

Chapter 7

Loss and Damage Associated with Climate Change: What and Why, Stakeholder Perspectives, and a Way Forward

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