systematically unpack the interconnections and dynamics between vulnerability, climate-attributable loss and damage, and programme and policy responses (Bharadwaj, Karthikeyan and Deulgaonkar, 2023).

The **predisposing factors** domain encompasses elements that make certain areas, communities or sectors inherently more susceptible to loss and damage from climate change. This can include demographic context, geographical location, socioeconomic-cultural conditions, political factors and pre-existing vulnerabilities like poverty, lack of access to resources or a fragmented and incoherent policy system. For instance, poor and marginalised communities along coasts may have lower capacities to cope and recover from climate impacts such as sea-level rise. By identifying these predisposing factors, interventions can be designed to mitigate the inherent risks they pose.

The **precipitating factors** domain focuses on the triggers causing loss and damage. These could range from acute events like storms and heatwaves to more gradual processes like sea-level rise or desertification. Understanding the intricacies between short-term weather events and long-term climate patterns (for example, a climate change-induced increase in sea surface temperatures can contribute to the intensity of storms, cyclones and hurricanes) is vital for devising effective solutions. Recognising the interplay between weather and climate is essential. Understanding these factors is crucial for real-time response and recovery efforts. For example, knowing the precipitating factors of forest fires in a particular region can inform emergency preparedness for future and immediate firefighting strategies.

Lastly, the **protective factors** domain covers elements that contribute to resilience against climate change impacts. These can include social protection and DRR mechanisms like community preparedness programmes or robust healthcare systems. Protective factors aim to enhance the coping capacities of vulnerable groups and mitigate the losses and damages when adverse events occur. For example, a community with a well-designed early warning system for cyclones can be better prepared to reduce loss of life.

Wisner et al. (2004) have proposed a pressure and release model that argues that disaster occurs when two opposing forces meet: natural hazards and the processes that create vulnerability. In other words, disasters occur when the impact of a hazard coincides with the vulnerabilities in a community. This model features three components on the social side: root cause, dynamic pressure and unsafe conditions. This model's social side components could be related to predisposing factors. The variables on the hazard side of the Pressure and Release model could be related to precipitating factors.

The framework of predisposing, precipitating and protective factors is also based on the principles of the UNDP framework entitled "What does it mean to leave

no one behind?" The key factors of this framework, namely governance, geography, socioeconomic status, shocks and fragility and discrimination, have been covered in this analytical framework of predisposing, precipitating and protective factors of climate loss and damage. UNDP adopts a precautionary approach to addressing substantial social and environmental challenges, emphasising the implementation of the mitigation hierarchy. This approach involves initially preventing potential adverse impacts on both people and the environment. In cases where avoidance is not feasible, the strategy then shifts to minimising, mitigating, and, as a last resort, offsetting and compensating for potential residual adverse impacts (UNDP, 2023a). The categorisation of predisposing, precipitating and protective factors forms a taxonomy that aids in classifying and measuring various parameters contributing to or exacerbating loss and damage within a specific context. This quantification facilitates a comprehensive understanding of the problem's magnitude and enables the prioritisation of resource allocation to address the adverse effects of climate change.

Together, these taxonomical domains provide a holistic framework for averting, minimising and addressing climate change-related loss and damage. They can enable policymakers and development practitioners to better understand the complexity of how different factors interplay to either exacerbate or mitigate loss and damage. This is especially important in diverse settings where generic solutions may not be effective. By categorising factors into these domains, policymakers, researchers and practitioners can more systematically evaluate risks and develop tailored interventions that account for a full spectrum of vulnerabilities and coping capacities.

2

Understanding the predisposing factors creating vulnerability to loss and damage

2.1 Why it is important to assess predisposing factors

To develop context-specific responses, understanding the underlying drivers of vulnerability that make certain systems, sectors and populations more vulnerable to climate change impacts is important. Therefore, in this research, we have considered the analysis of predisposing factors as the foundational step in designing inclusive strategies to manage climate-related loss and damage. It has helped us to identify where vulnerabilities exist and how deeply they are entrenched within communities. This nuanced understanding will be important for developing targeted strategies to bolster community resilience against climate impacts. By doing so, the interventions will not just be reactive but also proactively strengthen the capacities of the most vulnerable communities to face future climate challenges. A failure to understand these factors could, however, lead to a one-size-fits-all approach that can neglect the diverse needs of various communities.

The analysis of predisposing factors also enables us to highlight how these vulnerabilities can inhibit the capacity of communities to prepare, cope and recover from climate impacts. For instance, economic deficiencies, such as high levels of poverty and debt, can constrain local capacities to invest in adaptation measures or disaster recovery. Similarly, social factors

like gender disparities may restrict women's access to information and resources, making them more vulnerable during climate disasters.

This analytical framework becomes even more critical when considering LDCs and SIDS. These regions already grapple with significant developmental deficits, such as inadequate healthcare, poor infrastructure and lack of access to quality education. These existing challenges add an additional layer of complexity to their vulnerability profile. For example, a limited healthcare infrastructure not only affects the wellbeing of these communities but also severely constrains their ability to deal with climate-related health issues, such as the spread of infectious diseases following natural disasters.

It is also important to understand that developmental deficits in LDCs and SIDS often arise from systemic issues, including but not limited to lack of access to international markets, historic exploitation and current debt traps. These structural disadvantages must be acknowledged and integrated into any comprehensive strategy to address climate-induced loss and damage. Failure to consider these factors could result in interventions that are not only ineffective but could further exacerbate existing inequalities.

The identification and categorisation of predisposing factors was done by applying a multidimensional approach that goes beyond the immediate climate and

environmental impacts. The analysis considered four distinct domains — demographic, social, economic and political — to provide a comprehensive framework for understanding vulnerabilities and development deficits in the context of climate change impacts. The factors considered under each of these domains is as follows.

2.2 Demographic factors

Understanding demographic factors like population growth, age distribution, urbanisation and migration patterns allows for an assessment of the scale and complexity of climate-induced loss and damage. For instance, rapid urbanisation without appropriate infrastructure could exacerbate flood risks, while areas with a high dependency ratio may struggle with evacuation and disaster recovery. By cataloguing these factors, we can develop interventions that are more demographic-sensitive, ensuring that the most vulnerable population segments like children and the elderly are adequately protected.

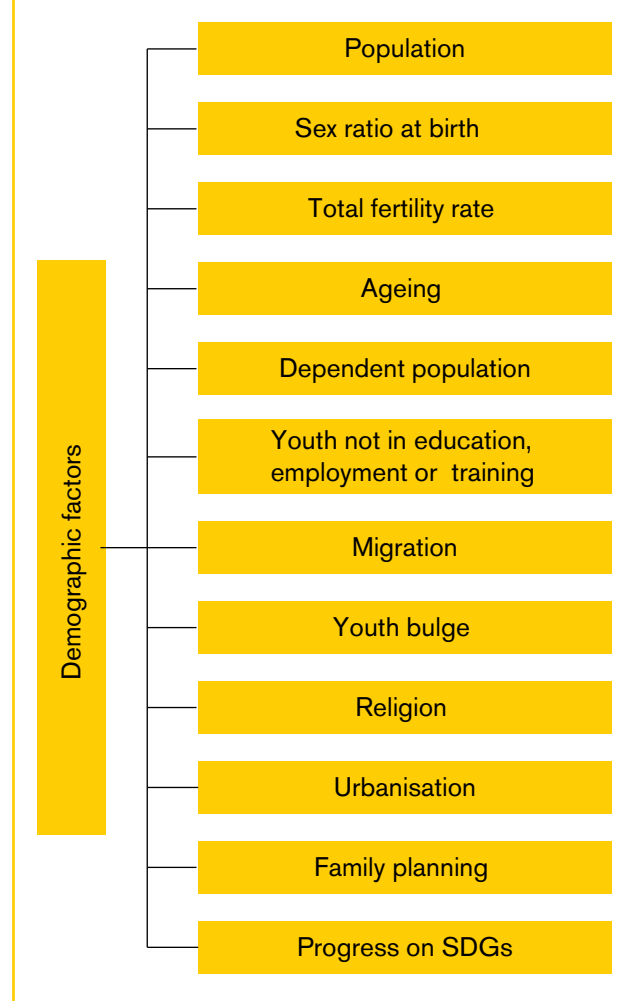
Figure 1 provides the taxonomical domains of analysis considered under the demographic factors.

Box 2 summarises the prevailing trends and key facts that have emerged from the analysis of the demographic factors.

Our analysis shows that the Asia-Pacific region is witnessing a major transition marked by a significant shift from youthful, predominantly rural demographics to an older population concentrated in urban areas. The people in these countries are most vulnerable to climate change, which will be a crucial determinant in the population changes that are happening across the region (ADB, 2017). Population size, structure and composition influence and are influenced by climate change. High fertility rates with declining mortality rates in some of the LDCs and SIDS will lead to population growth and a youth bulge, which will in turn add to a milieu of adverse socioeconomic issues like unemployment, migration, loss of livelihoods, etc. (UN ESCAP, 2022). Some of the SIDS are moving towards a higher proportion of ageing people. Ageing significantly influences individuals' ability to adjust and manage the consequences of climate change (UN ESCAP, 2021). Older people have reduced resilience to natural disasters and thus face greater susceptibility to diseases and the potential ramifications of climate change for food availability, water and sanitation, healthcare, housing, and transportation services.

Both LDCs and SIDS experience migration driven by various factors such as economic reasons and climate-induced disasters. These factors play a significant role in shaping the populations and dynamics of these countries. Afghanistan, Bangladesh and Myanmar exhibit distress migration. Climate change is projected

Figure 1. Variables considered for analysis of demographic factors



to increasingly amplify the significance of environmental factors in driving migration (ADB, 2012). Climate-induced migration also affects Pacific Island Small States. Migration patterns and occupational choices are influenced by gender. Bangladesh experiences more women migrating for domestic work opportunities in the Gulf (ILO, 2021). Climate change will not only affect migration patterns but also the underlying factors propelling migration.

Urbanisation is also a megatrend influencing these countries and has the potential to increase the climate change vulnerabilities of communities (UN-HABITAT, 2015). Many of the SIDS countries are approaching near complete urbanisation, while some LDCs are also on a trajectory of rapid urbanisation. Some LDCs have high unmet needs for family planning, especially for unmarried young girls and women. This is bound to make women more vulnerable (OECD and WHO, 2022). While their progress on certain indicators for education is encouraging, they must fast-track their progress on health indicators. Both will contribute significantly to improving resilience and reducing the vulnerability of people in the region.

BOX 2. TRENDS BASED ON ANALYSIS OF DEMOGRAPHIC FACTORS

Prevailing trends

- Fertility ↑ and mortality ↓
- Youth bulge, urbanisation and migration ↑
- Progress in access to education and health ↑

Key vulnerabilities and strengths

Population: Afghanistan, Bangladesh and Myanmar are the most populous nations among the LDCs; SIDS have highly dispersed populations; fertility rates are higher than the global average in many SIDS countries and in Afghanistan.

Sex ratio and female population: Bhutan and Maldives have lower sex ratios; in general the proportion of female populations are lower than the world average in many countries.

Ageing and dependency: The aged population is lower than the world average in many SIDS and LDCs; dependency is higher than the world average in SIDS.

Youth bulge: Many of the SIDS, including French Melanesia, Papua New Guinea, Solomon Islands and Vanuatu, are witnessing a trend towards a youth bulge; among LDCs, dependency is higher than the world average; among LDCs, Afghanistan has the highest proportion of youth not in education, employment or training.

Urbanisation: SIDS witness high rates of urbanisation, in some cases, near 100%; LDCs experience a proliferation of urban slums.

Migration: Economic factors and climate events act as drivers of migration; Afghanistan, Bangladesh and Myanmar exhibit distress migration; many SIDS witness climate-induced migration.

Education: There is good progress on many sub-indicators across LDCs and SIDS, however many children in LDCs are still not in school in the primary education levels.

Health: There is good progress across many sub-indicators, but variations across countries exist; infant mortality rate (IMR) is high in some LDCs; obesity is a major challenge in SIDS.

Progress on climate action: Both LDCs and SIDS have not progressed much on climate action and lag behind other countries in the Asia-Pacific region.

2.2.1 Key trends¹

Detailed analysis of different variables under the demographic domain provides a closer understanding of vulnerabilities and strengths of LDCs and SIDS in the Asia-Pacific region:

Population: The SIDS have low population density, with a relatively small population living across a large geographic area and spread across numerous islands (World Bank, 2023a). Fiji has the highest population with over 900,000 residents. In contrast, Tuvalu, and Nauru each have approximately 11,000 inhabitants. Among the LDCs in the Asia and Pacific region, Bangladesh is the most populous country with over 171.2 million people, followed by Myanmar with 54.2 million and Afghanistan with 41.1 million people.

Among the LDCs and SIDS in the Asia-Pacific region, Afghanistan, Solomon Islands and Vanuatu exhibited an annual growth rate of more than 2% in 2022, while the Marshall Islands and American Samoa report a negative growth rate of -1.2% and -1.7%, respectively. Compared with the overall growth rate of LDCs globally (2.3%), only Afghanistan, Solomon Islands and Vanuatu have shown a higher growth rate. Eleven of the LDCs and SIDS in the Asia-Pacific region have recorded a growth rate lower than the world average of 0.8%.

Total fertility rate (births per woman): Nine countries, including Cambodia, Bangladesh, Nepal and Myanmar have average fertility birth rates per woman higher than the global average (2.3). Of these, four are SIDS, namely, Palau, French Polynesia, Maldives and New Caledonia. The Pacific Small Island States

¹ This and the subsequent sections also have quotes from participants at a stakeholder workshop in Jakarta, Indonesia. A report on the workshop is given in Annex 3.

have an average total fertility rate of 3.2, much higher than the world average. There are high fertility rates in Afghanistan (4.6), Solomon Islands (4.0), American Samoa (4.0), Papua New Guinea (3.2), Samoa (3.9), Tonga (3.2) and Vanuatu (3.7). Palau has a fertility rate of 0.8, the lowest in the group.

Sex ratio at birth: The average sex ratio at birth (females per males) varies between 104.8 to 108.1 for the countries under analysis. Bhutan and Maldives are at the lower end of the spectrum, while Tonga is at the higher end of the spectrum. The percentage of the female population varies from 42.32% for Maldives to 52.15% for Nepal. Bangladesh, Cambodia, Myanmar, Nepal, Kiribati, Tonga, American Samoa and New Caledonia have a female population of 50% or slightly above 50%, while all others have slightly less than 50%.

Ageing: The population aged above 65 in most of the LDCs and SIDS in the Asia-Pacific region varies between 2% (Afghanistan, Nauru) to 7% (Myanmar, American Samoa), which is well below the world average of 10%. Only five countries — Palau, French Polynesia, Guam, New Caledonia, and Northern Mariana Islands have 10% or slightly more than 10% of their population over 65.

Dependent population: The age dependency ratio (as a percentage of working population) varies between 36% for Maldives and is as high as 84% for Afghanistan. Only 12 countries have age dependency ratios lower than 55%, the world average. The average of the Pacific and Small Island states is 65%, but seven countries in the region, namely, Kiribati, Timor-Leste, Tonga, Nauru, Solomon Islands, Samoa, and Vanuatu, have higher dependency ratios than this average.

Share of youth not in education, employment, or training (as a percentage of the youth population): The total youth population not engaged in education, employment or training is highest in

Afghanistan at 62.8%. It is between 30 and 50% for nine countries (Timor-Leste, New Caledonia, Nepal, Papua New Guinea, Nauru, Marshall Islands, Tuvalu, Vanuatu and Kiribati) and between 20 and 30% for six countries (Fiji, Lao People's Democratic Republic (Lao PDR), Maldives, Bangladesh, Micronesia and Samoa). Only Solomon Islands and Bhutan have youth not in education, employment or training as less than 10% of the youth population.

Migration: The LDCs exhibit a net outmigration of 236,068 people, whereas the SIDS witness a net outmigration of 5,742 people. Apart from Bhutan and Nepal, all other countries of the LDC group exhibit net negative migration. Afghanistan and Bangladesh have a significant net immigrant population. In SIDS, except for Palau and Papua New Guinea, all countries witness a net outmigration.

The total number of persons displaced under 'internally displaced persons, new displacements due to disasters' for LDCs is 2.06 million. Bangladesh records the highest at 1.5 million, followed by Afghanistan at 0.22 million. Among SIDS, Timor-Leste recorded the highest number of internally displaced persons and new displacements due to disasters.

Youth bulge: The Asia-Pacific has witnessed a 'youth bulge', or demographic bonus. This phenomenon is characterised by 20% or more of a national population being aged 15 to 24, accompanied by a rising number of working-age adults compared to the dependent population (YouthPolicy.org, n.d.). The LDCs are projected to contribute significantly to the youth bulge of the region. The youth bulge will be a significant challenge for SIDS countries. Countries including French Melanesia, Papua New Guinea, Solomon Islands and Vanuatu will have half their population under the age of 23 by 2050 (Wilson, 2020).

BOX 3. DATA IN THE ANALYSIS

The assessment of predisposing, precipitating and protective factors on different variables and indicators was done on the basis of datasets from the following sources and carrying out analysis on them in context of LDCs and SIDS in the Asia-Pacific region:

- World Bank Open Datasets (https://data.worldbank.org/?name_desc=false)
- Religious Diversity Index dataset from Pew Research Centre (www.pewresearch.org/religion/2014/04/04/religious-diversity-index-scores-by-country/)
- UNDP 2023 Global Multidimensional Poverty Index (<https://hdr.undp.org/content/2023-global-multidimensional-poverty-index-mpi#/indicies/MPI>)
- United Nations Multidimensional Vulnerability Index (https://www.un.org/ohrrls/sites/www.un.org.ohrrls/files/files/mvi_results.xlsx)
- United Nations Human Development Index (https://hdr.undp.org/sites/default/files/2021-22_HDR/HDR21-22_Statistical_Annex_HDI_Table.xlsx)

Religion: According to the Pew Research Centre, among the LDCs, Bhutan, Lao PDR, Myanmar and Nepal have high scores of 4 or above on the religious diversity index. Among the SIDS, Fiji and Northern Mariana Islands have higher scores of 5.8 and 3.7, respectively. Christianity is the major religion in most of the LDC and SIDS countries. Other religions include Islam, Buddhism and Hinduism (Pew Research Center, 2015).

Urbanisation: The average percentage of the urban population in the world is 57%. Of the countries being considered for analysis and for whom data was available, 16 countries have urban population percentages lower than the world average, and 11 countries have more than the world average of the urban population. Some of the SIDS member countries, such as Palau, American Samoa, Guam and the Northern Mariana Islands, record an urban population of more than 80%, and Nauru is 100% urban. Among the LDCs, Tuvalu (66%), Kiribati (58%), Bhutan (44%) and Bangladesh (40%) are among the most urbanised countries. The LDCs witness a high proportion of their urban population living in slums. Afghanistan stands highest with 73%, followed by Myanmar at 58% and Bangladesh at 52%. The lowest recorded data for the urban population living in slums is for Fiji, at 9%.

Family planning: One of the most densely populated regions of the world, the Asia-Pacific region has a lot to do in terms of access to modern family planning and reproductive healthcare. Among LDCs, data related to family planning is not available for all countries. It is observed that the unmet family planning needs for modern methods for LDCs is in the range of 0.3% for Timor-Leste and 25.8% for Nepal. Cambodia reported 20.5%, while Myanmar had a low rate of 1.2%. For SIDS, Maldives reported 25.6% and Papua New Guinea reported 25.1%. Family planning is cost-effective and reduces maternal mortality. Access to contraception enables women to make informed decisions, benefiting maternal and child health. Access to modern methods varies across the income categories within a country, often benefiting the high-income group. For unmarried women aged 15–24 years, Maldives records 96.4% access to modern methods, followed by Papua New Guinea at 69.6% and Cambodia at 50%, respectively. Improved family planning methods also have direct repercussions on reducing public health expenses. Access to reliable contraception techniques and ensuring suitable healthcare during pregnancy and childbirth empower women and young girls to make informed choices regarding their fertility, while also increasing the likelihood of healthy childbirth for parents.

Progress in achieving the Sustainable Development Goals (SDGs): LDCs and SIDS in the Asia-Pacific region excel in 'Affordable Clean Energy' (Goal 7) and 'Quality education' (Goal 9), whereas they struggle with 'climate action' (Goal 13). LDCs notably have progressed on 'Life

on Land' (Goal 15), driven by conservation aid. In SIDS, there is regression in 'Responsible Consumption and Production' (Goal 12) and 'Clean Water and Sanitation' (Goal 6) (UN ESCAP, 2023a).

SDG on Education: The LDCs have an aggregate of 3.3 million children out of school in primary education. Afghanistan records the highest at 1.9 million children, followed by Cambodia with 0.28 million and Bangladesh with 0.15 million. In SIDS, Papua New Guinea accounts for the largest share, with 0.08 million.

The global average adult literacy rate (the percentage of people aged 15 and above) in 2020 is 87. Only two LDCs have an adult literacy rate that is slightly more than the global average (89), while the Lao PDR equals the world average. In SIDS, except for Solomon Islands and Timor-Leste, all countries have rates higher than the global average. Guam reports 100%, while many others are close to 100%.

On the availability of trained teachers for pre-primary education, Bhutan, Cambodia, Marshall Islands, Nauru, Samoa and Tuvalu score a perfect 100%, but Micronesia, Solomon Islands, Tonga, Vanuatu, Maldives and Myanmar have a score of less than 90%, the lowest being Micronesia with 26%.

For primary education, the availability of trained teachers is 100% for Bhutan, Cambodia and Niue. It is more than 80% for seven countries (Solomon Islands, Maldives, Kiribati, Samoa, Tonga, Myanmar and Lao PDR). It is 50% or less for Vanuatu, Micronesia, Bangladesh and Fiji.

Access to basic drinking water facilities and sanitation in primary schools is 100% for Tuvalu, Cook Islands, Maldives, Nauru and Niue and more than 98% for Tonga and Samoa. However, it is less than 60% for Afghanistan, Lao PDR, Vanuatu and Solomon Islands.

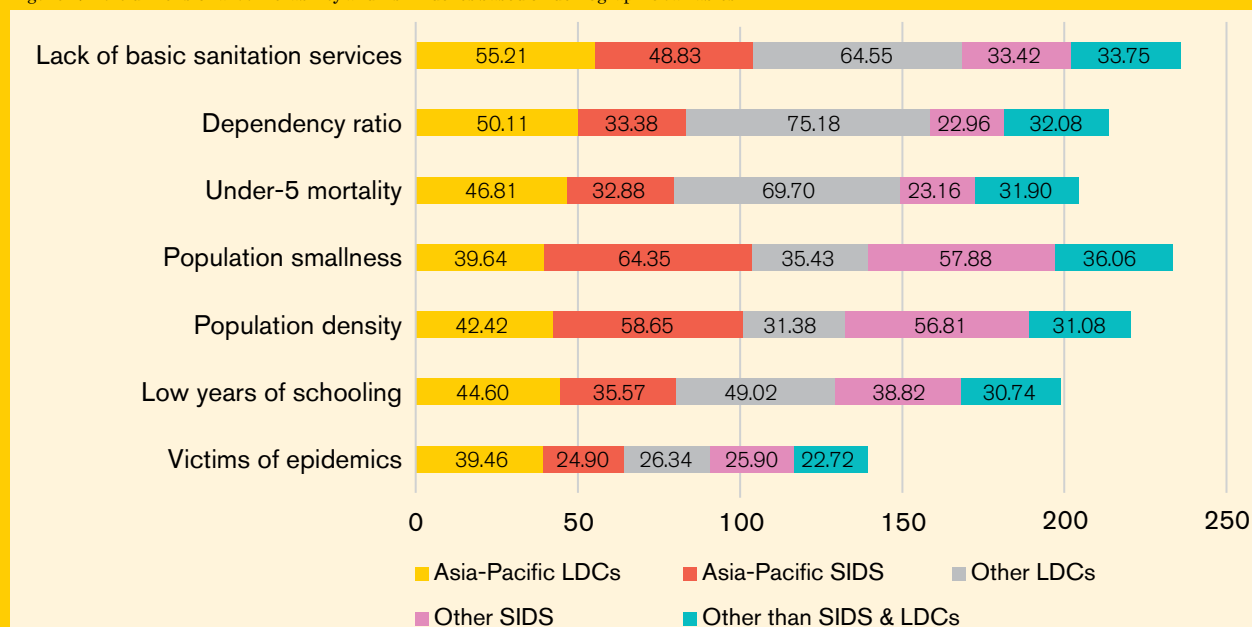
SDG on Health: The world average infant mortality rate (IMR) is 28 (per 1,000 live births) as of 2021, and it is 20 (per 1000 live births) for the Pacific Island Small States. However, there is a large variation in the IMR within the LDC and SIDS of the Asia-Pacific region. Afghanistan and Timor-Leste with an IMR rate of 43 are the highest, followed by Kiribati (38), Papua New Guinea (34), Lao PDR (34) and Myanmar (34). Maldives and Northern Mariana Islands have an IMR of 5, the lowest among the countries being researched.

The neonatal mortality rate for the world is 18 (per 1000 live births) as of 2021. Seven LDCs, including Bangladesh, Bhutan, Cambodia, Nepal, Solomon Islands, Tuvalu and Vanuatu, reported rates lower than the world average. Afghanistan reported the highest at 34 and Solomon Islands, the lowest at 8. In SIDS, the rate ranges from 4 for Maldives to 21 for Papua New Guinea. Five SIDS, including Maldives, Palau, Samoa, Tonga and Solomon Islands, have rates lower than the average rate of the Pacific Islands Small States (10).

BOX 4. MULTIDIMENSIONAL VULNERABILITY AND RISK INDEXES BASED ON DEMOGRAPHIC VARIABLES

In Figure 2, we show the vulnerability of the LDCs and SIDS in the Asia-Pacific region in comparison to other regions and other developing and developed countries.

Figure 2. Multidimensional vulnerability and risk indexes based on demographic variables



Source: Authors' calculation based on data from Hazard and Exposure Index: INFORM Report 2021 <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/2021/INFORM%20Annual%20Report%202021.pdf> and Assa, J and Meddeb, R (2021) Towards a Multidimensional Vulnerability Index. DOI: 10.13140/RG.2.2.17634.45763

The analysis of vulnerability and risk index shows a distinct trend for LDCs and SIDS, particularly those in the Asia-Pacific region.

Human Development Index (HDI) emerges as a notable differentiator between LDCs and SIDS in the Asia-Pacific region. LDCs in this region have a significantly higher HDI of 61, compared to their SIDS counterparts, which register an HDI of only 39.6. This suggests that LDCs in the Asia-Pacific region are somewhat better off in terms of overall human development, which encompasses factors like education, life expectancy and per capita income.

When it comes to **victims of epidemics**, LDCs in the Asia-Pacific region are disproportionately affected, with a value of 39.46 compared to the 24.90 of SIDS in the same region. This highlights a concerning vulnerability to health crises among LDCs in this geographical area.

In terms of **education**, measured by 'Low Years of Schooling', Asia-Pacific region LDCs also face challenges but are relatively better off than SIDS in the region. They register 44.60 compared to 35.57 for SIDS, signalling that educational attainment is somewhat better in LDCs but still poses a concern for both groups.

Population density and **population smallness** metrics indicate specific challenges for SIDS in the Asia-Pacific region. With a population density of 58.65 and population smallness at 64.35, making them potentially more susceptible to various socioeconomic and environmental risks.

In summary, while both LDCs and SIDS in the Asia-Pacific region face considerable challenges, the nature of these challenges varies. LDCs struggle more with epidemics and have a slightly better HDI, while SIDS face specific risks related to their small size. These trends underscore the need for tailored, region-specific interventions to address the unique challenges faced by these vulnerable groups.

The Maternal Mortality Ratio for Afghanistan is the highest, with 620 per 100,000 live births as of 2020, followed by Cambodia at 218 per live 100,000 births.

The under-5 mortality rate for the world is 38 per 1,000 live births, as of 2021. Five countries, Afghanistan (56), Kiribati (48), Lao PDR (43), Myanmar (42) and Timor-Leste (51), had rates higher than the world average.

Seven countries among SIDS had rates higher than the average of Pacific Island Small States (23). They include Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Papua New Guinea and Timor-Leste. Of these seven, Timor-Leste had the highest rate at 51.

SIDS member states face alarmingly elevated rates of health issues such as obesity (80%), type 2 diabetes (20%) and non-communicable disease-related premature mortality (70%), surpassing global averages. Of particular concern is the swift escalation of childhood overweight and obesity rates within SIDS. In 2016, the highest obesity rates (exceeding 30%) globally were recorded in Nauru among girls and in the Cook Islands among boys (Foster et al., 2023).

SDG on Clean Water and Sanitation: Data on access to safe water and sanitation services was not available for many countries. In five countries — Palau, Northern Mariana Islands, Niue, New Caledonia, American Samoa and Guam — more than 90% of the population has access to safe drinking water. However, in countries like Kiribati, Lao PDR, Nepal, Afghanistan, Cambodia and Tonga, 30% or less of the population has access to safe drinking water.

Open defecation is practised by more than 30% of the population in Kiribati and the Solomon Islands, while it is 10% or less in Nepal, the Marshall Islands, Tuvalu, Myanmar and Nauru. The percentage of the population practising safe sanitation is 65% in Bhutan and 61% in Myanmar and Lao PDR. It is around 6% for Tuvalu.

More than 85% of the population in Marshall Islands, Bhutan and Maldives have access to basic handwashing facilities in their premises. However, it is 30% or less for Vanuatu, Papua New Guinea, Afghanistan and Timor-Leste.

“In the Gunung Kidul region of Indonesia, which relies heavily on agriculture, the persistent drought conditions have led to a decline in crop yields and the emergence of pest infestations. Consequently, farmers have found it necessary to increase their expenditures on fertilisers, as the organic and natural fertilisers they traditionally used no longer seem to be effective. The investment in agriculture has far exceeded the actual crop yields. These challenges have also given rise to social issues, including a declining interest among the youth to engage in agriculture and a preference for urban living over rural areas.”

Workshop participant, Jakarta, Indonesia.

2.3 Social factors

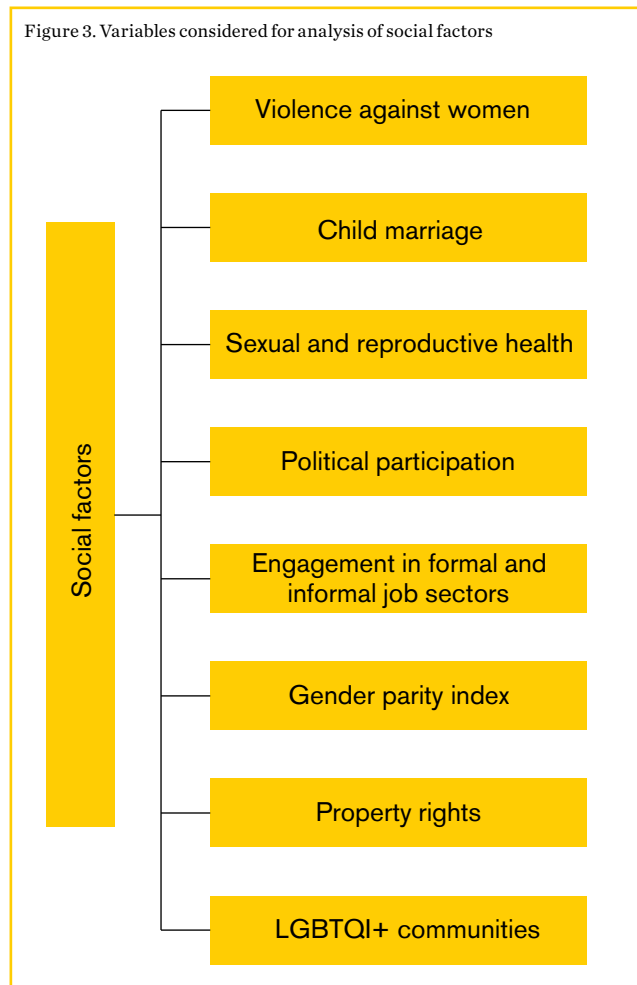
The social domain focuses on the vulnerabilities of specific groups such as women, children, elderly people, disabled people, minorities and LGBTQI+ communities. Elements like educational disparities, wage gaps and social discrimination directly influence these groups' capacity to prepare for and recover from climate disasters. For example, societies with wide gender disparities in education may see women disproportionately impacted by climate change due to a lack of access to information and resources. Understanding these social realities allows for the development of inclusive, targeted interventions that address the needs of these specific vulnerable groups.

Figure 3 provides the taxonomical domains of analysis considered under the social factors.

Box 5 summarises the prevailing trends and key facts that have emerged from the analysis of the social factors.

Our analysis shows that across LDCs and SIDS in the Asia-Pacific region, women experience gender disparities in the areas of resource access, decision-making power, access to education, healthcare access and economic and political opportunities. Additionally,

Figure 3. Variables considered for analysis of social factors



BOX 5. TRENDS BASED ON ANALYSIS OF SOCIAL FACTORS

Prevailing trends

- Gender disparities ↑
- Violence against women and child marriages ↑
- Progress in SDGs, particularly those pertaining to gender development ↓
- Vulnerabilities of women, children and minority communities ↑

Key vulnerabilities and strengths

Violence against women: High rates of gender-based violence reported in several countries, including Afghanistan, Kiribati, Timor-Leste, Solomon Islands, Vanuatu and Papua New Guinea.

Child marriage: Widely prevalent across the LDCs (excepting Tuvalu) with girls under 15 years of age getting married; Bangladesh faces a significant challenge.

Family planning and SRHR: Access to modern family planning methods, and sexual and reproductive health and rights (SRHR), presents a considerable gap in countries like Cambodia and Nepal, where 20.5% and 25.8% of women, respectively, experience difficulties in access.

Employment: There are differences in the employment rates of women across countries; Afghanistan is at the low end of the spectrum with just 14%, while Solomon Islands reported 81% of women in employment.

Gender parity in tertiary education: Significant disparities exist among countries; the parity is very low in Afghanistan and high in Myanmar.

Women's political participation varies from 2% in Vanuatu to a high of 40% in Timor-Leste.

Property rights: Many countries are lagging; the score ranges from 1 for Myanmar to 3.5 for Kiribati.

LGBTQI+ communities: Social inclusion is yet to progress in many countries; many countries have severe restrictions on these communities.

they suffer from discriminatory practices such as violence, child marriage and social exclusion. These practices amplify their vulnerability and undermine their resilience to climate-induced disasters (Quilt AI, 2023). Despite continued efforts by countries and resultant progress in some areas of gender equality, data available on the SDG indicators highlights significant inequality for women and girls across SDGs 3, 4, 5, 8, 11 and 16. The region continues to witness a declining trend on SDG 13, related to climate change, which will accentuate the effect on marginalised sections of society, including women, children, and Indigenous and LGBTQI+ communities (UN ESCAP, 2023b).

During disasters, sexual and gender-based violence (SGBV) becomes a prevalent factor that exacerbates pre-existing vulnerabilities. Effective mechanisms to address SGBV are vital especially since the Asia-Pacific region is more prone to climate-induced disasters (UN Women, 2016). The increase in child, early and forced marriages, particularly in low-income countries, is amplified by extreme weather events such as droughts and floods. These disasters worsen pre-existing issues of poverty and gender disparity, pushing families to resort to child marriage as a means of coping. Reducing

and eliminating child marriage and adolescent child pregnancies can have a far-reaching impact on the human capabilities of girls and enable them to cope with climate change impacts (Doherty et al., 2023).

Climate-related disasters are likely to hamper the capacity of health systems to provide access to sexual and reproductive health rights (SRHR) services for women and girls. By directing resources towards SRHR initiatives and delivering SRHR services in the aftermath of climate-related disasters, we can mitigate the adverse impacts of climate change on women.

Although both men and women work in the informal sector, women are disproportionately clustered within the poorest segments of informal employment. Additionally, the percentage of women engaged in climate-sensitive sectors such as agriculture, fisheries, and forestry is high and employment vulnerability remains elevated, affecting them disproportionately (Elasha, 2009). The existing societal norms, wherein women shoulder additional unpaid care and domestic work, such as securing water, food and fuel in the face of limited resources due to climate change, exacerbate these challenges. Climate change exacerbates pre-existing gender disparities, as women and girls

frequently face challenges in obtaining essential resources and wielding influence in decision-making processes. This situation poses unique threats to their livelihoods, health and safety (Han et al., 2022).

Accelerating climate change action can be driven by the active involvement of women, but achieving this necessitates the engagement, representation, and leadership of women in such efforts. In the absence of this, the responses and solutions to the climate crisis will persistently neglect their requirements and violate their rights. Both LDCs and SIDS in the Asia-Pacific region will have to continue their efforts towards enhancing women's representation, property rights for women and social inclusion of marginalised communities (UN Women Asia and the Pacific, 2011–2012).

2.3.1 Key trends

Detailed analysis of different variables under the social domain provides a closer understanding of vulnerabilities and strengths of LDCs and SIDS in the Asia-Pacific region.

Societal factors, including child marriages, access to SRHR, formal and informal employment opportunities, gender parity in tertiary education enrolment, access to property rights, political participation, and so on, have considerable bearing on the vulnerabilities of women, children and other marginalised sections of society. These vulnerabilities are further heightened by the impacts of climate change.

Violence against women: Physical and/or sexual violence experienced by women (as reported in the last 12 months) was significantly high (score of more than 40) in some countries like Afghanistan, Kiribati, Timor-Leste, Solomon Islands, Vanuatu and Papua New Guinea. It was low (score of less than 10) in countries like Bhutan, Maldives, Lao PDR, Cambodia, Palau and Cook Islands. According to the data from World Bank, in the Asia-Pacific region, women who reported having had their first sexual experience as forced sex ranged from between 2% in Cambodia to 28% in Vanuatu. Maldives reported a significant proportion of female genital mutilation.

Child marriage: Apart from Tuvalu, all LDCs in the Asia-Pacific region reported having child marriage of girls aged below the age of 15. Rates ranged from 1.6% for Myanmar, the lowest, and 15.5% for Bangladesh, the highest. Eight SIDS reported witnessing this practice, with the rate ranging from 0.2% for Fiji to 5.6% for Solomon Islands (World Bank Data, n.d.a). This rate is amplified when considering child marriages of girls below 18 years, with rates for LDCs in the region ranging from 1.8 to 51.4%, with Bangladesh reporting the highest, while other countries such as Nepal and Lao PDR also report nearly one-third of girls experiencing child marriage before the age of 18. The

trend is also high in SIDS in the region, ranging from 1.8% for Tuvalu (the lowest) to 27.3% for Papua New Guinea (the highest).

Sexual and reproductive health and rights: Data is available for only a limited number of LDCs and SIDS in the region. Cambodia and Nepal reported 20.5% and 25.8% of women, respectively, not having access to modern methods of family planning. Among the SIDS, Marshall Islands and Papua New Guinea reported 25.6% and 23.1%, respectively. Among unmarried women in the 15–24 age category, this issue becomes critical. Maldives reported a near total inaccessibility (96.4%), while Papua New Guinea and Cambodia also reported more than two-thirds of women (69.6%) not having access. The prevalence of modern contraceptive methods ranges from 14.8% for Timor-Leste to 33.2% for Nepal. In SIDS, only three countries had data, which ranged from 10.6% (Marshall Islands) to 22.3% (Papua New Guinea). HIV prevalence is reported by only one member: Cambodia.

The adolescent fertility rate (births per 1,000 women in the age bracket 15–19) in LDCs ranged from 19 for Bhutan, the lowest, and 83 for Afghanistan, the highest. Twelve LDCs and SIDS (Cambodia, Nepal, Lao PDR, Bangladesh, Afghanistan; Palau, Samoa, Papua New Guinea, Marshall Islands, Solomon Islands, Vanuatu, Nauru) had rates higher than the global average of 42. Among SIDS, adolescent fertility rates ranged from 7 for Maldives to 72 for Nauru, the lowest and highest respectively, with five countries (Papua New Guinea, Marshall Islands, Solomon Islands, Vanuatu, Nauru) reporting more than the average of the Pacific and Small Island States (44).

Engagement in formal and informal job sectors: The employment to population ratio for females over the age of 15 ranges from 14% for Afghanistan (the lowest) to 81% for Solomon Islands (the highest). Nine countries (Papua New Guinea, New Caledonia, Bhutan, Guam, Lao PDR, Timor-Leste, Vanuatu, Cambodia, Solomon Islands) reported rates higher than the global average

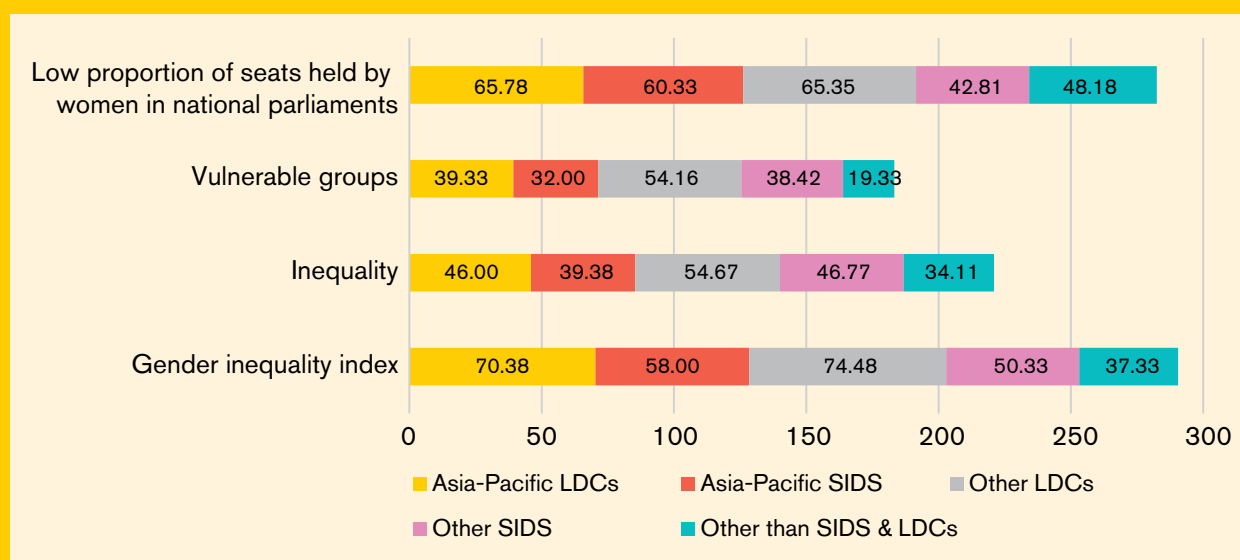
“In poor and disadvantaged families, the shifting climate frequently causes significant disturbances to family life; also impacting children who frequently must abandon their education to assist with household responsibilities such as walking long distances to fetch water. This leads to the interruption of a child’s learning and recreational activities. Additionally, the scarcity of water contributes to health problems associated with personal hygiene.”

Workshop participant, Jakarta, Indonesia.

BOX 6. MULTIDIMENSIONAL VULNERABILITY AND RISK INDEXES BASED ON SOCIAL VARIABLES

In Figure 4, we show the vulnerability of the LDCs and SIDS in the Asia-Pacific region in comparison to those in other regions and other developing and developed countries.

Figure 4. Multidimensional vulnerability and risk indexes based on social variables



Source: Authors' calculation based on data from Hazard and Exposure Index: INFORM Report 2021 <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/2021/INFORM%20Annual%20Report%202021.pdf> and Assa, J and Meddeb, R (2021) Towards a Multidimensional Vulnerability Index. DOI: 10.13140/RG.2.2.17634.45763

The analysis of vulnerability and risk index highlights different social challenges faced by LDCs and SIDS, particularly those in the Asia-Pacific region.

Firstly, the **gender inequality index** stands out as a significant concern for LDCs in the Asia-Pacific region, registering a high value of 70.38. This is notably higher than the index for SIDS in the same region, which is 58. Although this is less than LDCs, it is still high compared to average. The higher the index, the greater the gender disparity, indicating that LDCs and SIDS in the Asia-Pacific region face severe gender-related challenges.

Inequality also is more pronounced in LDCs in the Asia-Pacific region, with a value of 46, and 39.38 for SIDS. This suggests that social and economic disparities are more significant in LDCs and SIDS within this region.

When it comes to **vulnerable groups**, LDCs in the Asia-Pacific region again show higher vulnerability, scoring 39.33, whereas SIDS score 32. This metric could encompass a range of socially vulnerable populations, and the higher score for LDCs and SIDS indicates a greater need for social protection measures.

Lastly, the metric for **low women's representation in national parliaments** is quite high for both LDCs and SIDS in the Asia-Pacific region, at 65.78 and 60.33 respectively. This signals a common challenge of gender inequality in political representation that both groups face, although it is slightly more acute for LDCs.

In summary, LDCs and SIDS in the Asia-Pacific region appear to face substantial social challenges, particularly in terms of gender inequality, broader social inequality, and vulnerability of certain social groups. These challenges are complex and interconnected, emphasising the need for multifaceted social interventions tailored to the specific needs of these countries in this region.

of 45%. Among the SIDS in the region, the rates of the female population over the age of 15 engaged in the formal and informal sectors ranged from 35% for Samoa to 81% for Solomon Islands. Among the SIDS, Solomon Islands, Timor-Leste, Guam and Vanuatu had higher women's employment rates than the average for the Pacific Island Small States (52%).

The female labour-force participation for LDCs ranged from 19.8% for Afghanistan, the lowest, to 48.5% for Solomon Islands, the highest. While only three LDCs (Bhutan, Lao PDR and Cambodia) had rates higher than the global average of 39.5%, eight SIDS had higher rates (Papua New Guinea, Tonga, French Polynesia, Vanuatu, Timor-Leste, Guam, New Caledonia and

Solomon Islands). Among the SIDS, female labour-force participation ranged from 27.4% for Maldives (the lowest) and 48.5% for Solomon Islands (the highest). The average of Pacific Island Small States was 41.2%. Seven countries of SIDS had rates higher than this.

The percentage of vulnerable employment to total employment ranged from 10% for Guam to 83% for Afghanistan, the lowest and highest respectively. All LDC members reported an employment vulnerability rate higher than the global average of 43%. Among SIDS, the range varies between 10% for Guam and 75% for Papua New Guinea. Four countries (Solomon Islands, Timor-Leste, Vanuatu and Papua New Guinea) had a rate higher than the Pacific Island Small States (49%). Countries including Afghanistan, Bhutan, Lao PDR and Papua New Guinea reported nearly three-fourths of total employment as vulnerable employment.

Unemployment rates remained the highest for New Caledonia at 12.3%, while it was 0.4% for Cambodia, the lowest among the LDCs in the region. Six countries (Afghanistan, Nepal, Guam, Samoa, New Caledonia and French Polynesia) had rates higher than the global average of 5%. The range for SIDS in the region is between 2.1% in Vanuatu to 13.1% in French Polynesia. Six of the nine SIDS (except for Solomon Islands, Vanuatu and Papua New Guinea) reported rates higher than 3.9%, the average of Pacific Island Small States.

Gender parity index: The gender parity index for school gross enrolment in tertiary education for LDCs in the Asia-Pacific region ranges between 0.39 for Afghanistan and 1.29 for Myanmar, the lowest and highest rates, respectively, among the countries being researched. Apart from Myanmar, all other LDCs had rates lower than the global average of 1.14. Among the SIDS, the gender parity index ranged from 0.57 for Papua New Guinea to 1.73 for Maldives. The average of Pacific Island Small States is 1.3, and five SIDS (Fiji, Palau, Samoa, Tonga, and Maldives) exceeded this average.

The World Bank's Country Policy and Institutional Assessment (CPIA)² reports a world average gender equality rating of 3.3 (1=low, 6=high) (World Bank, 2022). The CPIA gender equality rating varies between 1 for Afghanistan to 4 for five countries (Bhutan, Cambodia, Lao PDR, Fiji and Samoa). Other countries reporting a score better than the world average are Nepal, Timor-Leste, Vanuatu and Maldives, all with a score of 3.3.

Of the five LDCs that reported data on the percentage of women (aged 15–49) making their own informed decisions regarding sexual relations, contraceptive use and reproductive healthcare, Timor-Leste reported 40% while Cambodia reported 76%, the lowest and highest rates, respectively, among the countries being researched. Among the SIDS, only three countries reported data: Maldives (58%), Papua New Guinea (57%) and Timor-Leste (40%).

Political participation: Women's representation in parliament ranged from 2% in Vanuatu to 40% in Timor-Leste. Women's representation in parliament is better than the world average of 26% in only two LDCs in the region — Nepal (33%) and Afghanistan (27%). Except for Fiji and Timor-Leste, all other SIDS countries reported low single-digit figures for political participation of women in parliament.

Property rights: The CPIA property rights and rule-based governance index (1=low, 6=high) for the countries being researched ranged from 1 for Myanmar to 3.5 for Kiribati, Tuvalu, Vanuatu and Micronesia. Only five other countries (Lao PDR, Nepal, Solomon Islands, Fiji and Maldives) had a score higher than the global average of 2.8.

Social inclusion and equity: The CPIA social inclusion/equity cluster average covers a wide range of policy areas such as gender equality, equity of public resource use, human development, social protection, and environmental sustainability (1=low to 6=high). Among LDCs, it ranges from 1.7 for Afghanistan to 4 for Bhutan. Four LDCs had a score greater than the global average of 3.3. In SIDS, it ranged from 2.6 for Samoa to 3.4 for Tonga. The average score for Pacific Island Small States is 3.2. Three SIDS had greater scores.

² The World Bank's Country Policy and Institutional Assessment (CPIA) assesses the conduciveness of a country's policy and institutional framework to poverty reduction, sustainable growth, and the effective use of development assistance.

2.4 Economic factors

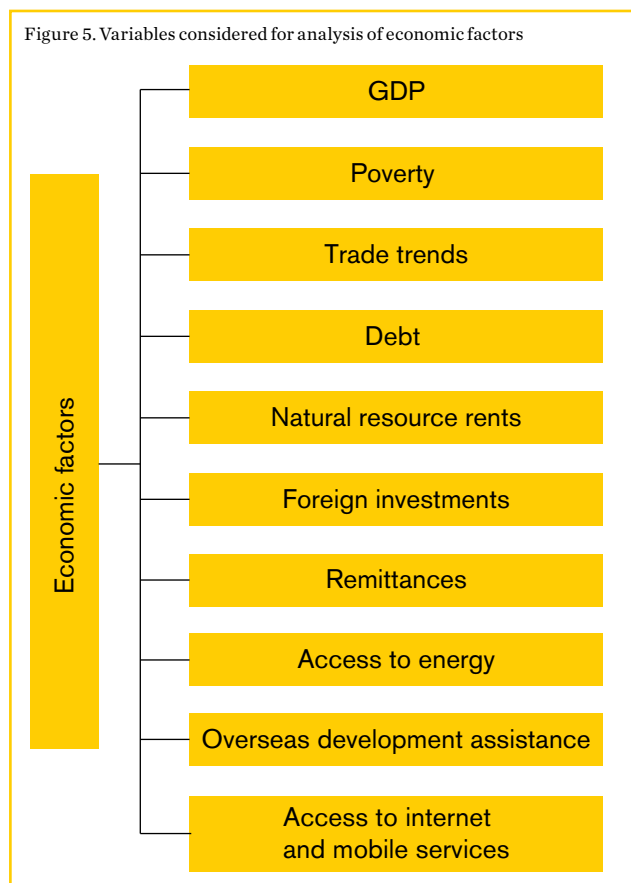
The economic domain focuses on variables like GDP, poverty levels, debt structures and industrial dependencies significantly influencing a country or community's resilience to climate impacts. For example, regions heavily reliant on natural resources for their economy are particularly susceptible to climate-induced loss and damage. Additionally, unaffordable health expenditure associated with climate loss and damage is an indication of a lack of robust social protection. Moreover, high levels of poverty and debt can make it almost impossible for communities to invest in climate adaptation and mitigation measures. By identifying these economic vulnerabilities, more effective resource allocation and financial assistance programmes can be designed.

Figure 5 provides the taxonomical domains of analysis considered under the economic factors.

Box 7 summarises the prevailing trends and key facts that have emerged from the analysis of the economic factors.

Our analysis shows that across LDCs and SIDS in the Asia-Pacific region, climate change-induced disasters are having significant detrimental effects on the economy, leading to substantial losses. The region has incurred significant economic costs due to disasters. Between 1970 and 2015, the annual economic toll

Figure 5. Variables considered for analysis of economic factors



surged from US\$52 billion to surpass US\$523 billion, encompassing damage to property, crops and livestock (UN ESCAP, 2016).

Primary sectors comprised of agriculture, fishing and forestry engage a large part of the population in the LDCs and SIDS of the Asia-Pacific region. These sectors are climate-sensitive, affecting the livelihoods of a significant proportion of the population (FAO, 2021). These sectors are also deeply interconnected, and hence impact the overall economy. When a single sector faces a threat, it puts the entire system at risk, endangering many livelihoods. Hence solutions focused solely on isolated sectors are insufficient (UN ESCAP, 19 July 2023). Climate change economics provide crucial perspectives on the consequences of taking no action, as well as on implementing climate mitigation measures. Without intervention, GDP in the region could decline by up to 3.3% by 2050 and 10% by 2100, compared to the baseline scenario. Additionally, the economic toll from disasters across the region is on the rise (UN ESCAP, 2016). While this is projected for the entire Asia-Pacific region, it is more relevant to the LDCs and SIDS.

Poverty can exacerbate the consequences of climate change for impoverished communities. People living in poverty face a heightened vulnerability to climate-related events like floods and droughts, resulting in more substantial losses when such events occur. Typically, humanitarian finances are allocated in response to post-disaster situations, resulting in unpredictable cash flows and fundraising that hinges on specific events. The delay between recognising the financial need and disbursing funds often leads to an ineffective and untimely response. In instances where financial assistance does not reach communities promptly, individuals resort to alternative domestic sources — primarily household savings and assets — as their initial means of defence against loss and damage. A notable example is seen in Bangladesh, where impoverished rural households impacted by climate-related risks allocate as much as 15% of their total expenditure to risk reduction, a figure that rises to 30% in households led by women (Bharadwaj et al., 2022). Countries facing debt stress face the dual challenges of achieving the SDGs and maintaining external debt. Some of LDCs and SIDS are heavily dependent on overseas development assistance (ODA), which curbs their abilities to invest adequately in climate actions (IMF, 2018).

Foreign direct investment (FDI) is not so significant in LDCs and SIDS. However, remittances play a crucial role in strengthening their economies. Both LDCs and SIDS have made great strides in providing access to energy for their populations but have yet to make progress on improving internet and cellular phone penetration; both will have a positive impact on their ability to cope with disasters.

BOX 7. TRENDS BASED ON ANALYSIS OF ECONOMIC FACTORS

Prevailing trends

- GDP growth in 2022 ↓
- Agriculture, fishing and forestry are vital sectors for LDCs and SIDS but are vulnerable to climate change; projected economy ↓ due to climate-induced disasters by 2050 and 2100, without climate action.
- Remittances ↑ the strength of the economies in many LDCs and SIDS.

Key vulnerabilities and strengths

GDP: In 2022, most countries experienced negative growth. Only Bhutan, Fiji and Maldives had annual GDP growth rate above the world average of 3.1%.

Poverty: Wide variations exist among LDCs and SIDS; while Bhutan has a rate of 0.9% (as measured at US\$2.15/day), Solomon Islands recorded a high of 26.6%.

Trade: Most countries experienced trade deficits; deficits were particularly high in Bangladesh and Nepal, while Timor-Leste had a surplus.

Debt: Significant variations persist across nations; Lao PDR recorded the highest debt as a percentage of gross national income (GNI), while Maldives and Fiji also exhibited high debt levels.

Overseas development assistance (ODA): Most SIDS depend on ODA; Tuvalu received the highest ODA as a percentage of GNI, whereas Bangladesh and Myanmar received less than the average for global LDCs.

Primary sector: Most countries rely heavily on primary sectors like agriculture for their economy.

Natural resources rents: With the exception of Timor-Leste, Papua New Guinea, Solomon Islands and New Caledonia, all other SIDS have zero or negligible natural resources rents.

Capital formation: Wide variations across countries, with Vanuatu leading and Fiji trailing.

Foreign direct investment (FDI): Disparities among nations across LDCs and SIDS; Cambodia, Timor-Leste and Maldives receive the highest FDI as a percentage of GDP, while Vanuatu has negative FDI.

Remittances: The economies of many countries depend on remittances; Tonga and Samoa record significantly high levels of remittances.

Access to science and technology: Most countries report low spending at less than 1% of GDP.

Access to energy: Most countries report high level of access, apart from a few, like Papua New Guinea.

Mobile phones and internet: Many SIDS countries lag behind the world average in terms of the penetration of mobile phones and internet. Additionally, the latest cable infrastructure has yet to reach all the SIDS countries in the Asia-Pacific region. As of 2022, Nauru, Timor-Leste and Tuvalu did not have any international submarine cable connections. Most countries with international submarine cables rely only on a single cable, which is not very efficient in terms of connectivity and performance. The Asia-Pacific region is home to some of the lowest E-Government Development Index rankings in the world, including Lao PDR (159th), Afghanistan (184rd), Solomon Islands (165th), Micronesia (164th), Marshall islands (160th), Samoa (152th) and Papua New Guinea (170th).

2.4.1 Key trends

Factors such as the GDP growth rate of a country, per capita GDP, poverty rate, trade trends, debts, FDI, dependence on climate-sensitive primary sectors, the extent of natural rents in a country, access to energy, internet, and science and technology, are crucial determinants of a country's economy. Sound and robust economies can invest in disaster preparedness and climate actions and enable their populations to face climate contingencies and mitigate their impacts upon

them. Contrarily, disasters can impact the economy of a country adversely in the short term and long term (UN ESCAP, 2016). Detailed analysis of different variables under the economic domain provides a closer understanding of the vulnerabilities and strengths of LDCs and SIDS in the Asia-Pacific region:

GDP: The impact of COVID-19 on the economies of most countries, especially those in the LDCs and SIDS, was all too pervasive. While there are signs of recovery, in 2022, only seven countries (Bhutan, Papua New Guinea, Cambodia, Nepal, Bangladesh, Maldives

and Fiji) recorded a growth rate higher than the world average of 3.1. Most of the SIDS and associated countries in the region (Northern Mariana Islands, Timor-Leste, Palau, Samoa, Solomon Islands, Tonga, New Caledonia, American Samoa and Micronesia), along with Afghanistan, recorded negative growth rates. Growth ranged from -29.7% in Northern Mariana Islands to 16% in Fiji.

Projected GDP growth for 2023 ranges from 2% for Nauru to 12.3% for Palau. While most countries will have growth rates of less than 4%, Tuvalu, Samoa, Nepal, Papua New Guinea, Bangladesh, Cambodia, Fiji and Palau are projected to have growth rates equal to or higher than 4%. Trends are similar for projected GDP growth in 2024 (The World Bank, 2022a).

In 2022, only the Associated SIDS countries of American Samoa, Northern Mariana Islands, French Polynesia, Guam and New Caledonia reported GDP per capita better than the world average of US\$12,647.5. All other LDCs and SIDS in the Asia-Pacific region report per capita GDP less than the global average. Among SIDS, Kiribati reports the lowest GDP per capita at US\$1,702 and Tuvalu the highest at US\$5,335. In the group of countries being researched, New Caledonia reports the highest per capita GDP of US\$36,668. GDP per capita is lowest for Afghanistan at US\$363.7 (The World Bank, 2022b).

Poverty: The latest available poverty estimate (2017–2019) indicates that the poverty rate for LDCs and SIDS in the Asia-Pacific region is in the range of 0.9% for Bhutan, the lowest, and 26.6% for Solomon Islands, the highest, when measured in terms of US\$2.15/day at 2017 purchasing power parity (ppp). Six countries (Vanuatu, Bangladesh, Micronesia, Timor-Leste, Solomon Islands and Papua New Guinea) reported poverty rates higher than the global average of 8.5%. Among the SIDS, poverty rates ranged between 0% in Maldives to 39.7% in Papua New Guinea. These estimates will rise manifold when measured at US\$3.25/day.

Trade trends³: The net trade deficit varies between US\$36,887 million for Bangladesh (2022) to a net surplus of US\$100 million for Timor-Leste (2022). Trade surpluses were also reported by Maldives (2021) and Myanmar (2022). All other countries reported a trade deficit. Apart from Bangladesh, only Nepal (2022) had a trade deficit more than US\$10,000 million. While Gaum, Cambodia, New Caledonia, French Polynesia and Lao PDR had a deficit of between US\$1,000 million and US\$10,000 million, all the rest of the countries had a deficit of less than US\$1,000 million.

Debt: Data on the present value of debt as a percentage of gross national income (GNI) is available only for eight LDCs in the region (Bangladesh,

Cambodia, Lao PDR, Myanmar, Nepal, Solomon Islands, Timor-Leste and Vanuatu). It ranges from 7.9% for Solomon Islands to 54% for Lao PDR. Cambodia and Vanuatu also report high debt levels at 31.7% and 36.9%, respectively. For SIDS, data is available for seven countries only: Fiji (22.4%), Maldives (66.6%), Papua New Guinea (23.3%), Samoa (47%), Solomon Islands (7.9%), Timor-Leste (9.4%) and Vanuatu (36.9%). The debt for GNI is lowest for Solomon Islands and highest for Maldives.

Overseas development assistance (ODA): In 2021, among the LDCs and SIDS of the Asia-Pacific region, the net ODA as a percentage of GNI was lowest for Bangladesh at 1.2% and highest for Tuvalu at 44.4% GNI. Afghanistan (31.7%), Kiribati (18.4%), Solomon Islands (16.5%) and Vanuatu (15%) also had a high percentage. Only five countries among the LDCs and SIDS of the Asia-Pacific region (Bangladesh, Maldives, Myanmar, Lao PDR, Nepal and Papua New Guinea), received less ODA compared to the average ODA of LDCs of the world (4.8%). For SIDS, ODA as a percentage of GNI ranged between 2.3% for Maldives to 44.4% for Tuvalu. Ten SIDS and Associated SIDS member countries (Maldives, Papua New Guinea, French Polynesia, Samoa, New Caledonia, Timor-Leste, Nauru, Vanuatu, Fiji and Solomon Islands) reported higher ODA receipts compared to the average of Pacific Island Small States. The maximum ODA receipt was by Tuvalu at 44.4%, followed by Marshall Islands (36.5%), Micronesia (29.4%), Palau (22.7%) and Tonga (22.8%).

Primary sectors: The world average for the value of primary sectors like agriculture, forests and fishing was 4.3% of GDP in 2022. Only two countries, New Caledonia (1.8%) and Palau (3.9%), had a lower percentage compared to the world average. The highest percentages of primary sector value to GDP were found in Solomon Islands (34.1%), Afghanistan (33.5%), Kiribati (26.7%) and Marshall Islands (25%). Myanmar, Nepal, Vanuatu, Cambodia and Micronesia have a primary sector contribution of 20% or more to GDP. Seven countries (French Polynesia, Maldives, Timor-Leste, Fiji, Samoa, New Caledonia and Palau) have a primary sector contribution of less than 10% to GDP.

The percentage of people engaged in agriculture as a percentage of total employment⁴ varies from 2% in French Polynesia to 62% for Nepal. In Bhutan and Lao PDR, more than half of employment is based on agriculture.

All LDCs in the Asia-Pacific region reported a higher proportion of people employed in the agricultural sector than the global average of 26%. However, in the SIDS, the contribution of the agriculture sector to total employment ranges from 2% in French Polynesia to 42%

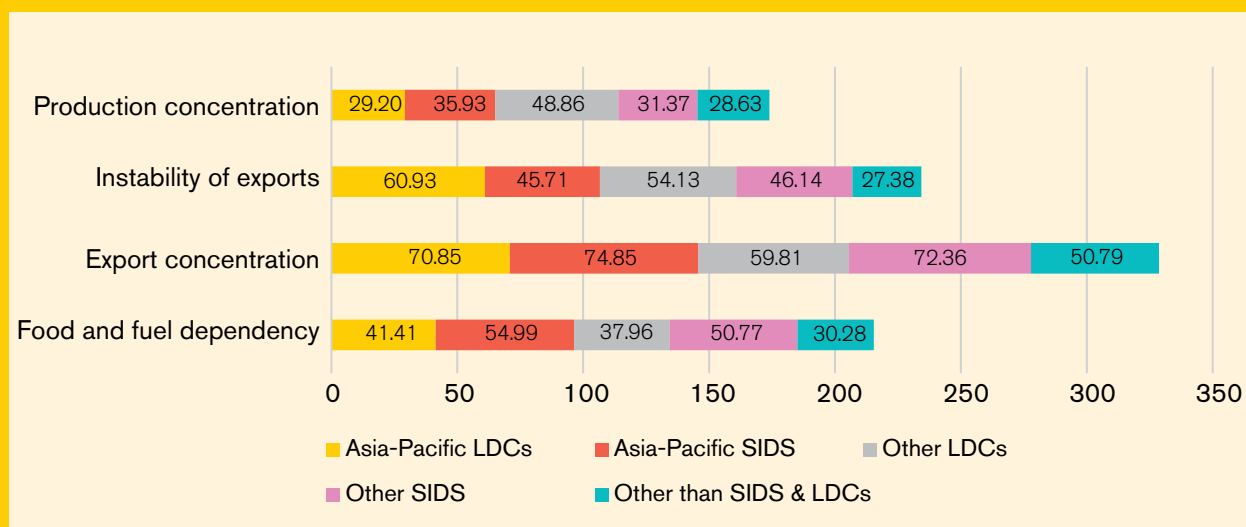
³ Data for Papua New Guinea and Afghanistan not considered for analysis as the data was more than 10 years old.

⁴ Data for Guam not considered as it reported zero.

BOX 8. MULTIDIMENSIONAL VULNERABILITY AND RISK INDEXES BASED ON ECONOMIC VARIABLES

In Figure 6, we show the vulnerability of the LDCs and SIDS in the Asia-Pacific region compared to those in other regions and other developing and developed countries.

Figure 6. Multidimensional vulnerability and risk indexes based on economic variables



Source: Authors' calculation based on data from Hazard and exposure index: INFORM Report 2021 <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/2021/INFORM%20Annual%20Report%202021.pdf> and Assa, J and Meddeb, R (2021) Towards a Multidimensional Vulnerability Index. DOI: 10.13140/RG.2.2.17634.45763

The analysis of vulnerability and risk index highlights different economic challenges faced by LDCs and SIDS, particularly those in the Asia-Pacific region.

For the **dependency index**, LDCs in the Asia-Pacific region register a score of 41.75, significantly lower than the 60.2 for SIDS in the same region. This suggests that the SIDS are more economically dependent, perhaps due to limited resources or economic diversification.

The **economic vulnerability** index value of Asia-Pacific LDCs is higher (57.67) than that of SIDS (45.00) in the same region. This indicates a greater susceptibility to economic shocks and stresses in LDCs, which can be exacerbated by factors such as political instability and social inequality.

In terms of **food and fuel dependency**, SIDS in the Asia-Pacific region are more dependent, scoring 54.99, compared to 41.41 for LDCs. This could be indicative of the limited self-sufficiency and higher reliance on imports for essential commodities in SIDS.

The **export concentration** score is high for both groups but slightly higher for SIDS in the Asia-Pacific region at 74.85, versus 70.85 for LDCs. High export concentrations can make economies more vulnerable to global market fluctuations, affecting both LDCs and SIDS but posing a slightly higher risk for the latter.

Instability of exports is another area where both groups face challenges. LDCs in the Asia-Pacific region score 60.93, while SIDS score 45.71.

Finally, on the **production concentration** front, Asia-Pacific region SIDS score 35.93, slightly higher than LDCs at 29.20, suggesting that SIDS have a more concentrated production sector, making them potentially more vulnerable to specific economic shocks.

In summary, both LDCs and SIDS in the Asia-Pacific region face multifaceted economic challenges, but the nature and intensity of these challenges differ. While LDCs are more economically vulnerable and face export instability, SIDS are more dependent and have higher export and production concentrations. These nuances highlight the need for targeted economic policies tailored to the specific challenges and vulnerabilities of each group.

in Vanuatu. Only three countries (Vanuatu, Timor-Leste and Solomon Islands) reported a higher percentage than the average for Pacific Island Small States (35%).

Natural resources rents: The total natural resources rent as a percentage of GDP is zero for many SIDS (Kiribati, Tuvalu, Maldives, Marshall Islands, Micronesia, Nauru, Palau, Tonga, American Samoa, French Polynesia, Guam and Northern Mariana Islands). It is less than 1% for two SIDS (Samoa and Vanuatu) and four LDCs (Afghanistan, Nepal, Bangladesh and Cambodia). It is highest at 34.7% for Timor-Leste, followed by Papua New Guinea (27.4%), Solomon Islands (18.4%) and New Caledonia (16.8%). Four of the LDCs in the Asia-Pacific region exceeded the global average of 3%. Among the SIDS, Timor-Leste, Papua New Guinea, Solomon Islands and New Caledonia exceeded the average of Pacific Island Small States (4.2%).

Gross capital formation: Gross capital formation consists of outlays on additions to the fixed assets of the country along with the net changes in the level of inventories. The gross capital formation as a percentage of GDP for LDCs and SIDS in the Asia-Pacific region is in the range of 12% for Fiji to 51% for Vanuatu, the lowest and highest, respectively. Nepal, Bhutan, Bangladesh, Cambodia, Myanmar, Maldives, Samoa and Micronesia had a contribution of one-third or slightly more of gross capital formation as a percentage of GDP.

Foreign investments: Net FDI as a percentage of GDP in 2022 varies from the low of -0.41% in Vanuatu to 11.9% for Cambodia. FDI as a percentage of GDP is more than the world average of 1.6% for only seven countries among LDCs and SIDS of the region (Myanmar, Maldives, Lao PDR, Cambodia, Fiji, Solomon Islands and Timor-Leste).

Remittances: Most of the LDCs and SIDS of the Asia-Pacific region saw personal remittances higher than the global average of 0.8% of GDP. Eight countries (Afghanistan, Bangladesh, Bhutan, Myanmar, Lao PDR, Tuvalu, Palau and Nauru) have remittances of between 1 and 5% of GDP and six countries (Cambodia, Fiji, Kiribati, Solomon Islands, Timor-Leste, and Vanuatu) have remittances as a percentage of FDI of between 5 and 10%. Four countries have exceptionally high remittances as a percentage of GDP: Tonga (46.2%), Samoa (33.6%), Nepal (22.8%) and Marshall Islands (10.7%).

Access to science and technology: Data on research spending on science and technology was not available for all the countries under review. Among the LDCs and SIDS in the Asia-Pacific region, six countries (Cambodia, Myanmar, Nepal, Lao PDR, Guam and Papua New Guinea) had research and development (R&D) expenditure of less than 1% of GDP. This is much lower than the global average of 2.63%. The number of researchers in R&D per million people in both LDCs and SIDS is negligible when compared to the global average.

Access to energy: Most of the LDCs and SIDS in the Asia-Pacific region have energy access that is greater than the world average of 91.4%. While 11 countries (Bhutan, Lao PDR, Timor-Leste, Maldives, Nauru, Palau, Tonga, French Polynesia, Guam, New Caledonia and Northern Mariana Islands) have 100%, in five countries (Afghanistan, Samoa, Bangladesh, Tuvalu, and Marshall Islands) it is more than 97%. The countries where populations have low access to energy are Papua New Guinea (22.4%), Vanuatu (70%), Myanmar (72.5%), Solomon Islands (76.3%), Cambodia (82.5%), Micronesia (83.6%) and Nepal (89.9%).

Internet and cellular phone penetration: Most of the LDCs and SIDS in the Asia-Pacific region have mobile cellular subscription rates per 100 people that are lower than the world average of 107. Five countries, namely Bangladesh (109), Cambodia (120), Nepal (127), Palau (133) and Maldives (135) reported a subscription of more than the world average, and four countries (Bhutan, Timor-Leste, French Polynesia and Fiji) have a subscription rate of 100 per 100 people. The lowest rates are in American Samoa (4%), Micronesia (19%) and Northern Mariana Islands (28%). In 11 countries (Vanuatu, Tuvalu, Tonga, French Polynesia, Samoa, Guam, New Caledonia, Nauru, Bhutan, Maldives and Fiji), more than 65% of the population has internet access, compared to the world average of 63%. The population in the rest of the countries have lower access to the internet, the rate being 0 in American Samoa and Northern Mariana Islands. It was 18% in Afghanistan and 27% in Palau.

2.5 Political factors

Governance structures, political stability and administrative capacities play a vital role in a community's ability to manage climate-related risks. Weak governance can hinder effective disaster response and long-term climate adaptation strategies. Issues like corruption, ineffective law enforcement and limited political representation for marginalised communities can compound vulnerabilities. Recognising these political factors enables the crafting of policy frameworks that are not only effective but also equitable and just.

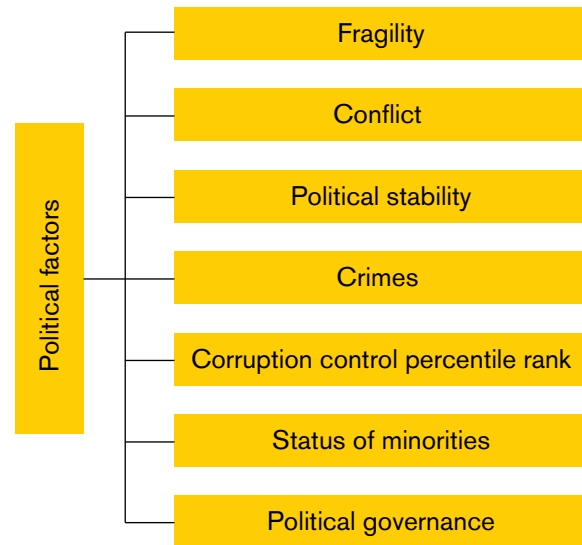
Figure 7 provides the taxonomical domains of analysis considered under the political factors.

Box 9 summarises the prevailing trends and key facts that have emerged from the analysis of the political factors.

Our analysis of political factors shows that with a substantial number of LDCs in the Asia-Pacific region reporting fragility, it becomes a critical factor influencing climate action. Climate change and fragility are closely linked. When there is pre-existing fragility, it hinders a state's capacity to respond to climate change,

establishing a detrimental cycle referred to as a 'fragility trap' (Jaramillo et al., 2023). Conflicts compound the problems caused by climate change, hampering

Figure 7. Variables considered for analysis of political factors



BOX 9. TRENDS BASED ON ANALYSIS OF POLITICAL FACTORS

Prevailing trends

- Fragility, conflicts, and corruption ↑ ; and displacements ↑

Key vulnerabilities and strengths

Fragility: Among the 13 LDCs, seven (Bangladesh, Cambodia, Lao PDR, Myanmar, Solomon Islands, Timor-Leste and Papua New Guinea) are reported to be in a fragile state; Afghanistan is categorised as 'extremely fragile'.

Conflicts resulted in significant displacements; Myanmar accounted for the highest displacements among the LDCs, while Afghanistan, Bangladesh, Lao PDR and Nepal also witnessed such displacements.

Political stability: Most LDCs recorded a low score for political stability (as per the World Governance Indicator, score range: -2.5 to 2.5); Afghanistan, Bangladesh and Myanmar recorded negative scores; many SIDS countries recorded a score of 1, excepting Papua New Guinea, which recorded a negative score, while Solomon Islands and Timor-Leste recorded 0.

Crimes: Most SIDS reported a low score in the Global Organized Crime Index 2021, while Myanmar and Afghanistan recorded higher scores than the global average.

Corruption: SIDS exhibit good corruption control, except for Nauru, Palau, Tonga and Vanuatu. In the LDCs, corruption control varies widely; Bhutan exhibited the highest corruption control.

Transparency and accountability: SIDS perform better in the CPIA transparency, accountability and corruption in the public sector score, while the LDCs have low scores as compared to the world average.

Status of minorities: The CPIA policies for social inclusion index score varies across LDCs; Afghanistan and Myanmar have low scores, while Bhutan had the highest score.

Political governance: Variations exist across countries; Afghanistan, Cambodia and Myanmar record low scores in the voice and accountability indicator.

Governance effectiveness: Differences persist; Afghanistan, Myanmar and Marshall Islands have low scores in single digits; while Bhutan, American Samoa, Guam and Fiji record high scores of 70 and above.

climate change adaptation and recovery efforts, and heightening the vulnerability of poor communities. These communities are often displaced, and, as refugees, struggle throughout their lives. Women, children and vulnerable people are severely impacted. Several LDCs and SIDS are affected by conflicts. In the LDCs in the Asia-Pacific region, more than a million people are displaced due to conflicts, which exacerbates their vulnerabilities to climate change.

Corruption is a social and economic scourge, disproportionately affecting poor and vulnerable people. It worsens the plight of those already struggling in the aftermath of disasters. LDCs suffer from high corruption levels, particularly in countries such as Afghanistan, Bangladesh, Cambodia, Lao PDR and Myanmar (UNDP, 2012).

Good governance and democratic institutions provide stability and contribute to economic and social development, thereby supporting people's wellbeing. Good governance provides a platform for multi-stakeholder coordination crucial for climate action. While numerous LDCs grapple with inefficient governance, SIDS benefit from more effective governance structures (Kang, 2017).

2.5.1 Key trends

Weak governance emerges as a significant factor affecting people's ability to cope and recover from climate impacts. Climatic impacts are poised to disproportionately affect the most marginalised communities. Because of existing inequalities and insufficient social safety nets, the Asia-Pacific region's most vulnerable populations are likely to experience the worst impacts, potentially leading to severe humanitarian and security crises. Adverse impacts can be mitigated through effective governance at the global, regional and national level (UNDP, 2012).

Fragility: According to the 'States of Fragility 2022' report published by the Organisation for Economic Co-operation and Development (OECD), among the 12 countries in the Asia-Pacific region that are classified as LDCs, seven (Bangladesh, Cambodia, Lao PDR, Myanmar, Solomon Islands, Timor-Leste and Papua New Guinea) are categorised as being in a fragile state, while Afghanistan is classified as being in an extremely fragile state. Bhutan, Nepal, Kiribati, Tuvalu and Vanuatu are deemed to be non-fragile.

Conflicts: Millions of people around the globe find themselves uprooted from their homes due to conflict and persecution. In the Asia-Pacific region, Afghanistan, Bangladesh, Lao PDR, Myanmar, Nepal, Papua New Guinea, Solomon Islands, Timor-Leste and New Caledonia reported having displacement due to conflict. Conflicts tend to weaken an economy by diverting away resources from climate action.

Political stability: Political stability, absence of violence/terrorism estimates by the Worldwide Governance Indicator of the World Bank reports that three LDCs, Afghanistan, Bangladesh and Myanmar, recorded a negative score, indicating low stability (aggregate score -2.5 to 2.5). The remaining LDCs record a score of 0 or 1, again indicating poor stability. Among the SIDS, only Papua New Guinea recorded a negative score, Solomon Islands and Timor-Leste recorded 0, while all others recorded a score of 1.

Crime: The Global Organized Crime Index 2021 compiled by the Global Initiative Against Transnational Organized Crime, highlights that among the LDCs, Myanmar (7.59) and Afghanistan (7.08) record the maximum score for 'criminality', against the global score of 4.87. However, most of the SIDS countries, including Tuvalu, Nauru, Samoa, Vanuatu, Marshall Islands and Kiribati, record low scores, indicating low crime rates.

Corruption control percentile rank: This rank measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests. The percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. The 'Corruption Control Percentile Rank' scores for LDCs ranged from 12 for Cambodia, the lowest, to 90 for Bhutan, the highest. Countries including Afghanistan, Bangladesh, Cambodia, Lao PDR and Myanmar record scores of less than 20. SIDS scores are in the range of 25 for Papua New Guinea and 89 for American Samoa and Guam. Most of the SIDS countries score 70 and above. Countries including Nauru, Palau, Tonga and Vanuatu have lower scores of 40 or less.

The CPIA transparency, accountability and corruption in the public sector rating (1=low, 6=high) has a world average of 2.9. For the Pacific Island Small States, the score is 3.6. Six countries (Afghanistan, Myanmar, Cambodia, Bangladesh, Lao PDR and Papua New Guinea) have a score lower than the world average. The highest scores are for Bhutan (4.5) followed by Samoa and Tuvalu at 4.0 each. Afghanistan has the lowest scores.

Status of minorities: The CPIA policies for social inclusion/equity cluster coverage index for LDCs in the Asia-Pacific region ranges from 1.7 for Afghanistan to 4 for Bhutan. For SIDS, Papua New Guinea recorded the lowest score of 2.6, while Samoa recorded the highest at 3.9. The global average is 3.

Political governance: The voice and accountability indicator of the World Bank for LDCs ranges from 4 for Lao PDR to 87 for Kiribati. The SIDS record high scores ranging from 40 for Fiji to 89 for Tuvalu. Across the LDCs and SIDS, apart from Lao PDR, Afghanistan also

scored low. Kiribati, Marshall Islands, Micronesia and Tuvalu record a high score of more than 80.

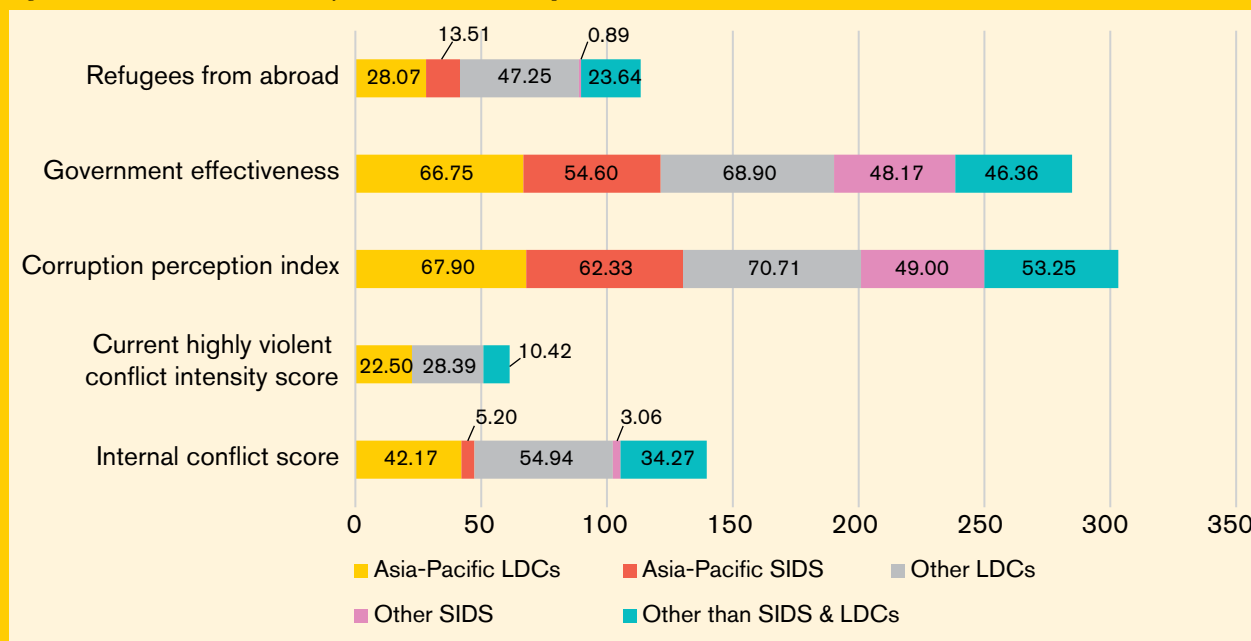
For government effectiveness, the LDCs record a score of 5.77 for Afghanistan, the lowest, while Bhutan

recorded the highest score of 75.48. In SIDS, the scores ranged from a low of 7.21 for Marshall Islands to a high of 73.56 for American Samoa and Guam.

BOX 10. MULTIDIMENSIONAL VULNERABILITY AND RISK INDEXES BASED ON POLITICAL VARIABLES

In Figure 8, we show the vulnerability of the LDCs and SIDS in the Asia-Pacific regions in comparison to those in other regions and other developing and developed countries.

Figure 8. Multidimensional vulnerability and risk indexes based on political variables



Source: Authors' calculation based on data from Hazard and exposure index: INFORM Report 2021 <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/2021/INFORM%20Annual%20Report%202021.pdf> and Assa, J and Meddeb, R (2021) Towards a Multidimensional Vulnerability Index. DOI: 10.13140/RG.2.2.17634.45763

The analysis of vulnerability and risk index highlights several political challenges faced by LDCs and SIDS, particularly those in the Asia-Pacific region.

Starting with the **internal conflict score**, LDCs in the Asia-Pacific region have a significantly high score of 42.17. This suggests that internal conflicts are a much more pressing issue for LDCs, potentially destabilising these nations further. On the **current highly violent conflict intensity score**, Asia-Pacific region LDCs again show greater vulnerability with a score of 22.5.

When it comes to the **corruption perception index**, both LDCs and SIDS in the Asia-Pacific region score quite high, with values of 67.9 and 62.33, respectively. This indicates that corruption is a pervasive issue affecting both types of nations, although slightly more for the LDCs.

The **government effectiveness** metric shows LDCs in the Asia-Pacific region scoring 66.75, higher than the score of 54.6 for SIDS. This is an interesting contrast to the conflict scores and suggests that despite internal and violent conflicts, LDC governments are perceived as relatively more effective.

Finally, the **refugees from abroad** metric highlights another area where LDCs face greater challenges, with a score of 28.07 compared to 13.51 for SIDS. This indicates that LDCs in the Asia-Pacific region are more likely to bear the brunt of refugee influxes, which can strain already limited resources.

In summary, political vulnerabilities and challenges are markedly higher for LDCs and SIDS. The data underscores the complex political landscape in these countries, characterised by internal conflicts, corruption and the challenges posed by refugees. These issues necessitate multi-pronged and context-specific political strategies to address the unique challenges faced by LDCs in this region.

3

Understanding the precipitating factors causing loss and damage

3.1 Why it is important to understand the precipitating factors

The analysis of precipitating factors is crucial in understanding the triggers that result in loss and damage due to climate change, particularly when placed in the context of predisposing factors among different vulnerable groups. These precipitating factors could range from sudden extreme weather events like cyclones and floods to slow-onset processes such as sea-level rise, ocean acidification and desertification.

In this research, we have categorised and analysed these precipitating factors, considering various types of climate impacts such as economic and non-economic loss and damage. Economic impacts typically include loss of property, assets and livelihoods, while non-economic impacts can span loss of life, loss of cultural heritage and identity, to psychological stress and other health-related issues. We cross-referenced these precipitating factors with different vulnerable groups — such as women, children, disabled people and others — to delve deeper into how varying impacts manifest uniquely across these demographics. The different levels of analysis are as follows:

Climate change trends: Slow- and rapid-onset changes in the climate, such as temperature shifts, precipitation variability and new weather patterns, are

more than just statistics; they directly translate into real-world impacts like sea-level rise, intensified droughts and erratic monsoons. Recognising the trends, like increased frequency of cyclones, increased glacial melt or glacial lake outbursts, helps us anticipate what is coming next, especially in areas already struggling with developmental deficits.

Impacts on various spheres:

Economic: From economic growth to debt structure, the impacts of climate change are felt across all sectors. For instance, sudden extreme weather events can devastate primary sectors like agriculture, amplifying debt and poverty.

Non-economic: This encompasses social issues like increased hunger, water scarcity and violence against vulnerable groups. It also includes political tensions that arise from resource scarcity.

Figure 9 presents the layered approach to unpacking the taxonomical domain of precipitating factors that have been used in the assessment.

Understanding these precipitating factors becomes even more critical for LDCs and SIDS because they already grapple with significant developmental deficits. These deficits, often characterised by poverty, lack of access to resources and poor governance, among other issues, exacerbate their susceptibility to climate-induced loss and damage. Therefore, the significance

Figure 9. Taxonomical domains of analysis for precipitating factors

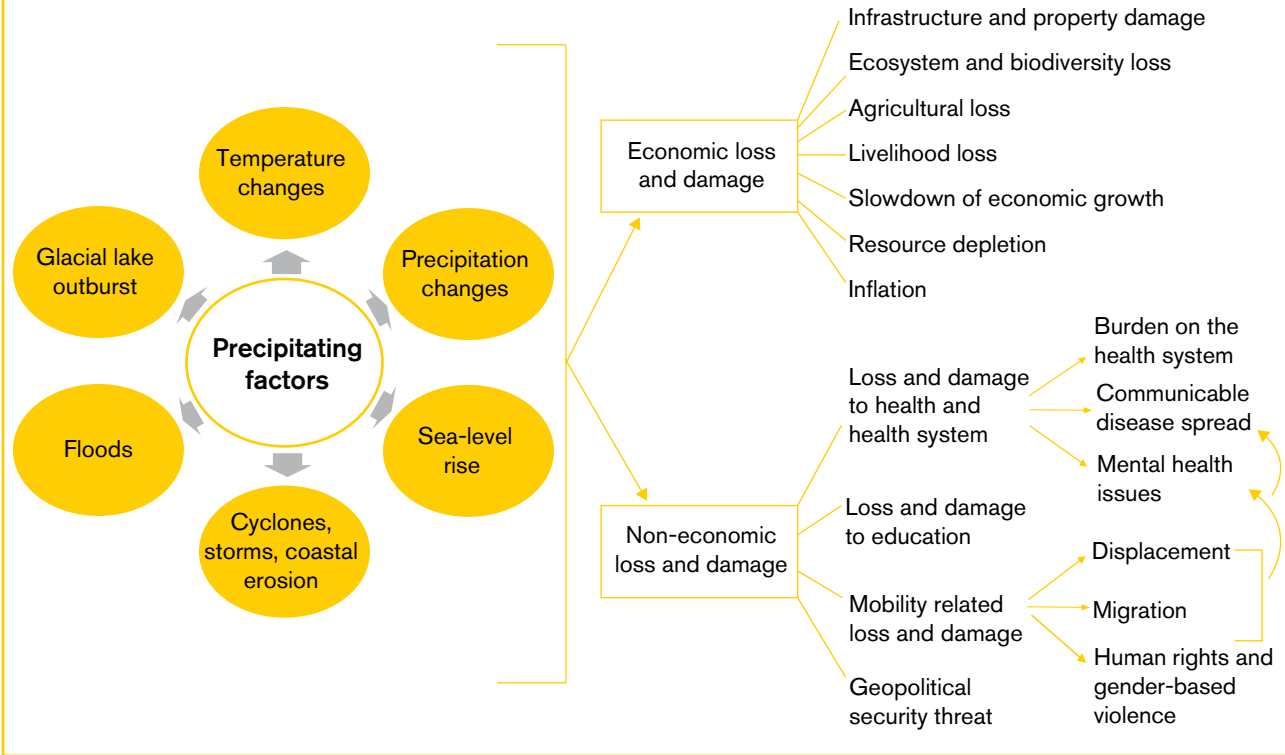
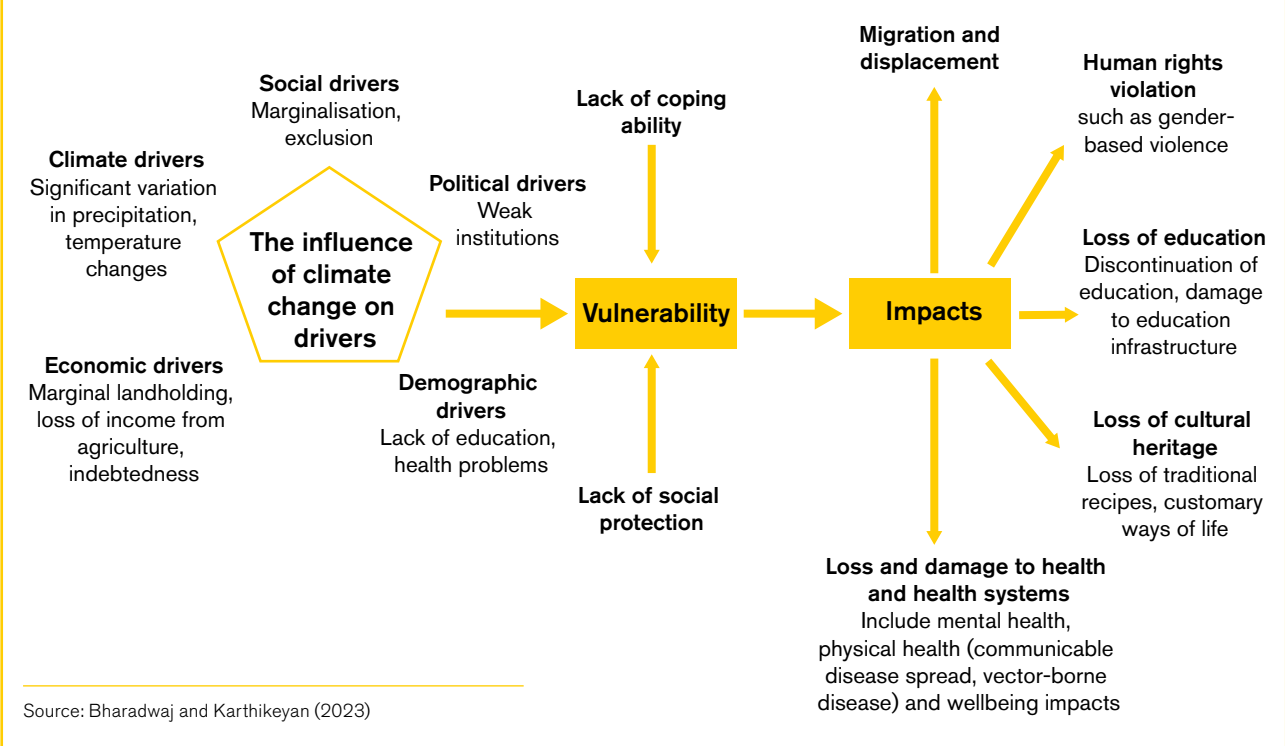


Figure 10. Interaction between predisposing and precipitating factors



Source: Bharadwaj and Karthikeyan (2023)

of precipitating factors takes on added weight, serving almost as a ‘multiplier effect’ that compounds existing vulnerabilities (predisposing factors). Figure 10 shows how predisposing drivers interact with climate drivers to create vulnerability and impacts.

This approach is essential in formulating targeted interventions and influencing policy changes that acknowledge and address the complex and intersecting challenges faced by vulnerable communities, especially in LDCs and SIDS.

3.2 Climate change loss and damage trends

3.2.1 Temperature changes

BOX 11. TRENDS BASED ON ANALYSIS OF TEMPERATURE CHANGES

Prevailing trends

- Summer air temperatures and annual count of hot days and warm nights ↑, heatwaves ↑

Key vulnerabilities and strengths

Frequency and intensity of very high temperatures becoming more severe, the probability of lethal heatwaves has become more frequent in different parts of Asia; marine heatwave events, especially affecting island countries and coastal regions have had prolonged duration in recent years.

The average temperature across the globe has increased over the past four decades, with each decade being warmer than the previous one. The World Meteorological Organization (WMO) has confirmed 2023 was the warmest year ever recorded by a wide margin (WMO, 2024). The IPCC attributes these increasing temperatures to increased emission of greenhouse gases resulting from anthropogenic activities (IPCC, 2014). As per the Sixth Assessment Report of the IPCC, current levels of atmospheric CO₂ have not been experienced for at least two million years. Also, global surface temperatures have increased faster since 1970 than in any other 50-year period during at least the last 2,000 years (IPCC, 2021a). The trend of notable rises in summer air temperatures and annual counts of hot days and warm nights has been consistent throughout the Asia-Pacific region (Supari et al., 2016). In addition, during the past 60 years temperatures in this region have increased faster than the global mean (UN ESCAP, 2023c).

With the frequency and intensity of very high temperatures becoming more severe, the likelihood of extreme events (including heatwaves) has become severe across most regions (IPCC, 2021b). Climate change exacerbates the intensity of most extreme heat events globally. Studies attributing the cause have determined that the occurrence of the most severe heatwaves has significantly increased, and in some cases, they may only be feasible because of climate change (Clarke et al., 2022). Based on an analysis of 40 years of data of ERA5⁵ (Noh et al., 2021) found evidence that the Pacific-Japan

Pattern⁶ is related to the summer climate over parts of Asia, especially Korea and Japan. Positive Pacific Japan Patterns have increased the likelihood of heatwaves over these regions (Noh et al., 2021). Several other studies have found a higher probability of lethal heatwaves becoming more frequent in different parts of Asia (Dong et al., 2021; Im, Pal and Eltahir, 2017; Saeed et al., 2017; Supari et al., 2016). In South Asia, temperatures frequently exceed 28°C, and many more lethal heatwaves are probably occurring than are registered in global datasets like the EM-DAT (Clarke et al., 2022).

In India, the number of occurrences of extreme summers have been more in the current century and these hotter summers tend to occur during the El Niño years as per the record of observations between 1951–2018 (Mishra et al., 2020). India and Pakistan both suffered long and severe heatwaves in 2019 and in 2022 (Marcotullio, Keßler and Fekete, 2022). Severe heatwaves occurred during the summer of 2018 in Japan (Wang et al., 2019), with maximal and minimal temperatures throughout Japan reaching unusual highs for eleven consecutive days in July (Hayashida, Shimizu and Yokota, 2019).

Atmospheric temperature extremes have also increased in frequency and intensity in the island nations of the Asia-Pacific region. Pacific island countries are also vulnerable due to marine heatwaves, which are extreme and prolonged oceanic warm water events. For example, between 1982 and 2019, Fiji experienced a total of 82 marine heatwave events. These marine heatwave events typically lasted around 5–40 days, but notably, in the years 2010 and 2011, there were three marine heatwave events that extended beyond 40 days (Holbrook et al., 2022).

To establish a scientific connection between anthropogenic climate change and resultant loss and damage, it is essential to explore two key aspects: (a) the correlation between greenhouse gas emissions and meteorological shifts, and (b) the link between meteorological changes and societal repercussions. Otto et al. (2014) delved into these realms using Probabilistic Event Attribution (PEA), a research methodology assessing the extent to which past anthropogenic emissions can be linked to extreme weather events. Many countries are developing databases to record losses from weather-related incidents. PEA offers a valuable tool to enhance this information by identifying specific losses attributable to anthropogenic climate change. While PEA is a relatively recent scientific discipline, it is growing rapidly. The ongoing efforts to establish a taxonomy of loss and damage will contribute to fortifying research on the association between climate change and its adverse consequences.

⁵ ERA5 is an atmospheric reanalysis of the global climate that provides hourly estimates of many atmospheric, land and oceanic climate variables covering the period from January 1940 to present and produced at the European Centre for Medium-Range Weather Forecasts.

⁶ The Pacific Japan Pattern is a dominant teleconnection pattern and is considered a source of heatwaves in East Asia. The formation of this pattern is related to anomalous convective activity over the western Pacific warm pool.

3.2.2 Changes in precipitation

BOX 12. TRENDS AND FACTS BASED ON ANALYSIS OF CHANGES IN PRECIPITATION

Prevailing trends

- Annual mean precipitation is projected to ↑ by 50% under the business-as-usual (BAU) scenario
- Occurrence of intense rainfall ↑

Key vulnerabilities and strengths

Heavy precipitation is attributed to warmer temperatures; annual mean precipitation is on the rise. However, there are many regions, such as Pakistan and Afghanistan, where projected changes are uncertain.

Precipitation patterns in the Asia-Pacific region are influenced by extremely intricate meteorological factors. Extreme precipitation is a climate stressor affecting 60% of the population in the region. Among the meteorological factors, the monsoon plays a crucial role, impacting both spatial and temporal variations in precipitation over Asia. Weather patterns, temperature anomalies, atmospheric circular patterns and precipitation regimes are also influenced by the El Niño-Southern Oscillation (ENSO). The impact of ENSO is further complicated by the Indian Ocean Dipole, the North Atlantic Oscillation and the Pacific Decadal Oscillation (Dong et al., 2023).

In most parts of the Asia-Pacific region, annual mean precipitation is projected to increase by 50% under the business-as-usual (BAU)⁷ scenario in the later part of the twenty-first century. Recent decades have witnessed a notable rise in intense rainfall events globally, with the most substantial increases observed in Southeast Asian nations (Asian Development Bank, 2017).

In Asia, the heavy precipitation is attributed to increased atmospheric circulation and warmer temperatures that increase the amount of water vapour in the atmosphere (Lee, Wenig and Chan, 2023). With every 1°C rise in temperature, the water vapour in the atmosphere increases by 7% (Shimpo et al., 2019).

Although the annual mean precipitation is on the rise, there are many regions where the projected change is uncertain. In parts of Pakistan and Afghanistan, annual mean precipitation is projected to decline (Asian Development Bank, 2017).

These variabilities in climate have resulted in increased numbers of natural disasters in the Asia-Pacific region. Between 1970 and 2019, Asian countries have

recorded more than 3,000 disasters, with 975,622 lives lost, and reported economic damages of US\$1.2 trillion. The greatest economic losses (57%) were due to floods in Asia (World Meteorological Association, 2021). Other studies (EM-DAT, The International Disaster Database; World Meteorological Organization, 2021) show that almost 40% of disasters (between 2000 and 2021) worldwide have occurred in Asia and the Pacific.

3.2.3 Sea-level rise

BOX 13. TRENDS AND FACTS BASED ON ANALYSIS OF SEA LEVEL RISE

Prevailing trends

Sea-level rise ↑, subsidence of land along the coasts ↑

Key vulnerabilities and strengths

Among the LDCs in Asia, the coastal lowlands of Bangladesh are highly impacted by sea-level rise, with 50% of its land area being low elevated coastal zones; Small island nations such as Marshall Islands, Kiribati, Maldives and Tuvalu have been reshaped owing to sea-level rise and flooding of low-lying areas; sea-level rise is the most significant impact of climate change in small island nations across the Asia-Pacific region, contributing to coastal erosion, flooding and salinity intrusion, and in many cases, leading to diminishing land for inhabitants.

Seventeen of the 25 cities that are most exposed to a one-metre sea-level rise worldwide are in Asia and the Pacific. Sea-level rise contributes to the impacts of coastal hazards, endangers fragile water supplies, and compounds with other hazards to pose long-term challenges for inhabitants of island nations (Martyr-Koller et al., 2021). In the Pacific Island region, land along the coasts is subsiding, and therefore, the effect of sea-level rise will be magnified in these areas in the future.

Among the LDCs in Asia, the coastal lowlands of Bangladesh are largely impacted by climate change induced sea-level rise (Hens et al., 2018) with 50% of its land areas falling under low elevated coastal zones⁸ (UNDP, 2023b). Small island nations such as the Marshall Islands and Tuvalu that have 90.9% and 76% of their land, respectively, in the low elevated coastal zone (UNDP, 2023b) have been reshaped owing to sea-level rise and flooding of low-lying areas. Other SIDS in the Asia-Pacific region with a high percentage of land in low elevated coastal zones include Maldives (97%) and Kiribati (97.4%). Sea-level rise is the most significant impact of climate change in small island nations across the Asia-Pacific region, contributing to coastal erosion, flooding and

⁷ Business-as-usual (BAU) scenario in climate change assumes that few or no steps are taken to limit greenhouse gas emissions.

⁸ Share of areas contiguous to the coast below five meters to total land areas of countries (UNDP, 2023b)

salinity intrusion and, in many cases, leading to diminishing land for inhabitants (Farbotko and Lazrus, 2012; Connell, 2016; Cauchi, Correa-Velez and Bambrick, 2019).

“Since sea level rise is a slow onset event, in the current systems it is not stated as a disaster, meaning there is no support for communities facing sea-level rise as in the case of rapid-onset disasters. The governments of vulnerable nations cannot simply force communities to leave without any support. Therefore, communities that experience sea-level rise stay until a real tragedy happens. There are no robust solutions in the current systems to address challenges of communities facing slow onset climate events.”

Workshop participant, Jakarta, Indonesia

3.2.4 Cyclones, storms, and coastal erosion

BOX 14. TRENDS AND FACTS BASED ON ANALYSIS OF CYCLONES AND COASTAL EROSION

Prevailing trends

- Tropical cyclones intensity ↑, severe storms ↑, coastal flooding and erosion ↑

Key vulnerabilities and strengths

The Asia-Pacific region is prone to large waves, including storm surges and tsunamis. Tropical cyclones are projected to be 17% more intense compared to current times by the end of the 21st century. Mortality and economic loss from tropical cyclones have been concentrated in Asia. SIDS in the Pacific region are also hugely affected by climate-induced cyclonic events as well as severe storms. Between 2005 and 2014, over 200,000 lives were lost, and almost one billion people were affected by storms and floods alone in the Asia-Pacific region, contributing to coastal erosion, flooding and salinity intrusion, and in many cases leading to diminishing land for inhabitants. Increased CO₂ levels in the ocean are also a major cause of ocean acidification. The impact of ocean acidification is critical to this region because of the high reliance on ocean-based protein sources for food security.

The Asia-Pacific region is prone to large waves, including storm surges and tsunamis, which have the potential to alter both the position and nature of the

shoreline in most areas (Nunn, 2014). Tropical cyclones are projected to be 17% more intense than today by the end of the twenty-first century (Albenis et al., 2023).

Cyclones accompanied by high winds, heavy rainfall and storm surges have caused extensive losses (economic and non-economic) in the Asia-Pacific region. Some of the very destructive tropical cyclones in the recent past have occurred in Asia. There has been a notable increase in the inland impacts (heavy rainfall, storm surges, heavy winds) of tropical cyclones between 1979 and 2016 in Asia (Chen et al., 2021; Utsumi and Kim, 2022).

Mortality and economic loss from tropical cyclones have been concentrated in Asia (Doocy et al., 2013). SIDS in the Pacific region are also hugely affected by climate-induced cyclonic events as well as severe storms and coastal flooding (Clissold et al., 2021). Between 2005 and 2014, over 200,000 lives were lost, and almost one billion people were affected by storms and floods alone in the Asia-Pacific region (UNESCAP, 2017).

Higher oceanic levels of dissolved carbon dioxide is one of the main causes of ocean acidification. Acidification, coupled with additional environmental pressures linked to climate change, especially in the context of anticipated future climate scenarios and heightened atmospheric CO₂ levels, poses a potential threat to numerous crucial ecosystem services that the ocean offers, including fisheries, aquaculture and shoreline protection (Doney et al., 2020). The physiological wellbeing of marine species that are consumed can be directly impacted by the chemical changes associated with ocean acidification. This is particularly crucial for Asian coastal countries and many small island states wherein the share of protein from fish can be more than 50%, indicating high reliance on the ocean for food security (Falkenberg et al., 2020).

3.2.5 Floods

BOX 15. TRENDS AND FACTS BASED ON ANALYSIS OF FLOODS

Prevailing trends

- Flood occurrence ↑

Key vulnerabilities and strengths

Flood occurrences have increased across the region and were primarily attributed to heavy rainfall patterns, including monsoon-induced heavy rainfall typical in Asia and rainfall associated with El Niño.

Floods are one of the visible impacts of climate change and account for 40% of natural disasters across the world (Ohi and Tapsell, 2000). There has been an upward trend of flood occurrence particularly in the

Asia-Pacific region (Kimuli et al., 2021). Most countries in Asia have extensive coastlines and dense populations along the coasts, making them very vulnerable to coastal flooding. Through modelling experiments on historic flood events (Alifu et al., 2022) it was found that ongoing climate change had a noticeable impact on the frequency of flood events. During the period 1951–2010, human-induced climate change was responsible for altering the occurrence of 20 flood events with a significant concentration of these occurrences observed along Asia's prominent rivers — the Yangtze, Indus, Brahmaputra, Tapi and Chao Phraya. These floods were primarily attributed to heavy rainfall, including monsoon-induced heavy rainfall typical in Asia and rainfall associated with El Niño. Examining the correlation between climate change and the surge in natural disasters in Asia and the Pacific, Thomas et al. (2013) concluded that a significant association exists between climate-related hazards, such as increased precipitation leading to floods, and the heightened frequency of intense natural disasters in Asia and the Pacific, including its subregions, spanning the period from 1971 to 2010.

3.2.6 Glacial lake outburst flood

BOX 16. TRENDS AND FACTS BASED ON ANALYSIS OF GLACIAL LAKE OUTBURST FLOOD

Prevailing trends

- Damage due to glacial lake outburst flood (GLOF) ↑

Key vulnerabilities and strengths

GLOFs are a major concern throughout High Mountain Asia. In the Hindu-Kush Himalayan region, countries like Nepal, Bhutan, India, China and Pakistan with dense populations near glacial lakes face increased flood risks due to glaciers melting since the 1950s. Densely populated areas downstream of glaciers of the Hindu-Kush Himalaya, such as Bangladesh and Myanmar, face widespread damage due to GLOF.

Glaciers melt as a response to warming temperatures, forming lakes at the terminus of the ice mass or within the main body of the glacier. Rapid accumulation of meltwater increases the volume of glacial lakes. Fragmentation of the source glacier, landslides and other processes can trigger displacement waves in the lake, resulting in a sudden release of water called a glacial lake outburst flood (GLOF) (Zhang et al., 2022).

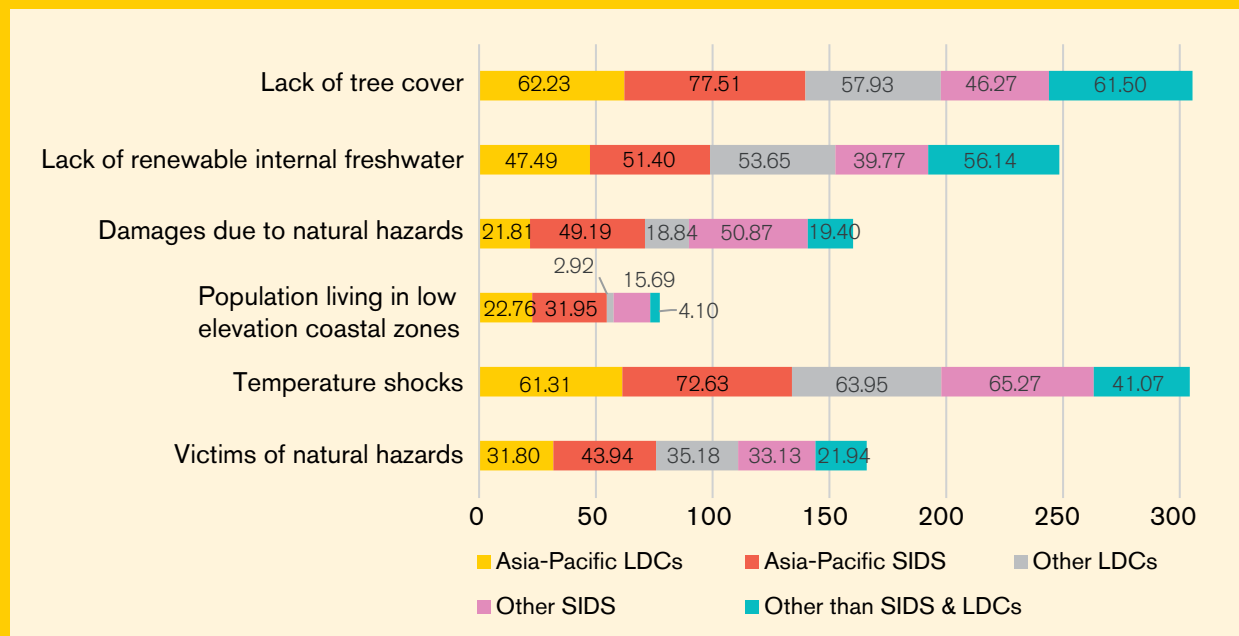
Globally the number and size of glacial lakes has rapidly grown by 50% since 1990 (Shugar et al., 2020). In the Hindu-Kush Himalayan region of Asia, most countries such as Nepal, Bhutan, India, China and Pakistan have glacial lakes and dense human populations living around and near these lakes. For example, Bhutan is home to more than 900 glaciers that are gradually melting and increasing the volume of water in its 2,794 glacier lakes (Shah et al., 2020). Since the 1950s, Bhutan has experienced a minimum of 18 GLOF incidents, with the most recent occurrence being the breach of subsidiary lake II of Thorthormi Tsho on 20 June 2019. At least seven of these events have resulted in varying degrees of damage to infrastructure and the loss of lives in downstream settlements in Bhutan (Rinzin et al., 2023). The consequences of a high-speed GLOF deluge reach well beyond its point of origin, frequently reaching catastrophic proportions that lead to substantial loss of life, extensive property damage, negative impact on livelihood and loss of water security, resulting in enduring socioeconomic and environmental challenges.

Furthermore, the downstream areas include dense and economically weak countries such as Bangladesh and Myanmar, which face widespread damage due to GLOF events. While ranking of glacial basins globally for risk from GLOF danger, (Taylor et al., 2023) found that Khyber Pakhtunkhwa basin in Pakistan is the region with the highest risk. In addition, glaciers in the Hindu-Kush Himalayan region, excluding those in the Karakoram (Bolch et al., 2017), are undergoing retreat, causing alterations in future water distribution, movement, and availability patterns (Scott et al., 2019).

BOX 17. MULTIDIMENSIONAL VULNERABILITY AND RISK INDEXES BASED ON ENVIRONMENTAL VARIABLES

In Figure 11, we illustrate the vulnerability of the LDCs and SIDS in the Asia-Pacific region compared to those in other regions and other developing and developed countries.

Figure 11. Multidimensional vulnerability and risk indexes based on environmental variables



Source: Authors' calculation based on data from Hazard and exposure index: INFORM Report 2021 <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/2021/INFORM%20Annual%20Report%202021.pdf> and Assa, J and Meddeb, R (2021) Towards a Multidimensional Vulnerability Index. DOI: 10.13140/RG.2.2.17634.45763

LDCs in the Asia-Pacific region have high vulnerability to **flood** with a score of 53.58. In terms of **physical exposure to tsunamis**, SIDS in the Asia-Pacific region face a higher risk with an alarming score of 82.1, far exceeding the 49.58 for LDCs.

On **physical exposure to tropical cyclone**, SIDS in the Asia-Pacific region score 29.9, LDCs score 23.17, suggesting a greater susceptibility to cyclones. Similarly, **temperature shocks** are a concern for SIDS in the Asia-Pacific region, with a score of 72.63 and LDCs with a score of 61.31.

People living in low elevation coastal zones is another area where SIDS in the Asia-Pacific region have a higher score (31.95) compared to LDCs (22.76), making them more susceptible to risks like sea-level rise.

Interestingly, **victims of natural hazards** and **damages due to natural hazards** are higher for SIDS in the Asia-Pacific region, with scores of 43.94 and 49.19, respectively, compared to 31.8 and 21.81 for LDCs. This underlines the heightened vulnerability of SIDS to natural disasters.

Finally, both LDCs and SIDS in the Asia-Pacific region show high scores in **lack of renewable internal fresh water** and **lack of tree cover**, indicating environmental degradation and potential water scarcity issues.

In summary, while both LDCs and SIDS in the Asia-Pacific region face a multitude of environmental and climatic challenges, the nature of these challenges varies. LDCs are more prone to flooding, while SIDS face higher risks from tsunamis, cyclones and temperature shocks. These nuanced vulnerabilities necessitate targeted environmental and DRR strategies tailored to each group's specific challenges.

3.3 Climate change loss and damage (economic)

BOX 18. TRENDS AND FACTS BASED ON ANALYSIS OF LOSS AND DAMAGE

Prevailing trends

- Economic costs of recovering from recurrent loss to property and infrastructure due to climate-induced extreme events ↑; multidimensional poverty and existing disparity ↑; loss to primary and naturally regenerated forests ↑; food prices ↑

Key vulnerabilities and strengths

Economy: The economic costs of recovering from recurrent loss to property and infrastructure due to climate-induced extreme events is challenging economies.

Trade: Extreme weather events cause disruption in supply chains and damage to transport infrastructure required for trade in goods; responding to extreme weather-related disasters can potentially lead to an increase in the debt of nations.

Loss of natural forests: Over the two decades spanning from 1990 to 2010, the Asia-Pacific region witnessed a loss of 38.7 million hectares of primary and naturally regenerated forests.

Agriculture and food security: In 2023, rice prices surged to their highest in almost 12 years. The sharpest increases in price came from Thailand (FAO, 2023).

Livelihood loss: Poor and marginalised communities often rely on nature for their livelihood and are at higher risk from the negative impacts of climate change on nature and biodiversity.

3.3.1 Loss and damage to economy

The main impact of climate change on the global economy has stemmed from property and infrastructure damage, reduced productivity, widespread migration, heightened security risks, and the costs of measures to reduce greenhouse gas emissions (Gillingham, 2019). Wade and Jennings (2016) said that increases in operational costs due to a rise in global temperatures will affect global economic growth with a possible impact of a 1% reduction in GDP growth per year. The economic costs of recovering from recurrent loss to property and infrastructure due to climate-induced

extreme events has posed a huge challenge for the world economy. Another climate change threat to long-term economic growth is aggressive and inefficient mitigation policies (Mendelsohn, 2009).

Climate change is poised to exert a substantial economic impact on numerous nations, with a notable concentration of lower-income countries facing an elevated degree of impacts. The Asia-Pacific region is facing significant climate-related risks from the expected increase in frequency and intensity of cyclones, floods, fires and other climate-related extreme events (Asian Development Bank, 2017; Cauchi, Correa-Velez and Bambrick, 2019; Filho et al., 2022; Clissod et al., 2021; Connell, 2016; Dong et al., 2021; Saeed et al., 2017). People living in LDCs and SIDS are vulnerable to multidimensional poverty. As of 2023, countries such as Kiribati, Cambodia, Timor-Leste, Myanmar, Lao PDR and Papua New Guinea each have more than 20% of their population in multidimensional poverty⁹ (UNDP, 2023c) and the economic consequences of climate change-induced extreme events have the potential to exacerbate existing disparities and hinder development trajectories (Bharadwaj, Mitchell and Karthikeyan, 2023; Guivarch, Taconet and Méjean, 2021). Of the LDCs in the Asia-Pacific region, Myanmar, Cambodia and Bangladesh have each experienced losses of 88.9%, 56.7% and 44.5%, respectively, of their GDP (UN, 2023). The IPCC's Sixth Assessment Report (IPCC, 2022) suggested that in a case of high warming (>4°C) and limited adaptation, the decline in annual global GDP by the year 2100 could be larger than the economic losses seen during significant events like the recession of 2008–2009 and the COVID-19 pandemic in 2020.

Tourism is a vital economic pillar for SIDS, providing crucial income for local livelihoods. However, the profound socioeconomic repercussions of the COVID-19 pandemic have had spill-over impacts on the tourism sector, posing a severe threat to national development and wellbeing. In a comprehensive study by Wolf et al. (2021) the vulnerability of the tourism sector in Pacific SIDS is examined against a

“Assessment of the impacts of slow-onset climate loss and damage is a challenge. There is a need for capacity building and policy advocacy, especially at the government level of developing countries to empower them to formulate and execute robust policies that embed climate loss and damage considerations across various segments of their populations.”

Workshop participant, Jakarta, Indonesia.

⁹ Multidimensional poverty encompasses a range of deprivation experienced by people in poverty on a daily basis, such as poor health, lack of education, inadequate living standards, disempowerment, poor quality of work, the threat of violence, and living in areas that are environmentally hazardous, among others.

backdrop of significant economic, ecological and social vulnerabilities exacerbated by societal challenges, with particular emphasis on climate change and the pandemic. The research underscores that climate-induced impacts and resulting shifts in tourism demand may precipitate a contraction in the tourism sector, with far-reaching implications for sustainable national development and wellbeing. Case studies of Tonga and the Solomon Islands provide tangible evidence of the diminishing tourist appeal of these destinations, further emphasising the urgent need for resilience and diversification strategies in the face of evolving global challenges (Wolf et al., 2021). Similarly, in Maldives for example, the economy is highly dependent on tourism (Maldives High Commission, UK, n.d.), and both slow-onset changes like sea-level rise and extreme events like flooding pose a severe threat to the economy.

People on low incomes have limited fallback resources and reduced climate adaptive capacity (Hallegatte, Fay and Barbier, 2018) and the Asia-Pacific region has an estimated 400 million people living in extreme poverty below the threshold of US\$0.90 a day (UN ESCAP, 5 July 2019). The Asia-Pacific region includes 13 of the 30 most vulnerable countries to climate change, and more than 7.5 million additional people may fall into poverty without any climate action (UN ESCAP, 15 May 2023). Moreover, climate uncertainties rarely exist in isolation; instead, they intertwine with socioeconomic drivers of change, yielding new uncertainties and vulnerabilities, particularly affecting the poor (Mehta et al., 2019).

Acting to reduce the risk of climate-induced disasters represents a significant financial burden for low-income communities, constraining their pathways out of poverty. In 2015, rural households in Bangladesh collectively allocated nearly US\$2 billion on climate and disaster management efforts. The financial strain of mitigating climate-related risks was three times higher for households headed by women (Eskander and Steele, 2019).

3.3.2 Climate change impacts on trade

Trade exacerbates climate change, given that there is a release of greenhouse gases at every step of the cross-border trading process. Conversely, climate change also influences global trade, particularly through climate-related disasters that raise trade expenses, damage logistical networks, and interrupt worldwide value chains. Rapid-onset events as well as slow-onset impacts of climate change pose serious risk to exports and international trade. Extreme weather can cause disruption in supply chains and damage of transport infrastructure required for trade in goods. Slow-onset changes such as sea-level rise pose a threat to ports. In September 2021, operations at the world's busiest port, Shanghai, had to be suspended for nearly two days

owing to Typhoon Chanthu. Similarly, the tourism sector is the mainstay for many small island nations in the Asia-Pacific region that is hard hit by climate disasters.

Infrastructure that serves as the foundational support of the economy worldwide involves large investments. Climate change poses a huge risk to infrastructure. In Asia alone, losses to physical assets and infrastructure in the year 2020 came to US\$67 billion, with a single disaster, Cyclone Amphan, which hit India and Bangladesh, causing damage estimated at US\$14 billion (Newburger, 2021). Efforts to respond to extreme weather-related disasters could potentially lead to an increase in the debt of nations, especially LDCs and SIDS (Bharadwaj, Mitchell and Karthikeyan, 2023).

3.3.3 Loss of natural forests

Over the two decades from 1990 to 2010, the Asia-Pacific region witnessed the loss of 38.7 million hectares of primary and naturally regenerated forests, a loss which has left an indelible mark on the region's ecosystems and biodiversity (FAO, 2010). Between 2001 and 2019, Southeast Asia alone forfeited a vast expanse of 0.61 million hectares, a territory greater than the entire landmass of Thailand (Feng et al., 2021). The Asia-Pacific region faces impacts on species distribution, population sizes, and reproductive or migratory timing due to climate change and related extreme events. Heightened occurrences of pest and disease outbreaks stemming from these changes could further detrimentally affect agricultural production and human wellbeing in the region (Mader and Uchiyama, 2020)

The pressure on nature and biodiversity is exacerbated by climate change, which has been identified as the reason behind 11–16% of the ecological losses suffered across the Asia-Pacific region (Temasek, World Economic Forum and AlphaBeta, 2021).

3.3.4 Changing climate and its impact on agriculture and food security

The growing economies in the Asia-Pacific region will be further affected as climate change has a direct and significant impact on agricultural crops, livestock and fisheries. Changes in temperature and precipitation patterns affect crop yields and shift growing seasons and pose multiple other risks such as pest and disease outbreaks, change in soil fertility and water scarcity. Climate-related impacts have resulted in loss of livelihood for farmers (Paudel et al., 2021), higher production costs leading to inflation in the agriculture sector, and food security concerns, especially for poor and vulnerable people (Douglas, 2009). In 2023, rice prices surged to their highest in almost 12 years. The sharpest increases in price came from Thailand (FAO, 2023). Climate change disasters have adverse impacts on supply chains (Kara, Ghadge and Bititci, 2021)

exacerbating the challenges of trade in agricultural and other food products (Reddy, Singh and Anbumozhi, 2016; Fleming et al., 2014). During Cyclone Ami in 2003, Fiji lost over US\$35 million in crops (McKenzie, Prasad and Kaloumaira, 2005).

More than 300 million people in the Asia-Pacific region are estimated to be living in hunger (ADB, 2023). Climate change-attributable loss and damage is felt most by the poor because they have low adaptive capacity (such as access to assets, support and information). Poor and marginalised communities often rely on nature for their livelihoods and are therefore at higher risk from the negative impacts of climate change on nature and biodiversity (Addison et al., 2022).

Climate change impacts add to the existing challenges in agricultural production, food distribution and access across the region (Solaymani, 2018; WFP, 2015). The risks arising from climate shocks, such as crop failures due to changing precipitation patterns, or price spikes of food items after a climate-induced disaster, lead to reduced accessibility of food, and disease outbreaks after extreme events like floods and cyclones are higher for the poor (Hallegatte et al., 2016). In extreme events such as

floods, heatwaves and droughts, it is the poorest who are more exposed to the impacts and lack adaptive capacity, making it difficult for them to overcome poverty. Among the poor, women respond to climate crises differently, making them even more vulnerable — for example, when there is a lack of access to food after a disaster, women tend to eat less to support their family, leading to malnutrition (Islam, 2010).

3.4 Non-economic loss and damage (NELD)

3.4.1 Climate change and the relation between human rights and gender violence

As climate change intensifies, it exacerbates vulnerabilities and disproportionately affects marginalised communities, leading to far-reaching social impacts, such as increased inequality, disruption of the cultural and social fabric, conflict, and violation of human rights (Bharadwaj et al., 2022). Many of these social impacts are disproportionately impacting the most

BOX 19. TRENDS AND FACTS BASED ON ANALYSIS OF NON-ECONOMIC LOSS AND DAMAGE (NELD)

Prevailing trends

- Displacement ↑; social inequality ↑; gender-based violence ↑; health system ↓

Key vulnerabilities and strengths

Mobility and social inequality: From 2008 to 2020, 80% of total global new displacements related to disasters in the Asia-Pacific region. In 1990, the IPCC forecast that by 2050, over 200 million people would migrate due to climate change impacts globally. Data revealed that 80 million of these international migrants reside in Asia and the Pacific (ADB, 2011), though these figures are not directly linked to the IPCC's climate migration prediction. Natural disasters were the main reason for forced migration in the Asia-Pacific region. Migration and displacement particularly affect vulnerable groups like women, children and older people.

Gender-based violence: Climate shocks and extreme events have a direct correlation with gender-specific impacts. In the event of a disaster, gender roles, health and wellbeing interact in a complex way, with women being disproportionately affected. Women are highly vulnerable to sex and gender-based violence during and after climate disasters, in their own homes, in shelter facilities and elsewhere.

Health and healthcare systems: Severe climatic events put a strain on health systems by increasing demand for health services. The Asia-Pacific region is particularly vulnerable to emerging infectious diseases — in particular, zoonotic and vector-borne diseases — because of many factors, including dense population levels, mobility and urbanisation, and environmental changes. Climate suitability for the spread of infectious diseases is likely to increase. Diseases like dengue, chikungunya and zika, which are prominent in the tropical and subtropical regions of the world, have altered their geographical distribution and incidence. The geographical pattern of the prevalence of dengue fever shows progression to larger parts of Asia. Extremely hot conditions and heatwaves are a major public health concern in large parts of Asia. The recurring cycles of extreme events exacerbated by climate change leave an indelible mark on mental and emotional health. The connections between extreme weather and climate events, loss of livelihoods, and mental health issues are associated with lower levels of resilience.

marginalised sections of society, including older people, women, and children. Climate shocks and extreme events have a direct correlation with gender-specific consequences. In the event of a disaster, the interplay of gender roles, health and overall wellbeing unfolds in a complex manner, leading to a disproportionate impact on women in the face of these challenges (see Box 19). Women are highly vulnerable to sex and gender-based violence during and after climate disasters at their own homes, in shelter facilities, and elsewhere, especially when family and community structures breakdown due to forced displacement (Bharadwaj et al., 2022; Memon, 2020; Hayward and Ayeb-Karlsson, 2021). Forced displacement, the involuntary movement of people from their homes or habitual relocations, is often the only response for survival in the face of a rapid-onset climate event such as a cyclone. Climate migration is the movement of people from one place to another voluntarily as a coping mechanism to reduce the stressors of climate change. When slow-onset events like drought jeopardise livelihoods dependent on natural resources such as farming, raising livestock and fishing, individuals' capacity to sustain their income is undermined. This motivates them to contemplate migration as they seek improved economic prospects (Bharadwaj et al., 2021d).

While migration can yield economic advantages, it also has social repercussions for migrants and their families who are left behind (particularly women, children and older people). Migration carries substantial costs and risks that can be especially burdensome for already impoverished individuals and households. It results in family separation and alters traditional gender roles. The areas receiving migrants (mostly major urban areas) often lack basic infrastructure (housing and sanitation) to accommodate migrants, posing health, security and safety risks. Labour and workplace safety regulations are frequently disregarded, leading to overwork, inadequate pay and exposure to polluted environments (Bharadwaj et al., 2021d).

In the Asia-Pacific region, a significant proportion of migration occurs within the region, often involving movement from rural areas to urban centres. Additionally, there is substantial organised and unauthorised labour migration from South and Southeast Asia to the six Gulf Cooperation Council nations, as well as from Southwest Asia to the Middle East and Europe. Unfortunately, these migrations sometimes lead to exploitative situations reminiscent of human trafficking.¹⁰ Industries like brick-making, fishing, manufacturing, sex work, domestic labour and construction often see a high prevalence of trafficking victims. This is exacerbated due to climate stressors.

During disasters, instances of women and child trafficking rise, with reports of missing children and young girls (Memon, 2020). Because of security and privacy concerns, women often choose to remain in disaster-stricken areas rather than moving to shelters (Sharmin and Islam, 2013).

After Cyclone Komen hit Myanmar in July 2015, the country was badly affected by flooding, flash floods and landslides. The affected areas were identified to have faced a high risk of human trafficking owing to migration (International Organisation for Migration, 2015). Similarly, when Typhoon Haiyan hit the Philippines in 2013, some areas that were severely affected were already suffering from poverty and high rates of trafficking. After Typhoon Haiyan made landfall, rates of trafficking surged in these areas. Victims of this trafficking included individuals who had been displaced within the country, households led by women, and children who had become orphaned due to the disaster (International Organisation for Migration, 2017).

The underlying socioeconomic issues in LDCs and SIDS are exacerbated due to the impacts of climate change; this calls for both short- and long-term approaches that tackle the interplay of socioeconomic issues and climate impacts on vulnerable communities. For example, in the Malaita province of Solomon Islands, underlying social issues such as alcoholism, crime and domestic violence have worsened owing to climatic impacts of sea-level rise, flooding and storms. Measures addressing these socioeconomic issues would also help improve the region's resilience to climate change (Ploeg et al., 2020).

3.4.2 Climate change and geopolitical threat

Climate change is influencing global geopolitical scenarios and has the potential to exacerbate security concerns and lead to the emergence of unforeseen and unpredictable threats. Extreme weather and climate change-induced disasters pose a security concern, worsening existing political, social and economic conditions (Cook and Nanthini, 2023).

The international geopolitical landscape has changed in recent decades. Demographic growth and urbanisation continue in developing countries, alongside rising material demands and expectations. Consumption of renewable and non-renewable resources is increasing rapidly, potentially leading to shortages in vital resources like food and water, and overall environmental quality. Non-material issues are also changing, including increasing global connectivity, shifting gender roles, and greater emphasis on human rights and minority

¹⁰ Human trafficking involves the use of force, fraud or compulsion to obtain some type of labour or commercial sex act. Trafficking may occur for a variety of reasons, including psychological or emotional vulnerability, economic hardship, lack of a social safety net, natural disasters or political instability.

rights. Each of these shifts leads to strategic changes in geopolitical structures, driven by security concerns, conflicts of interest, as well as opportunities for collaboration between nations (Bosnjakovic, 2012).

There is a close relationship between water scarcity, climate change-induced variability in water availability, and transboundary conflict. For example, one-third of the water discharge of the Indus River into its basin spanning India and Pakistan is from glacial melt. Climate change has resulted in glacier shrinkage, thereby altering the quantity of water flow in different sub-basins of the Indus, impacting agricultural irrigation in both countries (Giese et al., 2022). The historical Indus Water Treaty governing water-sharing between India and Pakistan is tested by these changing water patterns and has been labelled as outdated (Parvaiz, 2021). Similarly, the Mekong, a transboundary river with its watershed spanning China, Myanmar, Lao PDR, Thailand, Cambodia and Vietnam, is affected by the accumulative effects of climate change, coupled with increasing anthropogenic activities, including dams in its upstream areas. Climate change projections for the river basin from 2026–2041 by the Mekong River Commission include a basin-wide temperature increase, increasing average annual precipitation, with more rainfall during the wet season, and increasing flooding throughout the basin, including more frequent flash floods, all of which can significantly impact river flow patterns, river and coastal ecology, and the services the river provides to the population (Evers and Pathirana, 2018). These changes may jeopardise the multilateral strategic partnerships between the countries sharing the water of the Mekong (Ogden, 2022; Hongzhou, 2020).

Climate change stands as a significant driver of geopolitical friction in the Pacific region, imperilling the survival of island nations. The disparate effects of climate change on countries and the increasing lack of trust between developed and developing nations are fuelling global disputes (Bosnjakovic, 2012).

3.4.3 Climate-induced distress mobility

Demographic loss and damage in the context of climate change refers to the adverse impacts on human populations, particularly in terms of displacement and migration, changes in demography, and societal disruptions caused by climate change impacts. These impacts can result from rapid-onset extreme weather events as well as slow-onset changes such as sea-level rise, prolonged droughts, increased temperatures and other climate-related factors.

Displacement: Climate change has led to sudden and gradual environmental changes, making certain areas uninhabitable and leaving people with no option but to leave their homes and move to safer locations, resulting in population displacement (Bharadwaj et al., 2021a). For example, rising sea levels can force

residents of coastal areas to relocate due to the risk of inundation. In the Asia-Pacific region, many small island nations are facing threats of sea-level rise and coastal flooding and erosion. The Carteret Islands, a group of low-lying atolls in Papua New Guinea, have experienced severe and frequent coastal erosion, saltwater intrusion into fresh water sources, and flooding, making it extremely difficult to practice agriculture and other livelihoods (fishing). The population have gradually been relocated to mainland Bougainville (Connell, 2016).

Distress migration: Climate change impacts typically exacerbate pre-existing socioeconomic and political conditions, leading to migration. Households or members of households mostly migrate internally in response to gradual climate impacts, as well as extreme events, and are influenced by a mix of variables including among others, the age and educational level of the household head, the household size, household income and migration network (Bharadwaj et al., 2021d). Climate-induced migration may be short-term, seasonal (especially for those with livelihoods that do not bring year-round income, such as agriculture) and temporary, or permanent (ie displacement, which mostly happens on account of severe climatic impacts rendering the environment inhabitable). A World Bank study projects that climate change will cause 216 million people to be internally displaced by 2050 (Clement et al., 2021)

Although migration is a form of climate risk management, it has social implications and risks. Migration leads to disturbance of the family unit and alters traditional gender roles. Women, children and older people who are mostly left behind when men of the household migrate bear a disproportionate burden of managing the household. Women migrating with men face risks of sexual exploitation, excessive workloads and harsh living conditions. The job markets in urban areas that are often the destination site for migrants are not adequately developed to absorb migrants. Similarly, the basic infrastructure (including housing, sanitation and health systems) of an urban area does not offer any social security to migrants, as most social security schemes lack a portability component. Migrants often are forced into housing in unhygienic and crowded urban areas, are unable to send their children to government schools or use government-subsidised health services or school meals. Unregulated labour markets compel migrants to overwork, receive lower pay and endure unsafe conditions without proper safety protection (Bharadwaj et al., 2022).

In Bangladesh, for example, recurrent flooding and cyclones have affected livelihoods in coastal areas, leading to migration to cities in search of better livelihoods. Often the urban centres are not equipped with infrastructure and facilities to accommodate a

large migrant population. More than 50% of the urban population in Bangladesh lives in slums (World Bank, 2023b). Apart from living in cramped spaces lacking enough physical space and often devoid of privacy, these slum dwellers are forced to live in highly unhygienic conditions lacking basic utilities. According to the findings of the Bangladesh Urban Health Survey 2021 (NIPORT, 2021), only 27.9% of families residing in slums had access to not-shared, improved toilet facilities.

3.4.4 Heat-related loss and damage

Loss and damage due to climate change encompasses various adverse effects on human health and the healthcare systems. Severe climatic events put a strain on health systems by increasing demand for health services, owing to increased morbidity. Extreme events and climate disasters may also disrupt healthcare systems. This can manifest in various ways, such as the need to evacuate hospitals, potential damage to or closure of medical facilities, interruptions in patient care due to power outages, and the hindrance of people's access to healthcare facilities due to impaired roads or transit systems. These challenges collectively underline the vulnerability of healthcare services in the face of extreme weather events.

The Asia-Pacific region is particularly vulnerable to emerging infectious diseases — in particular, zoonotic, and vector-borne diseases — because of many factors, including dense populations, mobility and urbanisation, and environmental changes such as agriculture and livestock intensification and deforestation. The impact of climate change amplifies existing and underlying health challenges. One of the critical aspects of climate L&D is its impact on disease burdens. Under high greenhouse gas scenarios, climate suitability for the spread of infectious diseases is likely to increase. Diseases like dengue, chikungunya and zika, which are prominent in the tropical and subtropical regions of the world, have altered their geographical distribution and incidence (Wang et al., 2023). Southeast Asian countries rank second after the African region with respect to malaria (WHO, 2022). Between 2020 and 2021, increased cases and incidence were seen in Myanmar and Bangladesh. In Asia, dengue fever outbreaks were prevalent in the initial decades of the twentieth century. Intense outbreaks of the disease surfaced in the 1950s, particularly affecting the Philippines and Thailand. The geographical pattern of the prevalence of dengue fever shows progression to larger parts of Asia (Hij et al., 2016). Moreover, several Pacific island nations, including the Cook Islands, Tahiti, New Caledonia, Vanuatu, Niue and Palau, have seen dengue fever outbreaks (Banu et al., 2014). As per the United Nations Multidimensional Vulnerability Index 2023, the percentage of the population that are victims of epidemics is as high as 100% in a few LDCs in the region, such as Solomon

Islands and Lao PDR. Similarly, among the SIDS in the Asia-Pacific region, Maldives and Samoa had 100% of their population affected by epidemics.

Extremely hot conditions and heatwaves are a major public health concern in large parts of Asia. The rapid and dense urban agglomeration across Asia causes a heat island effect, further increasing the vulnerability of the region to heatwaves (Sharma, Andhikaputra and Wang, 2022). This impacts vulnerable groups such as older people, outdoor and agricultural workers, homeless people, children and pregnant women, and people with pre-existing health issues, among others, putting them at high risk of dehydration, heatstroke, and, in the worst case, death. According to the United Nations, 76% of all children in Asia are exposed to extreme high temperatures (UNICEF, 7 August 2023).

Changing precipitation patterns influence water availability and quality, resulting in health impacts. Climate-induced extreme events like flooding and cyclones cause waterborne diseases to become more prevalent. Droughts affect sanitation and hygiene practices due to water scarcity, contributing to disease transmission. The La Niña phenomenon in South and Southeast Asia causes climate changes that affect water quality and sanitation, particularly in underdeveloped and poorer nations. Among the LDCs in the Asia-Pacific region, Tuvalu, Myanmar, Bhutan and Lao PDR have less than 50% of their population using at least basic sanitation services (UNDP, 2023b). The lack of access to clean water and improved sanitary conditions has a direct link to diarrhoeal infections (Kim et al., 2021).

The links between climate change and concerns related to mental health and wellbeing are well-established (Bharadwaj and Huq, 2022; Filho et al., 2022). Recurring cycles of extreme events such as drought and cyclones, exacerbated by climate change, not only disrupt livelihoods but also leave an indelible mark on emotional health. Frequent extreme flooding, cyclones and heatwaves in Bangladesh are major risk factors for common mental disorders such as anxiety and depression (Wahid et al., 2023; Rahman et al., 2023).

Slow-onset climate change that unfolds over extended periods presents a range of challenges that can significantly affect individuals' mental wellbeing. Tuvaluans are experiencing distress because of the local environmental impacts caused or exacerbated by climate change, and through hearing about the potential future consequences of climate change (Gibson et al., 2020; Box 20).

The need for communities to abandon their ways of life and shift to new livelihood activities because of changing environmental circumstances has a cascading impact on their mental health and wellbeing. The connections between extreme weather and climate events, livelihoods and mental health in the Pacific region are associated

with a low level of resilience (Filho et al., 2022). Livelihood loss due to recurrent extreme weather events has a huge impact on mental health and wellbeing, sometimes resulting in suicide (Bharadwaj, Karthikeyan and Deulgaonkar, 2023; Carleton, 2017).

Migration, often viewed as a coping strategy during climate-induced crises, has also affected mental wellbeing. The migrants and the families they leave behind experience a myriad of mental health issues. Migrant communities living in urban areas frequently encounter challenges related to experiencing isolation and depression, primarily stemming from the absence of social networks and familiar support systems. Migrants in urban areas often find themselves living in severely overcrowded and substandard living conditions. These circumstances have been closely linked to elevated levels of depression. Wahid et al. (2023) found residents in two most populated urban areas of Bangladesh, Dhaka and Chattogram, to be at higher odds of depression and anxiety than others.

BOX 20. CLIMATE CHANGE AND MENTAL HEALTH IMPACTS

Climatic changes in Tuvalu encompass rising air and sea temperatures, amplified cyclone severity, coral bleaching, ocean acidification and sea-level rise. Vulnerability is heightened, as human settlement relies on coastal areas, vulnerable to inundation and erosion due to sea-level rise. Tuvalu has limited fresh water sources, including rainwater and an underground water lens*, which face challenges from changing rainfall patterns and salinisation due to sea-level rise and extreme events. The region's dependence on coastal resources and the fragile freshwater supply makes Tuvalu especially susceptible to the impacts of climate change (IPCC, 2022).

Changes in local climate as well as climate change as a global phenomenon act as stressors among Tuvaluans, causing significant distress, including feelings of sadness, worry and anger, and poor health, impacting participants' daily functioning. Researchers found that financial hardship intensified distress, and both local and abstract climate change stressors correlated moderately with broader psychological distress, highlighting the complex mental health challenges arising from climate change in this vulnerable context (Gibson et al., 2020).

* Underground water lens, also known as Ghyben-Herzberg lens, is a convex-shaped layer of fresh groundwater or aquifer that floats above the denser saltwater. This is usually found on small coral or limestone islands and atolls.

“The special needs of persons with disabilities are seldom thought of in the event of any disaster. Awareness programmes, training sessions of disasters or any related activities rarely invite groups of people with disabilities or people with other special needs, so we don't hear enough about their needs.”

Workshop participant, Jakarta, Indonesia.

Children are at a very high risk within this context, as their emotional and mental strength is significantly tested. This not only endangers their current wellbeing but also has a lingering impact on their future health trajectory and cognitive growth. Children with special needs and disabilities face further challenges. In the Asia-Pacific region, over the time span between 1968 and 2022, 41% of children (between 0 to 18 years) faced five or more climate shocks, compared to global average of 14% (UNICEF, 2023).

3.4.5 Loss and damage to education

Education-related L&D caused by climate change encompasses the adverse effects of climate change on educational systems, institutions and educational opportunities. These impacts can hinder access to quality education, disrupt learning environments, and undermine educational outcomes. While the magnitude of the disruption to learning is often not immediately evident, quantification of the losses to learning and the resulting damage to human capital (calculated using implied reduction of lifetime earnings) due to a climate disaster is comparable to that of property damage (Oppen, Park and Husted, 2023).

Extreme weather events like cyclones, floods and storms damage educational institutions' infrastructure, making it unsafe for continuing learning. In many areas, school buildings also double up as shelters in the wake of climate disasters, resulting in disruption of learning processes for extended periods. For example, in Tuvalu, newly constructed climate-resilient school infrastructure could pose a challenge to continuing education, given that these buildings are used as evacuation centres and shelters in the wake of extreme events (Vaughter, Huang and Park, 2023). Similarly, as heatwaves become common in Asia, education systems face the challenge of ensuring an uninterrupted academic calendar. The global average number of completed years of education is 8.65 years, however in almost all the LDCs of the Asia-Pacific region, years of schooling are lower than the global average (UNDP, 2022b). In countries such as Afghanistan, the average number of years of schooling is as low as three years, and climate change impacts have gradually led to a disruption in school education, especially for the poor and vulnerable.

Climate-induced migration and displacement often result in disrupted education for children and adolescents. Moving to new locations may cause extended periods of school absence, changing schools and dropping out of school altogether. School dropouts are also caused by increasing burdens on families owing to resource scarcity due to climate change (decreasing crop yield, crop failure, and absence for extended periods by the earning members of the household).

BOX 21. CLIMATE CHANGE-INDUCED SCHOOL DROPOUTS IN DROUGHT-PRONE RAJSHAHI, BANGLADESH

In inland Bangladesh, particularly in Rajshahi, a hot and drought-prone region, the changing climate is impacting children's education. Rising temperatures often impact girls' education due to the discomfort caused by traditional clothing, worn even during the hottest season. Additionally, climate change-induced extreme weather, such as heatwaves and floods, has hit the region's agriculture-based economy, driving families towards poverty. As families experience financial strain, they search for solutions to alleviate their difficulties. Thus, parents often withdraw their children from school, leading to child labour and early marriage.

Nearly 30% of students, ranging from fifth grade to senior secondary age, have dropped out of school during the period of 2017–2021. The region has the highest rate in Bangladesh of girl students dropping out of school for marriage (Bangladesh Directorate of Secondary and Higher Education) (Kapoor, 2022).

4

Understanding the state of protective factors

4.1 Why it is important to understand protective factors

Our research framework also incorporates an extensive review and analysis of protective factors, particularly focusing on policy responses and interventions. The inclusion of protective factors in our study is imperative for multiple reasons. Primarily, it serves to identify the variety of safety nets and support systems needed to mitigate both economic and non-economic impacts of climate change, particularly for vulnerable groups. This segment of our research brings to the fore the existing strategies, models and frameworks that aim for anticipatory action, vulnerability reduction and resiliency building, especially in the areas of DRR, health and human mobility (see Figure 12).

We categorised policy responses based on their effectiveness, scalability and contextual relevance. This helped to distil best practices that are not merely theoretically robust but have also demonstrated real-world efficacy. Our taxonomy, which organises these protective measures, allows us to analyse their applicability to different vulnerable groups.

The importance of understanding protective factors becomes even more pronounced in the context of LDCs and SIDS. These regions are already contending with significant development deficits, ranging from insufficient healthcare systems to limited educational opportunities and fragile economic foundations. Hence,

their ability to adapt to or recover from climate-induced impacts is constrained further by these pre-existing vulnerabilities.

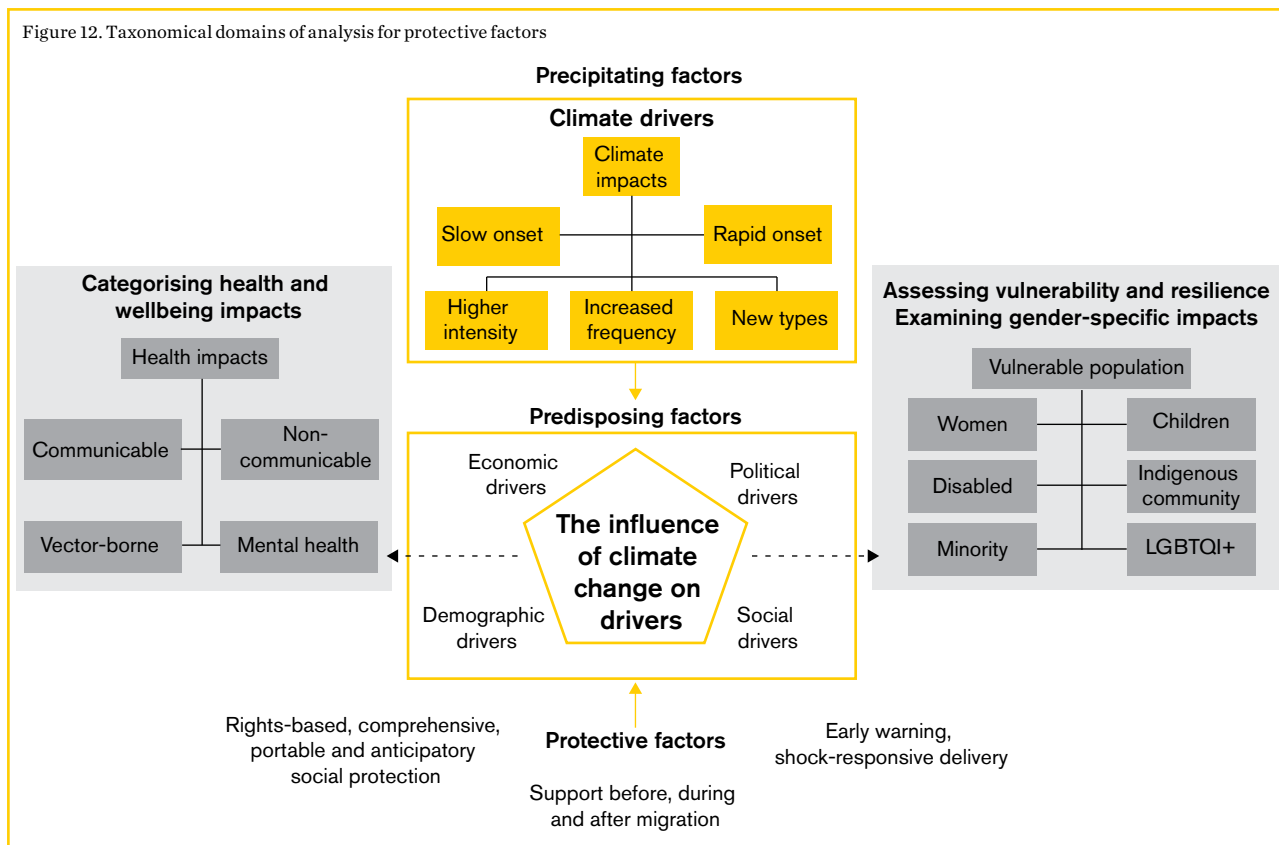
In such constrained contexts, it is not enough to import policy solutions that have worked in more developed settings — there is a need to identify strategies that account for these limitations and yet offer meaningful protection. Failure to understand the unique challenges and existing protective measures in these regions could result in policy recommendations that are misaligned with the regions' specific needs and realities.

By examining the current landscape of policy responses and interventions, we can identify existing gaps and inefficiencies. This not only prevents the wasteful repetition of ineffective solutions but also allows for more targeted and innovative interventions. Understanding these gaps is important for optimising resource allocation and promoting accountability, thereby enabling a more nuanced and impactful approach to climate adaptation and mitigation.

“We need to have a long-term, strategic vision that guides not only environment conservation, but specifically about the multidimensional, multifaceted, and interdisciplinary issue of climate change.”

Workshop participant, Jakarta, Indonesia.

Figure 12. Taxonomical domains of analysis for protective factors



The evaluation of protective factors thus provides actionable insights that are attuned to the complexities of these vulnerable regions. This nuanced understanding can aid in formulating holistic policies that not only address immediate climate impacts but also align with broader development objectives. By exploring protective factors along with predisposing and precipitating factors, our research offers a comprehensive framework that is equipped to guide effective and inclusive policy interventions, especially for regions most in need.

4.2 Social protection as an adaptive response to climate change and disaster risk reduction

Social protection plays an important role in enhancing resilience and safeguarding people's wellbeing, particularly in the face of recurring climate-related crises that disproportionately affect impoverished communities. Governments worldwide utilise social protection programmes as a fundamental part of their development strategies to alleviate poverty and sustain economic growth and social development. Social protection is also designed to complement initiatives aimed at enhancing climate resilience by reducing vulnerability, promoting climate-resilient livelihoods, and bolstering inclusive disaster preparedness (Bharadwaj et al., 2021b).

In the last two decades, the Asia-Pacific region has witnessed strong economic growth. However, there is still a gap in the extent of social protection in the region. According to the World Social Protection Report 2020–22: Regional Companion Report for Asia and the

BOX 22. COVERAGE AND GENEROSITY OF SOCIAL PROTECTION SYSTEMS IN LDCS AND SIDS

The social protection systems in LDCs and SIDS face similar challenges and exhibit comparable coverage and generosity levels to those observed in low-income countries and lower-middle-income countries. In LDCs, approximately 15% of the total population, on average, receives social protection, with only 18% of those in the poorest quintile being covered. The average per capita amount falls significantly below the global extreme poverty threshold of ppp US\$1.90 a day, although it is notably higher for those in the poorest quintile. In SIDS, social protection systems tend to perform relatively better. On average, they cover about 26% of the total population, and around one-third of those in the poorest quintile receive benefits. Moreover, the average benefits provided in SIDS are closer to meeting the minimum subsistence standard (UNDP, 2023; UNDP, 2022).

Pacific (International Labour Office, 2021), only 44.1% of the population have access to at least one social protection benefit. Underinvestment in social protection is a key reason for this gap. The region's social protection spending is relatively low, averaging 7.5% of GDP annually, which is significantly below the global average of 12.5%. Among the LDCs in the region, the share of GDP for social protection ranges from 0.7% (Bangladesh, Lao PDR and Solomon Islands) to 8% in Timor-Leste. Similarly, the share of GDP allocated for social protection in SIDS in the region ranges from as low as 0.1% in Papua New Guinea to 10.8% in Kiribati (ILO, 2022).

The CPIA social protection rating (1=low, 6=high) for LDCs in the region ranges from 1.5 for Afghanistan as the lowest, to 3.5 for Bangladesh and Kiribati, the highest among LDCs. For SIDS, the value ranges from 2 for Marshall Islands and Micronesia, to 4 for Maldives (World Bank Data, n.d.b). The percentage of the population covered under social protection in LDCs ranges from a low of 2% for Bhutan to 40% for Bangladesh and Nepal. Among the SIDS, the percentage of the population with social protection coverage ranges from a meagre 2% in Solomon Islands, to 35% in Timor-Leste, followed by Kiribati (30%) and Marshall Islands (24%). Countries including Nepal, Bangladesh, Fiji and Timor-Leste report coverage of one-third of the population or slightly more; all other countries report low single digit coverage only (World Bank Data, n.d.c).

Given the Asia-Pacific region's vulnerability to climate change and natural disasters, there is a pressing

need to integrate social protection measures to enhance its climate resilience. There have been some efforts towards implementing social protection as an adaptive response to climate impacts in the region, for shielding the vulnerable against climate, health and socioeconomic shocks.

Across the Asia-Pacific region, UNDP supports initiatives that promote transformative approaches to social protection, through economic empowerment, skills development, financial inclusion and building climate resilience that enhances capabilities and opportunities to cope with climate vulnerabilities. This includes integrating climate resilience into social protection systems (UNDP, 2023d). Examples include mainstreaming climate resilience into the Mahatma Gandhi National Rural Employment Guarantee Program in India, developing insurance and risk financing solutions to counter climate impacts due to fiscal constraints in Pakistan, mapping vulnerable groups for climate adaptation via digital readiness in the Philippines, implementing an urban poverty reduction initiative that helped low-income communities with support for climate-resilient housing, skills development in Bangladesh, and advocating for gender-responsive climate actions in sectors like agriculture and energy in Bhutan (UNDP, 2023d).

By protecting livelihoods, enhancing adaptive capacity, and supporting sustainable development, shock-responsive social protection programmes can contribute to efforts to building lasting peace, especially in fragile and conflict-affected nations (Bharadwaj and

BOX 23. EVIDENCE OF THE USE OF SOCIAL PROTECTION FOR CLIMATE DISASTER RESPONSE IN THE ASIA-PACIFIC REGION

In July 2020, the Jumana River in Bangladesh witnessed exceptional and prolonged flooding. Using upstream river data, electronic cash payments were initiated for downstream households a few days prior to the flooding reaching downstream areas. This proactive cash transfer was primarily used for food and water, reducing the likelihood of households going without food for a day by 36%. Three months post-flood, the households receiving this support exhibited improved food consumption and wellbeing. These households also experienced fewer asset losses, reduced reliance on borrowing, and reported increased earning potential. (Pople et al., 2021).

In 2016, Cyclone Winston hit Fiji, resulting in substantial losses. The government allowed affected households to withdraw cash from their National Provident Fund accounts, with around 170,000 approved withdrawals totalling approximately US\$110 million (Sengupta, Tsuruga & Dankmeyer, 2023). In December 2021, the Philippines experienced Typhoon Rai amid the COVID-19 pandemic, and a "calamity assistance package" for members and pensioners of the state-run pension fund provided advance pensions and loans for recovery. In 2020, Vietnam was hit by 14 storms, causing extensive flooding, especially in central Vietnam. Vietnam Social Security ensured the continuity of benefits by deploying staff to collect payments, collaborating with local post offices for timely disbursements, and promoting online services for efficiency and cost-saving (Sengupta, Tsuruga & Dankmeyer, 2023). The 2022 floods in Pakistan affected around 33 million people and caused a total economic loss of US\$15.2 billion (The World Bank, 28 October 2022). The existing social protection scheme, the Benazir Income Support Programme, was utilised by the Government of Pakistan to provide emergency cash transfers as flood relief assistance of approximately US\$0.2 billion (Government of Pakistan, 2023).

Karthikeyan, 2023). Social protection tools such as cash transfers, skills development and employment assistance play an important role in averting or reducing the rise in vulnerability caused by challenges, primarily by maintaining household income levels. Skills development and employment programmes promote climate-resilient practices and livelihoods, as exemplified by the training programmes in Nepal, which cover basic skills, sanitation, health practices and nutrition (Rigolini, 2021).

Cash transfers encourage savings, asset building and income stability during severe climate impacts, particularly those that develop slowly over time. One example is the first conditional cash transfer initiative introduced in Indonesia, Program Keluarga Harapan (PKH), or the Family Hope Programme. PKH aims to enhance human capital by providing cash transfers to families under certain conditions related to accessing healthcare and education services. This initiative serves a dual purpose: easing the financial burden of very poor households in the short term and making long-term investments in the health and education prospects of future generations. This dual approach is designed to help recipients escape poverty sustainably. Since 2010, the Indonesian government has made efforts to expand PKH's reach, enhance programme administration efficiency, and amplify its impact on impoverished populations (Ministry of Social Affairs, Republic of Indonesia, 2023). The programme's support for improving livelihoods acts as a coping strategy in times of climate disasters, especially for low-income households. Moreover, the training and counselling component of the programme supports participants to extend their social network, which indirectly impacts their abilities to explore alternate livelihood options in case of a climate disaster (Fitritia and Matsuyuki, 2023). Cash transfers and public works offer responses to extreme climate incidents. Following extreme climate disasters like cyclones, public works play a crucial role in facilitating recovery through activities such as cleaning, rebuilding and reviving local economies. The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), originally designed to improve rural livelihoods, also supports reducing climate risk. The public works in

“For introducing support for climate attributable loss and damage, the government needs to integrate and address climate change issues in the ongoing social protection system rather than bringing in new systems and frameworks. For example, in the case of Indonesia, the existing support in the form of health insurance, health benefit coverage may include provisions to include support for health-related loss and damage due to climate change.”

Workshop participant, Jakarta, Indonesia.

MGNREGA provide assured rural employment (Government of India, Ministry of Rural Development, n.d.); the incorporation of public works fosters local-level planning that often includes small-scale rural infrastructure such as retention walls, micro-irrigation projects, check dams and water recharge pits that support climate adaptation at the local level (Fischer, 2019).

Strong, adaptive social protection systems play a crucial role in bolstering a nation's ability to withstand various crises, including those stemming from natural calamities, conflicts and disparities. Adaptive social protection merges disaster risk management and adaptation measures to prepare vulnerable households for climate-driven disasters through design, delivery systems and assessments attuned to their climate vulnerabilities.

4.3 Social protection for children and families

The vast majority of children in the Asia-Pacific region are not covered under social protection. Only 18% of children in the region receive effective coverage, which is lower than the global average of 26.4% (ILO, 2022). Among SIDS in Asia-Pacific countries, the Cook Islands have achieved universal coverage.

The Cook Islands have a highly developed social protection system and it is one of the few that provides targeted social assistance payments to children. In the Cook Islands, children up to the age of 16 are provided with cash transfer assistance to support the family in their education and other expenses (Ministry of Internal Affairs Cook Islands, n.d.). Although child-focused cash transfers are becoming more widespread, many countries still lack adequate coverage and benefit levels. The prevalent focus on poverty-targeted programmes leaves many children without protection. Additionally in Asia and the Pacific, a lack of civil registration poses a significant obstacle to the inclusion of large numbers of children under five in social protection programmes (UN ESCAP and ILO, 2021).

4.4 Social protection for women and men of working age

Maternity protection: Climate change and natural disasters disproportionately impact women and girls. They often have reduced capabilities to prevent, adapt to or recover from the consequences of these events. Moreover, women are more likely to experience undernourishment during disasters and periods of food scarcity. That makes social protection during maternity an important protection for all women, engaged in informal work or not in the labour force, especially during childbirth. Countries in the region with guarantees

of paid maternity leave have had overall lower infant mortality and lower under-five mortality rates (Puliyel, Kim and Mitra, 2020).

The Asia-Pacific region has made strides in maternity benefit coverage, which is currently at 45.9%, slightly surpassing the global average (ILO, 2022). Yet these benefits mainly apply to women in formal jobs, leaving many women without protection. Variations across countries exist, with some LDCs such as Afghanistan and Myanmar providing coverage to fewer than 2% of women during childbirth. In many countries, maternity benefit durations fall below internationally recommended standards (ILO, 2022).

Social insurance: Coverage of social insurance programmes is also low (in single digit figures) for most LDCs and SIDS countries in the Asia-Pacific region. Only four countries — Palau, Samoa, Marshall Islands and Micronesia had coverage in the range of 17–36% (World Bank, 2022).

Sickness protection: Across the Asia-Pacific region, slightly more than 40% of workers have legal protection for sickness benefits (ILO, 2022). Coverage of social protection and labour provision in LDCs is in the range of 1% for Bhutan and 43% for Nepal. In SIDS, Tonga has 1% coverage while Palau and Fiji have 37%. Individuals who face the greatest risk from the negative health effects of climate change include poor people, minority communities, women, children, older people, people with chronic ailments or disabilities, those living in regions with a heightened incidence of climate-related illnesses, and workers who encounter extreme heat or heightened weather fluctuations. Ironically, they are mostly left out from insurance and other health risk management interventions.

Injury protection: Coverage for work-related illnesses or injuries is low across the Asia-Pacific region, with only approximately one out of four workers having such protection. In South Asia particularly, there is a significant issue of decent work standards, where merely 6.7% of workers have any form of employment injury protection. In countries with lower GDP per capita, like Afghanistan and Nepal, less than 5% of all workers have coverage for occupational injuries. Policies in economically stronger countries in the Asia-Pacific region ensure protection for most of their workforce. In Singapore, for example, the Work Injury Compensation Act provides assurance of employer assistance in case of disability and death due to injury at work (Ministry of Manpower, Singapore Government, n.d.).

In the context of LDCs and SIDS, with the coverage of social protection and labour as well as social insurance coverage being low, the provision of protection for work-related illnesses and injury is important to reduce vulnerabilities of low-income communities.

Disability benefits: Across the Asia-Pacific region, only 21.6% of individuals with severe disabilities have access to disability benefits, and there are significant disparities across the region (ILO, 2022). In most LDCs and SIDS of the region, coverage remains limited, leaving most disabled people without protection. Identification and registration of individuals with severe disabilities remains a challenge, often involving cumbersome procedures that act as both an obstacle and a burden to this group (Banks et al., 2018).

Of the LDCs and SIDS in the Asia-Pacific region, only Kiribati has a policy for the social protection of disabled people that acknowledges the need to include disabled people in climate change and disaster management information and planning. This policy, termed the Kiribati National Disability Policy and Action Plan 2018–2021, recognises and supports the Kiribati Local Governments' Association in disaster risk and climate change planning (Republic of Kiribati, n.d.).

Unemployment protection: Unemployment support is limited in the region, with only 14% of those without jobs receiving support. Most countries provide unemployment protection through contributory schemes or severance payments, with significant disparities across subregions. Southern Asia, for instance, extends assistance to less than 1% of the unemployed population, while Eastern Asia provides support to only a quarter (ILO, 2022). In LDCs and SIDS in the region, unemployment benefits are absent in most countries. Only three countries (Bangladesh, Myanmar and Cambodia) reported having unemployment coverage, albeit low (World Bank, 2022).

Public employment programmes, such as the Mahatma Gandhi National Rural Employment Guarantee Programme in India complement contributory measures, but have restricted scope, usually extending for up to 100 days. Social assistance programmes, aimed at poor or vulnerable people, offer some relief in case of job loss, but their benefits are often inadequate for basic living expenses.

4.5 Social protection for older women and men

Old-age pensions are the most widespread form of social protection in the region, with 73.5% of women and men having access, close to the global average. These impressive coverage rates have primarily been achieved by blending contributory and non-contributory programmes. This is exemplified by the wide range of pension schemes in India and the multi-tiered pension system in China (OECD, 2021b; China's New Rural and Urban Pension Schemes (n.d.)), which may be emulated in LDCs and SIDS depending on country-specific contexts.

Among LDCs and SIDS in the region, there are significant disparities in pension. This discrepancy is largely attributed to varying budget allocations for old-age benefits, resulting in lower coverage rates and less generous benefit levels (ILO, 2022).

SIDS achieving universal coverage for old-age benefits (pension systems) include the Cook Islands, the Maldives, Palau and Timor-Leste. Some LDCs have huge gaps in coverage, for example Cambodia and Lao PDR, which offer old-age protection to less than 10% of their populations (ILO, 2022).

BOX 24. WIDE ARRAY OF PENSION SCHEMES IN INDIA

In India, the Indira Gandhi National Old Age Pension Scheme is a non-contributory scheme for people living in poverty, with government contribution of around US\$2.4 per month per beneficiary up to the age of 79 years and approximately US\$6.01 for those aged above 80. Contributory schemes include the Pradhan Mantri Vaya Vandana Yojana, Senior Citizen's Savings Scheme, Atal Pension Yojana (Government of India, Ministry of Finance, n.d.a), and a market-based scheme, National Pension Scheme (Government of India, Ministry of Finance, n.d.b), to name a few.

4.6 Social protection, health and climate change

Access to adequate healthcare is a human right and important for wellbeing. The Asia-Pacific region is progressing towards universal healthcare, achieving a coverage rate of 65.1%, which is close to the global average (ILO, 2022). The region has adopted various methods, like universal insurance or direct healthcare. However, there is unequal coverage among subregions. Southern Asia has only 23.4% coverage compared to Southeastern Asia's 78.3% (ILO, 2022). Eastern Asia and the Pacific are almost fully covered. The lower coverage in Southern Asia is due to very low spending (1.4% of GDP). Southeastern Asia also spends little (1.9%) compared to the regional average (4%). Healthcare spending in the region is much less than the worldwide average. The significant healthcare expenses borne by individuals in countries such as Bangladesh and Myanmar highlight this funding gap (UN ESCAP and ILO, 2021).

Health expenditure in both LDCs and SIDS is significantly lower compared to the global average, indicating that services may be limited and that funding gaps remain. Additionally, in most other LDCs such as

Afghanistan, Bangladesh, Cambodia, Myanmar and Nepal, the out-of-pocket spending is more than 50% of all household expenses.

For SIDS, government healthcare spending ranges from 0.1% in Kiribati to 35.89% in Maldives. Other SIDS have an out-of-pocket spending of lower than 15% (World Bank, 2022).

Climate change exerts both direct and indirect influences on human health, frequently leading to enduring repercussions. The heaviest health burden is borne by the most poor and susceptible populations, exacerbated by disparities within nations. Despite low per capita emissions, low- and middle-income countries suffer the most health impacts related to climate change. The relationship between climate change and its effects on both the health sector and people's livelihoods and income is intricate and interconnected. Policies in healthcare, which play a crucial role in addressing the complex challenges posed by climate change on human health, establish a framework for adaptation and mitigation strategies, ensuring that vulnerable populations receive adequate healthcare services and support. Also, a strong disaster management system can help reduce the burden on healthcare systems. For example, in Bangladesh, Interactive Voice Response systems providing weather and early warning for anticipatory action, and investments in cyclone shelters have been useful in reducing casualties due to climate disasters (Ministry of Environment, Forest and Climate Change: Government of the People's Republic of Bangladesh, 2022). As a response to heatwaves, Dhaka in Bangladesh has a heat adaptation plan to support communities (Raihan, 2023), and the city has recently become the first Asian city to appoint a Chief Heat Officer as part of a collaboration between Dhaka North City Corporation (DNCC), Bangladesh, and the Arshat-Rockefeller Climate Resilience Center (Zami, 2023).

In Cambodia, the health equity fund is a nationally operating social protection programme. The programme offers free healthcare services, along with coverage for specific out-of-pocket expenses, to households that are registered under the IDPoor programme and some individuals working in the informal sector. As of 2018, it reportedly benefited approximately four million people, including three million who were part of the IDPoor system. The primary goal of this initiative is to improve access to medical treatment for poor households, particularly those at risk of malnutrition. Additionally, by reimbursing non-medical costs, the programme aims to alleviate the financial burden of seeking healthcare and reduce food insecurity among under-privileged households (WFP and University of Wolverhampton, 2023).

4.7 Climate change, migration and protection

Migration in the context of climate change is a complex phenomenon. While migration can offer a lifeline during environmental crises, it brings about a host of socioeconomic, health and other difficulties. The Asia-Pacific region has witnessed a notable surge in international migration, rising from 52 million migrants in 1990 to 65 million in 2019, with a balanced gender distribution. A significant portion of these migrants falls within the prime working-age bracket (15 to 64 years), making them vital contributors to both their home and host countries. Intraregional migration is a prominent feature, with 46 million individuals moving within the region in 2019 (UN ESCAP, 2020).

LDCs in the region exhibit a net negative migration of 236,068, whereas the SIDS had a net negative migration of 5,742 in the year 2021. Except for Bhutan and Nepal, all other countries of the LDC group exhibit net negative migration. World Bank data shows significant out-migration in Afghanistan and Bangladesh during 2021–2022. Bangladesh records the highest figure, at 1.5 million. Afghanistan accounts for nearly 4.5 million in internally displaced persons due to conflict, while Myanmar accounts for 1.5 million (World Bank, 2022). This mobility is not without its challenges. Migrants often consider moving out to other areas for better livelihoods and wages. However, owing to the stress of climate change and their urgent need for work, they often have low bargaining power and are faced with trafficking and modern slavery-like situations (Bharadwaj et al., 2022).

One of the key challenges faced by migrants in the region is their exclusion from social protection systems in the destination areas. Even when access is available, achieving the portability of social security benefits remains a cumbersome process. Additionally, healthcare access for migrants, particularly vulnerable groups, remains a significant challenge in areas with inadequate service provisions.

In the case of cross-border migrations, while some countries offer comprehensive healthcare schemes for long-term contract workers, seasonal migrants often find themselves excluded. Sending countries like the Philippines and Indonesia extend Universal Health Coverage (UHC) to their migrants, but difficulties arise due to the lack of agreements with healthcare providers in receiving countries, making reimbursement a complicated process. Thailand has introduced a voluntary migrant health insurance scheme, like its UHC, but the lack of portability limits its effectiveness. Access to education for migrant children, as well as basic services such as housing, clean water and sanitation, is also restricted, particularly for irregular migrants and

those in the informal sector who often endure poor living and working conditions (Bharadwaj et al., 2022).

Economic constraints, lack of resources (including networks), health and other societal conditions, and limited access to alternative livelihood options make some people unable to migrate, trapping them in unsafe climatic conditions. In a qualitative content and thematic analysis of Intended Nationally Determined Contributions (INDCs), it was found that although climate change was recognised as an existential threat by all SIDS in the Pacific region, only Fiji's INDC explicitly mentioned relocating communities to higher ground as part of their adaptation efforts. Tuvalu, while acknowledging the potential for future international migration in their INDC, asserts its right to take necessary measures to secure the survival and wellbeing of its nation and future generations on its islands (Thomas and Benjamin, 2017).

The Action Agenda on Internal Displacement, led by the United Nations Secretary-General, strives to facilitate lasting solutions for internally displaced persons, proactively prevent the emergence of new displacement crises, and guarantee that individuals confronted with displacement receive efficient protection and assistance (UNHCR, 2023). Additionally, the Global Compact for Migration provides a framework for international and regional coordination, offering the Asia-Pacific region an opportunity to align migration with sustainable development and human rights. There is still much work to be done to fully realise the Compact's goals and principles (UN ESCAP, 2020).

4.8 Financial resilience for disaster risk reduction

Climate shocks and disasters threaten economic development and human wellbeing in a world plagued by overlapping crises. Financial resilience can protect livelihoods and people from these shocks. Developing financial resilience requires policies and financial mechanisms that strengthen both financial and operational preparedness. The key to improving financial resilience is to mobilise private capital. To mobilise private capital effectively, it is crucial to establish a financial policy environment that fosters international finance and encourages private risk capital (World Bank, 2023c).

Disaster risk reduction (DRR) policies and financing: Effective disaster response and recovery require suitable policies, institutions and products. Financing instruments require a supportive policy framework for coordination across departments, along with institutions that ensure lasting financial and operational readiness. Development partners can aid in each stage of this process.

In the Asia-Pacific region, disaster risk financing faces a web of challenges. Limited funds hinder effective response and recovery, a problem compounded by frequent and severe disasters. Inadequate insurance coverage leaves individuals and governments vulnerable. Complex risk assessment, data gaps and institutional fragmentation further impede progress. Public awareness is lacking, and sustaining funding during recovery periods proves difficult. Disaster resilience is not prioritised, as it is considered to be preparing for an event that might never happen. Visible and well-communicated incentives are often lacking. Instead, funds and budgets are often overly focused on disaster response and recovery, with only a fraction dedicated to preventing disasters in the first place (ADB, 2020).

Amid varying political priorities, solutions demand improved risk assessment, collaboration, data sharing, innovative financing tools and regional cooperation. However, disaster resilience is not prioritised in most countries and often lacks visible and well-communicated incentives. There have been some new initiatives and collaborations established to bring together public and private partners in support of financial resilience. These include centres, coalitions and coordination bodies for public agencies, the private sector, civil society and academia (such as the InsuResilience Global

Partnership for Climate and Disaster Risk Finance and Insurance, launched at UNFCCC COP23 in 2017, and the Coalition for Disaster Resilient Infrastructure). Likewise, the Southeast Asian nations have a platform called the Southeast Asia Disaster Risk Insurance Facility (SEADRIF) for accessing disaster risk financing options and advice on financial services for post-disaster rapid financing to reduce their impact on people and their livelihoods (SEADRIF Initiative, 2023).

Some risk-pooling facilities do exist in some of the countries in the Asia-Pacific region. For instance, the Pacific Catastrophe Risk Insurance Pilot offers coverage to island nations, protecting them against damages caused by earthquakes, tsunamis and tropical cyclones, with coverage extending up to US\$100 million. Simultaneously, nations such as India, Thailand, the Philippines, Indonesia and Japan have adopted catastrophe risk pools to offer economically efficient financial safeguards against natural disasters. In India, the Fifteenth Finance Commission Report suggests fund allocation among Indian states considering factors such as the prevalence of hazards, the extent of exposed land and population, their vulnerability, and their disaster management capacity (Institute for Policy Research, 2021; Singh and Jha, 2023).

BOX 25. NATIONAL SOCIAL SECURITY STRATEGY OF BANGLADESH

The National Social Security Strategy (NSSS) of Bangladesh envisions a robust social security system that guarantees citizens' rights and provides a safety net for those facing shocks or crises. The goal is to enhance the efficiency and inclusivity of the system, prioritising the poorest and most vulnerable. Recognising the country's susceptibility to large-scale crises like floods and global challenges such as food and fuel crises, the NSSS aims to build resilience among Bangladeshi families. By expanding the coverage and value of priority schemes, the government seeks to strengthen the position of the poor and vulnerable, offering a crucial buffer against emergencies.

Strong management information systems and electronic delivery channels will enable swift emergency payments during crises. Mechanisms to identify and aid the hardest-hit areas will be established. Additionally, programmes addressing climate change and disaster prevention will be reinforced, including initiatives like conditional cash transfers for natural resource co-management. Through these efforts, Bangladesh aims to significantly improve its social security and disaster relief system by 2030.

However, evidence shows that progress towards integrating with climate strategies is slow and is undermined by a multitude of implementation challenges, including lack of data, lack of vulnerability assessment mechanisms, top-down, technocratic approaches and donor influence on quantity versus quality. Despite policy recognition and political commitment evident from the government's five-year plan on the need to integrate climate risks, there remains a gap in understanding and a tendency to view social protection primarily as post-disaster relief rather than as a long-term, rights-based intervention (Kundo et al., 2023).

4.9 Climate change adaptation and DRR: the need for coherence

Climate change has exacerbated the scale and intensity of disasters. While DRR and climate change adaptation (CCA) actions exhibit distinct characteristics, there are commonalities, such as the aim and importance of local action (Dias et al., 2020). Lack of harmonisation in institutional arrangements at multiple levels, lack of political will, inconsistent funding arrangements, and disrupted knowledge transfer hinder progress on aligning DRR and CCA (Islam et al., 2020). An assessment of several South Asian countries found that a lack of climate data for local level analyses that could be used for local actions converging DRR and CCA, institutional arrangements working in parallel, disconnects between DRR and CCA, and a lack of funding mechanisms and coordination among projects leading to duplication of actions on the ground are among the factors slowing down the integration of DRR into CCA (Mall et al., 2019).

Addressing these challenges requires context-specific approaches that involve building local capacities, raising awareness, improving data collection and sharing, enhancing coordination, and aligning DRR and CCA efforts with local development goals. It also necessitates creating an enabling policy environment and fostering community ownership to ensure the

successful application of DRR and CCA measures. Integrating DRR and CCA into development needs well-defined frameworks. Recognising the role of local actors in risk response underscores the need for people-centred and needs-based policy frameworks.

There is some progress towards integrating DRR and CCA at the strategy and policy level in the Sendai Framework for Disaster Risk Reduction 2015–2030, which was endorsed by the United Nations General Assembly. The Framework requires creating regional plans and strategies. The 2021–2024 Asia-Pacific Action Plan for implementing the Sendai Framework emphasises making development risk-aware. It treats DRR as a key aspect and boosts investment in prevention, climate adaptation and preparedness for increased resilience. For example, Fiji's National Disaster Risk Reduction Policy is in accordance with the Sendai Framework, and emphasises community involvement, risk assessment and coordination among government agencies (The Republic of Fiji, 2018).

5

Conclusion and way forward

As the complex multidimensional impacts of climate change are becoming increasingly evident, this research aims to present a comprehensive framework for understanding the multi-layered impacts and responses. The study particularly examines predisposing, precipitating, and protective factors in the context of LDCs and SIDS with a view to informing development of context-specific strategies for climate adaptation and resilience.

While this research provides a robust foundation for understanding the various facets of climate change impacts, it is not exhaustive. Climate change is an evolving phenomenon, and our frameworks and taxonomies will require periodic updates and revisions. Nevertheless, the research methodologies and insights presented here serve as essential tools for a wide array of stakeholders, by focusing on:

Categorising climate-attributable loss and damage: The taxonomy enables the systematic classification of various types of climate-induced losses and damages, including both tangible and intangible impacts. This nuanced categorisation provides a comprehensive lens through which to understand specific impacts, thereby informing targeted policy and intervention measures.

Identifying climate-resilient responses: Our taxonomical approach helps identify and classify effective, feasible, and scalable responses to climate-related challenges. This facilitates the identification and recognition of best practices and innovative strategies, particularly in areas of DRR, health and human mobility.

Integrating DRR and climate adaptation: The research allows for the fusion of disaster risk reduction and climate adaptation efforts. This integrated perspective offers a more holistic approach to tackling the multiple challenges posed by climate change and disaster risks, especially concerning health and human mobility. Categorising different types of losses and damages supports easier recognition of areas where adaptation and DRR efforts can be mutually beneficial.

Understanding health and human mobility interlinkages: The taxonomy aids in interpreting the complex relationships between climate-induced losses, health impacts and human mobility. This crucial understanding can guide the design of interventions that take into account broader social, economic and health dimensions.

Guiding policy and resource allocation: The structured framework arising from this taxonomy-based research underpins evidence-based policymaking and resource allocation. It can serve as a useful tool for decision makers for prioritising action areas and directing resources effectively.

The taxonomical approach guides the development of more efficient and fair interventions, influencing policy design. To apply this taxonomical framework, we propose a synergistic programme centred around three pillars.

The initial pillar, entitled 'Bottom-up evidence and multi-stakeholder dialogue,' highlights the importance of incorporating local insights and diverse stakeholder viewpoints for understanding the multifaceted nature of

climate change impacts. UNDP could utilise its global network to integrate grassroots voices into understanding climate change impacts. This would ensure that solutions are culturally and contextually relevant.

Building upon this localised understanding, the second pillar, 'Establishing a community of practice', aims to establish a collaborative ecosystem where stakeholders from diverse sectors and regions can exchange insights and foster innovation and learning. This community will act as a forum for validating grassroots evidence, turning individual experiences and observations into collective wisdom. Serving as the bridge between local realities and overarching climate strategies, it will ensure that policies and interventions benefit from a spectrum of perspectives and expertise. The expertise of the UNDP in relation to cultivating collaborative ecosystems would play a pivotal role in shaping this community of practice.

The third pillar, 'Planning, policy and programming based on grounded evidence and perspectives of the community of practice', is where the insights and collaborative outcomes of the community of practice will be translated into actionable and adaptive policies and programmes. This step is crucial for ensuring that the nuanced understanding gained from the ground is effectively integrated into climate strategies and action. It will close the feedback loop, allowing for policies and programmes that are continuously

informed and improved by on-the-ground experiences and expert insights. The expertise of the UNDP in relation to supporting governments in Nationally Determined Contributions, National Action Plans and policy development will ensure that these strategies are effectively integrated into national and international climate action plans.

Implementing these three pillars will ensure that climate action is not only grounded in the realities of those it aims to serve but also remains dynamic, adaptive and responsive to evolving challenges and needs. This comprehensive approach recognises that tackling climate change requires more than just top-down directives; it requires the active engagement, collaboration and wisdom of all stakeholders, weaving together local experiences and global strategies to create a resilient and sustainable future.

“Programmes and interventions that address loss and damage of climate change during and after a climate-induced disaster need to be continuous and synergic, rather than ad hoc programmes for relief and support.”

Workshop participant, Jakarta, Indonesia.

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Annexes

Annex 1: Research approach and methodology

The approach and methodology followed during this research is as follows:

Literature review and conceptual framework development:

- An extensive literature review was conducted to understand the existing taxonomies, frameworks, and research related to climate-attributable loss and damage, DRR, health and human mobility.
- Based on the literature review, a conceptual framework was developed that outlines the key components and relationships between vulnerability, climate impacts, and policy responses.

Identification and categorisation of predisposing factors (vulnerability and development deficits) for LDCs and SIDS in the Asia-Pacific region:

- Various factors contributing to vulnerability and development deficits in the context of climate change impacts for LDCs and SIDS in the Asia-Pacific region were identified.
- The identified pre-disposing factors were then categorised into relevant taxonomic groups (eg socioeconomic vulnerabilities, physical vulnerabilities, governance deficits).
- A taxonomy that organises and classifies these factors was developed for further analysis.

Identification and categorisation of precipitating factors (climate change loss and damage) for LDCs and SIDS in the Asia-Pacific region:

- Different types and dimensions of climate-attributable loss and damage, including physical, economic, health and environmental impacts for LDCs and SIDS in the Asia-Pacific region were identified, and data was collected on different parameters in these thematic areas.
- These impacts were then categorised and classified into relevant taxonomic groups (eg infrastructure damage, economic losses, health impacts).
- A taxonomy was created that organises and quantifies the loss and damage data for analysis.

Identification and categorisation of protective factors (policy response) for LDCs and SIDS in the Asia-Pacific region:

- Relevant policies, interventions and strategies being implemented by countries of the LDCs and SIDS of the Asia-Pacific region to address loss and damage due to climate change, DRR, health and human mobility were identified.
- The identified policy responses were categorised and classified based on their effectiveness, scalability and relevance to specific contexts. The responses comprised existing strategies, frameworks, models and solutions for cross-sectoral anticipatory action for vulnerability reduction and resiliency building on climate-attributable impact on health and human mobility.
- A taxonomy was developed that organises policy responses and protective factors for analysis.

Data collection and analysis:

- Detailed secondary research to collect information from relevant sources for each category of the taxonomy (vulnerability, climate impacts and policy responses) was undertaken for the LDCs and SIDS in the Asia-Pacific region. Broader trends in the region were also identified as part of the data collection.
- The information collected was analysed through secondary research to understand the interrelationships between predisposing factors, precipitating factors and protective factors.
- A detailed analysis on identifying patterns, trends and correlations in the information collected through secondary research was completed to gain insights into the complex dynamics of climate-attributable loss and damage and related responses.

Interdisciplinary approach for stakeholder engagement through deliberative dialogue:

- Promoting an interdisciplinary approach to the research is proposed by involving experts from diverse fields such as climate science, public health, economics and social sciences through deliberative dialogues with stakeholders in the Asia-Pacific region. This would be done for the purpose of validating the taxonomy, the scalable solutions identified through secondary research and to ensure the research aligns with real-world challenges and can inform practical solutions.

Annex 2: Geographic scope

Table 1: List of countries covered for the study

COUNTRY	CATEGORY
Afghanistan	LDC
Bangladesh	LDC
Bhutan	LDC
Cambodia	LDC
Lao People's Democratic Republic	LDC
Myanmar	LDC
Nepal	LDC
Vanuatu	LDC
Cook Islands	SIDS
Fiji	SIDS
Maldives	SIDS
Marshall Islands	SIDS
Micronesia (Federated States of)	SIDS
Nauru	SIDS
Niue	SIDS
Palau	SIDS
Papua New Guinea	SIDS
Samoa	SIDS
Tonga	SIDS
Kiribati	LDC and SIDS
Solomon Islands	LDC and SIDS
Tuvalu	LDC and SIDS
Timor-Leste	LDC and SIDS
American Samoa	SIDS Associated Members
French Polynesia	SIDS Associated Members
Guam	SIDS Associated Members
New Caledonia	SIDS Associated Members
Northern Mariana Islands	SIDS Associated Members
Tokelau	SIDS Associated Members
Vanuatu	LDC and SIDS Associated Members

According to the United Nations, of the 46 countries classified as least developed countries (LDCs), eight are in Asia, as of October 2022. They are Afghanistan, Bangladesh, Bhutan, Cambodia, Lao PDR, Myanmar, Nepal and Timor-Leste. Some of these countries are in the process of graduating from LDC status in 2024.¹¹

There are two LDCs in the Pacific region, as of October 2022, namely, Kiribati and Tuvalu. Vanuatu graduated from LDC status in 2020 and Solomon Islands, which is currently classified as a LDC, is also scheduled to graduate in 2024.

Small Island Developing States (SIDS) are island countries that face specific challenges due to their unique geographic characteristics. Of the 39 SIDS and 18 associated members of United Nations Regional Commissions globally, there are 15 countries and seven associated member countries in the Asia-Pacific region.¹² The fifteen SIDS member countries are Cook Islands, Fiji, Kiribati, Maldives, Marshall Islands, Micronesia (Federated States of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga and Tuvalu. The associated members are American Samoa, French Polynesia, Guam, New Caledonia, Northern Mariana Islands, Tokelau and Vanuatu.

The scope of the assignment covers the above countries. Customised datasets on different aspects for the above countries were collated from global repositories of the United Nations and other multilateral agencies like the World Bank and WHO. The data was subjected to analysis for drawing broader trends from these countries, and these trends were compared with the trends in LDCs, SIDS, Asia and Pacific region and global datasets.

¹¹ See: <https://www.un.org/development/desa/dpad/least-developed-country-category/ldcs-at-a-glance.html>

¹² See: <https://www.un.org/ohrrls/content/list-sids>

Annex 3: Workshop on taxonomy of climate-attributable loss and damage and scalable responses related to DRR, health and human mobility

October 3, 2023, Jakarta

Workshop overview

As climate change impacts are increasing in intensity and frequency, the response needs to transcend the traditional boundaries of sectors and disciplines. Impacts are felt across various domains, including health, social development, education, sanitation, and more. Understanding and addressing the multifaceted effects of climate change requires an integrated, multisectoral approach that brings together a diverse array of stakeholders.

This workshop on “Taxonomy of Climate-Attributable Loss and Damage and Scalable Responses related to DRR, Health and Human Mobility” held on October 3, 2023, in Jakarta, Indonesia, was an initiative to create such a platform, focusing especially on Indonesia, with an aim of exploring the impacts of climate change and the pressing issues it creates for vulnerable groups.

Climate change is no longer an isolated issue but a shared concern that calls for integrated action. The consultation used a deliberative dialogue approach to get insights from diverse stakeholders based on their grounded experience from different sectors and to contribute meaningfully to addressing the complex challenges of climate change. The workshop engaged 45 participants from both government and non-government agencies, as well as community organisations of Indonesia. The discussions highlighted insights of practitioners not just from the climate change space but from health, social development, education, sanitation, and other relevant domains, integrated perspectives on loss and damage due to climate change across different sectors. The deliberations brought out real-world challenges and opportunities that vulnerable communities face and insights on integrated solutions that could be considered with respect to the broader social, economic, and health dimensions of climate change.

The workshop was organised by UNDP Indonesia. The day-long workshop was structured into two sections: the first session was an introductory session that welcomed all participants and highlighted the concept of taxonomy as a framework for L&D attributable to climate change. In the second section, three parallel sessions were organised. These sessions deliberated on:

- Introduction to taxonomy in climate change loss and damage
- Interactions between climate drivers and vulnerability
- Protective features, policy responses and proposed outcomes of research on the taxonomy of climate loss and damage.

The guiding questions that were used for the deliberations the parallel session are given below:

Session i: Introduction to taxonomy in climate change loss and damage

Presentation on how taxonomy can aid in understanding climate change impacts

Group discussion: Applications and implications for climate research.

Guiding questions (these questions are meant to act as a guide and can be adapted or expanded based on the context; they aim to encourage participants to delve deeper into the complexities of the issue to find innovative solutions and insights)

- How can the principles of taxonomy be applied to categorise and analyse climate-attributable loss and damage?
- What specific areas of climate change loss and damage could benefit most from this approach?
- How might the use of taxonomy enrich current methods of studying climate change impacts?
- How can the research framework integrate predisposing, precipitating and protective factors to understand climate change loss and damage?
- What challenges and opportunities do you foresee in implementing a taxonomical approach in climate research?
- How can this framework foster collaboration among various stakeholders, including governments, NGOs, researchers, and communities, for addressing the growing challenge of climate change loss and damage?

Session ii: Exploring the interactions between climate drivers and vulnerability

Introduction on predisposing factors: underlying conditions that contribute to vulnerability.

Introduction on precipitating factors: impacts of climate change leading to loss and damage — tangible and intangible consequences.

Group discussion: on vulnerabilities and consequences of climate change loss and damage.

Guiding questions:

- How do social, economic, environmental, and institutional factors predispose certain systems and populations to climate change impacts?
- What are the key challenges in identifying and analysing these predisposing factors?
- How can we ensure that the analysis of predisposing factors is inclusive and reflective of diverse perspectives?
- How does climate change act as a precipitating factor in creating vulnerability and loss?
- What are examples of tangible and intangible loss and damage that could be categorised using this framework?
- How can the understanding of precipitating factors guide policy and response strategies to mitigate impacts loss and damage?

Session iii: Protective factors, policy response, and proposed outcome of research

Introductory sharing on categorising responses and policy measures that address climate change loss and damage.

Group discussion: on developing scalable responses for DRR, health, and human mobility.

Guiding questions:

- What kinds of policy measures and programmatic responses can be categorised as protective factors against climate change impacts?
- How can these protective factors be scaled to address the multifaceted challenges posed by climate change to DRR, health and human mobility?
- What collaborative efforts are needed to make protective measures more effective and adaptable across different regions and contexts?
- How can taxonomy-based research support the integration of DRR and climate adaptation efforts?
- What are the potential synergies and conflicts between DRR and climate adaptation, and how might they be addressed?
- How can integrated approaches lead to more effective responses to disaster risk and climate change impacts?
- How can taxonomy-based research provide a structured framework for policymaking and resource allocation?
- What challenges might policymakers face in prioritising areas for action and resource allocation?
- How can the research findings be translated into actionable insights for policy development, implementation, and evaluation?

Proceedings

Welcome and introduction

Siprianus BS, the Head of Democratic Governance and Poverty Reduction Unit (DGPRU) at UNDP Indonesia presented the introductory address and extended a warm welcome to the workshop attendees. He highlighted that while climate change is a widely discussed subject, its multifaceted effects create a challenge in comprehending and addressing it comprehensively.

Ritu Bharadwaj, Principal Researcher (climate governance and finance team) at IIED, introduced the attendees to the concept of taxonomy. Taxonomy, the science and process of categorising, classifying and naming living organisms involves organising and grouping organisms into hierarchical levels of classification, called taxonomic ranks, to create a systematic framework for understanding and studying biodiversity. The same approach to taxonomy may be used to understand L&D due to climate change and serve as a valuable tool in climate research.

She explained how a taxonomy-based framework can offer a standardised approach for collecting, categorising, and analysing climate impact data.

Additionally, Bharadwaj requested the participants to delve into the various aspects of climate-related L&D experienced across different sectors in Indonesia during the ensuing sessions of the deliberative workshop. In further elaborating on the concept of L&D, she provided insights from IIED's research on this subject and gave a comprehensive overview of the myriad factors contributing to loss and damage, with a particular focus on their disproportionate impact on impoverished communities.

Anwasha Tewary, Huairou Commission, and Erniyati, Yakkum Emergency Unit, Indonesia, jointly provided a grassroots perspective of climate change-induced L&D. Anwasha Tewary highlighted that grassroots communities face a compounding of risks when their vulnerabilities intersect with other factors. Addressing the interconnected consequences of climate change necessitates comprehensive, multi-level, and multi-structural solutions that foster transformative change. The Yakkum Emergency Unit is part of a global network working on inclusive emergency response, including community participation in needs assessment and aid distribution.

With examples of work done by the Yakkum Emergency Unit, Erniyati emphasised how organised grassroots groups and local communities are harnessing their collective resources, including personal savings and community funds, to address gaps in institutional support in the case of climate change-related L&D. She further shared how the Yakkum Emergency Unit has taken on various roles in the realm of emergency preparedness and response, such as forming local task forces, raising awareness, distributing relief supplies like food and medicines, and ensuring the safe evacuation of individuals to secure locations during crises, thereby improving community resilience to climate change. Additionally, the Unit is actively engaged in long-term adaptation strategies, including reforestation efforts, seed preservation, and the cultivation of organic, short-cycle, and extreme weather-resistant food crops. Furthermore, groups are fostering resilient recovery by collaborating with government bodies and key stakeholders to facilitate recovery after disasters and prepare for future shocks. Their initiatives encompass activities such as joint risk mapping with government officials, connecting vulnerable households with social protection programs, and implementing climate-adaptive agricultural practices, among others.

Session: Introduction to taxonomy in climate change loss and damage

This session commenced by providing an overview of taxonomy and its application in studying the effects of climate change-induced loss and damage. Key points discussed by the participants during the session include:

- Participants presented a comprehensive view of the multifaceted concept L&D, which includes both economic and non-economic dimensions. The imperative lies in clearly defining these categories and elucidating the associated responses. The emphasis is directed towards the examination of slow-onset impacts, as illustrated by one participant's experience on the cultural erosion caused by rising water levels. The question of how to account for irreversible damages in such cases remained. Participants expressed diverse preferences when it came to responses, including migration. The intricate variations in perspectives can be captured in a well-structured taxonomical framework.
- Slow-onset impacts are prevalent throughout Indonesia, affecting communities in various ways, including increased vulnerability of agriculture systems, limited access to clean water, and overall wellbeing. The climate consequences of El Niño have resulted in severe drought conditions, which, in turn, exacerbate water scarcity and compel communities to buy water. This, in a domino effect, leads to a range of interrelated consequences, including diminished agricultural output, loss of biodiversity, and an increase in the number of students dropping out of school. During the discussion, participants emphasised the intricate web of climate impacts affecting various sectors and the implications of using taxonomy for a better understanding of these impacts.
- Other slow-onset impacts that often remain unaddressed include health-related impacts on poor and disadvantaged families. Disturbances to family life create health impacts and stress, and often lead to children interrupting or leaving their education to help with household responsibilities, for example by walking long distances to fetch water. Rising temperatures are linked to increased incidence of malaria, while in other areas water scarcity impacts hygiene.
- The deliberation highlights the importance of incorporating the concept of taxonomy into our daily lives to address L&D, encompassing both direct and indirect consequences. This approach seeks to bring to light the frequently overlooked non-economic losses and enhance our comprehension of suitable actions for local communities.

- Participants also discussed the structuring of the taxonomy, including questions regarding the attribution of impacts to climate change, considering it as an additional driver of pre-existing issues, while distinguishing between L&D and vulnerability. Categorisation can be based on hazards or sectors like health, culture, and the environment. Moreover, interconnections between different impacts and their groupings should be a focus of the taxonomy.
- The taxonomy approach holds promise in bridging gaps related to L&D, emphasising capacity enhancement, the measurement of non-economic impacts, and establishing links between damage and climate change. It should encompass both economic and non-economic loss assessments while shedding light on the vulnerable groups within each sector. Additionally, involving grassroots organisations and vulnerable groups in discussions and initiatives is imperative. While there is a framework in place for addressing sudden impacts of climate change or disasters, there is a need for capacity building to address gradual, ongoing situations, given their complexity and the presence of data gaps. The necessary tools are available, but their implementation faces challenges due to limited capabilities and resources.
- The importance of incorporating local wisdom and Indigenous knowledge into the taxonomy was highlighted. Participants shared that Indigenous communities frequently detect environmental shifts without a complete comprehension of the underlying causes. Therefore, it is crucial to integrate viewpoints from the perspective of local wisdom and Indigenous knowledge when assessing the gradual, long-term effects on health.

Session: Exploring the interactions between climate drivers and vulnerability

This session commenced by introducing predisposing and precipitating factors of taxonomy and its application in studying the effects of climate change-induced L&D. Key points discussed by the participants during the session include:

- Various drivers are shaping the landscape in Indonesia, each impacting different aspects of society. Climate drivers are particularly influential in places like Yogyakarta, where extreme daytime heat and cold nights disrupt daily life, affecting self-care practices like bathing and cleaning. These conditions also lead to an increase in diseases, such as skin conditions and complications during menstruation, exacerbating health challenges.
- Indonesia experiences frequent climatic changes as it transitions between the dry and rainy seasons, but these fluctuations have become more severe and frequent, particularly in Yogyakarta. These changes in weather patterns cause crop failures. This, in turn, forces farmers to use costlier hybrid fertilisers, putting an additional financial burden on them. Financial constraints often lead to food shortages and nutritional deficiencies, hindering educational and social activities.
- Furthermore, financial challenges have also led to health problems, with nutritional deficiencies especially affecting children and women. Reducing incomes and growing financial challenges can lead to psychological health issues. For example, during the COVID-19 pandemic, fishing was disrupted in the coastal areas and individuals were forced to seek alternative livelihoods. This transition caused significant stress and anxiety as people grappled with uncertainties regarding their income. Similar experiences of livelihood loss are also being felt due to climate change-related stresses.
- Political factors also wield considerable influence in the Gunung Kidul region. For example, in the case of Gunung Kidul, the development of infrastructure, such as roads and resorts, has led to the displacement of long-tailed macaques from their natural habitats into residential areas, resulting in inconveniences for the local populace. Despite concerted efforts to protect their properties, addressing the macaque issue presents challenges. Furthermore, government insurance programmes for the agriculture and livestock sectors compound the existing challenges.
- The endeavours aimed at mitigating the above challenges often encounter obstacles from communities, including resistance to the adoption of bio-fertilisers. Additionally, the insufficiency of pertinent information and adequate awareness on these issues impedes the efficient management of agriculture and livestock. In case of livestock, disease spread is very fast and livestock owners are seldom aware of institutionalised support for them with this regard. There is a lack of proper record keeping in case of crop yield loss and livestock loss.
- Forest fires have far-reaching impacts on the environment, society and the economy, which are often profound and long-lasting. One of the consequences of forest fires is reduced capacity of the land to hold water, resulting in rapid floods.

- Vulnerable groups still lack comprehensive data collection efforts in Indonesia, hindering targeted support. The absence of official identification cards (ID cards) for many vulnerable individuals, especially disabled people, poses difficulties in accessing government assistance.
- Disabilities remain a sensitive and often concealed topic in society, making it challenging for the government to provide the necessary facilities and services, such as wheelchairs, sign language interpreters, and evacuation procedures for disabled people during emergencies. During health crises like the COVID-19 pandemic, efforts to vaccinate vulnerable and disabled populations faced obstacles due to misinformation. The lack of awareness and infrastructure for inclusive groups underscores the pressing need for more education and support.

Session: Protective factors, policy response, and proposed outcome of research

During this session participants deliberated on categorising responses and policy measures that address climate change L&D. The group discussed protective measures that could be scaled for response to DRR, health and human mobility in Indonesia. The following points discuss the various implementations of L&D mitigation regarding physical and social determinants of climate change impact, from private, public, and cross-collaborative sectors:

- **Empowering marginalised communities with renewable energy and water access:** initiatives like those led by Yayasan Stromnesia untuk Nusantara are addressing the pressing needs for clean water and electricity in underserved communities, emphasising preventive measures and improved societal welfare.
- **Integrated climate monitoring by the coordinating ministry:** The Coordinating Ministry for Maritime and Investment Affairs is developing a comprehensive system for monitoring climate-related data, enhancing their focus on mitigation efforts.
- **Grassroots climate initiatives with a focus on youth:** Numerous grassroots activities, including climate literacy programs for children and youth, aim to harness the potential of the younger generation as change agents. These initiatives also promote waste management and community resilience through practical, everyday actions.
- **Evidence-based approaches and preventive measures:** Common project practices involve evidence-based assessments prior to implementation and a primary focus on prevention, anticipation and risk mitigation, rather than reactive solutions.
- **Government programmes initiated within the Ministry of Finance and the Ministry of Manpower, Indonesia** promote the employment and skills development of disabled people.

Regarding protective factors from before, during and after disaster:

Social protection measures, such as cash distribution initiatives, play a crucial role in enhancing the wellbeing of citizens. This includes advocating for equitable gas and fuel prices across different geographical areas and boosting the value of nutritional crops for community welfare. However, social protection in Indonesia faces limitations, including rigid welfare indicators and unclear ministry roles in responding to climate change impacts on livelihoods.

Two levels of risk factor protection:

Policy level: Effective climate change planning should prioritise programme monitoring and evaluation, leading to national guidelines. Addressing the risk of governmental nomenclature changes affecting personnel and funding priorities requires a clear funding cycle that considers sustainability and knowledge transfer.

Implementation and reflection level: While implementation reference material is abundant, context-specific programme knowledge is scarce. Reflecting on past and ongoing projects can inform data-driven decision-making for adaptive future projects. Given common project timeline constraints, this reflective process is essential for tailoring solutions to specific communities.

When the private sector is involved in providing support to vulnerable communities, it is also important to ensure integration and utilisation of existing systems, instead of creating another system or data set. For example, a climate risk log needs to be reported to an integrated system and there should be efforts to ensure that the interpretation of hard science data can be understood by communities in the local context.

Adaptive social protection is applied at a conceptual level — but at the implementation level, there is confusion, as there aren't many good practical examples to learn from.

Slow-onset events often receive less attention. As a result, these impacts remain unobserved, making it difficult to appreciate the urgency for protective measures in health, sanitation, and economy. This lack of attention hinders the ability of provincial and district governments to mobilise the necessary resources.

- To address this issue, continuous and coordinated programmes dealing with climate-induced loss and damage are essential. Vulnerability assessment at country level is not very good. There are some vulnerability and risk index but the indicators are not comprehensive for across the regions.
- Awareness and information on vulnerability is also usually not interpreted or easily understood. The participants discussed about some effort in developing an app-based information system on vulnerability and risks to create a better grid system that is more accurate and more informative. The information relayed can be interpreted in its implication to daily lives, which then can be basis of decision making.

Investment for both slow-onset and rapid-onset needs to be equally sustainable

- There is a need for more discussion and exchange on parameters that can be impacted by climate-induced disasters. As climate change touches on so many aspects of life, each parameter advocates for the advancement of its own field, therefore fundings usually work in silos. The shift to an integrated approach is pertinent for including anticipatory climate change related support.
- The financial allocation of a country should consider protective measures. Over the last many years, private sector involvement in funding for research and market of climate change has been pertinent. Hence, private sector involvement is vital, particularly in connecting research and the market.
- Financial protection measures are sometimes not able to scale successfully, for example farmers in Indonesia that do not own land and are not willing to invest — do not get protection under crop insurance. Insurance reimbursements are usually made to the individuals who register, and those who are not aware and not registered under the schemes, are left out. There needs to be a regulated insurance scheme.
- The participants discussed about some positive examples of protective measures including the development of network of islands (would also apply to all Island nations) islands support each other during disaster. For example, in case of a flood and sea water intrusion in one island, another island was ready to adapt and become the shelter for the affected individuals. This was in coordination with the National Agency for Disaster Countermeasure. Although there were limitations, with respect to evacuation, it is a positive step towards protection and support for climate induced disasters.
- Another example discussed was of a significant investment in mangrove plantation to rehabilitate over 600 hectares of land. The project aims to achieve restoration of land and enhance the resilience of the coastal communities with respect to climate induced disasters.

Key messages

- Bringing attention to the concept of 'slow-onset' within the taxonomy may aid in emphasising the often-subtle losses and damages caused by climate change. This increased awareness can make us more attuned to the real-life impact on individuals and enhance our comprehension of the most suitable response for local communities.
- Predisposing factors magnify the consequences of precipitating factors, with extreme weather events and slow-onset environmental changes disproportionately affecting marginalised and vulnerable populations.
- Political will plays a crucial role in allocating resources and setting priorities for climate-related initiatives and climate finance. Utilising different diplomacy approaches or leveraging social media for public pressure can help emphasise the urgency of potential L&D from climate-induced disasters.
- Advocacy efforts on climate L&D may need more research. Projects often prioritise assessment and preliminary research over knowledge generation and sharing, necessitating increased investment in advocacy work.
- There is a deficiency in effective methods for motivating communities to participate in climate-related initiatives. Additionally, independent monitoring faces limitations, particularly when dealing with aspects that surpass local capacities, such as those that require advanced technology and engineering expertise.
- Empowering youth has been a priority in most programmes, but it has often favoured those from higher economic backgrounds, despite their not being the most affected group. Empowering every individual, particularly marginalised communities, is essential in addressing the impacts of climate change. Strategies include leading by example to empower various population groups. Politicians may need to embrace unpopular decisions for effective advocacy.

This paper provides a comprehensive taxonomy of climate-attributable loss and damage in context of Least Developed Countries (LDC) and Small Island Developing States (SIDS) in Asia and the Pacific. It highlights the need for tailored strategies encompassing demographic, socioeconomic, and political challenges, and suggests a three-pillar approach involving grassroots engagement, collaboration among stakeholders, and evidence-based policymaking to mitigate climate change effects.

IIED is a policy and action research organisation. We promote sustainable development to improve livelihoods and protect the environments on which these livelihoods are built. We specialise in linking local priorities to global challenges. IIED is based in London and works in Africa, Asia, Latin America, the Middle East and the Pacific, with some of the world's most vulnerable people. We work with them to strengthen their voice in the decision-making arenas that affect them — from village councils to international conventions.



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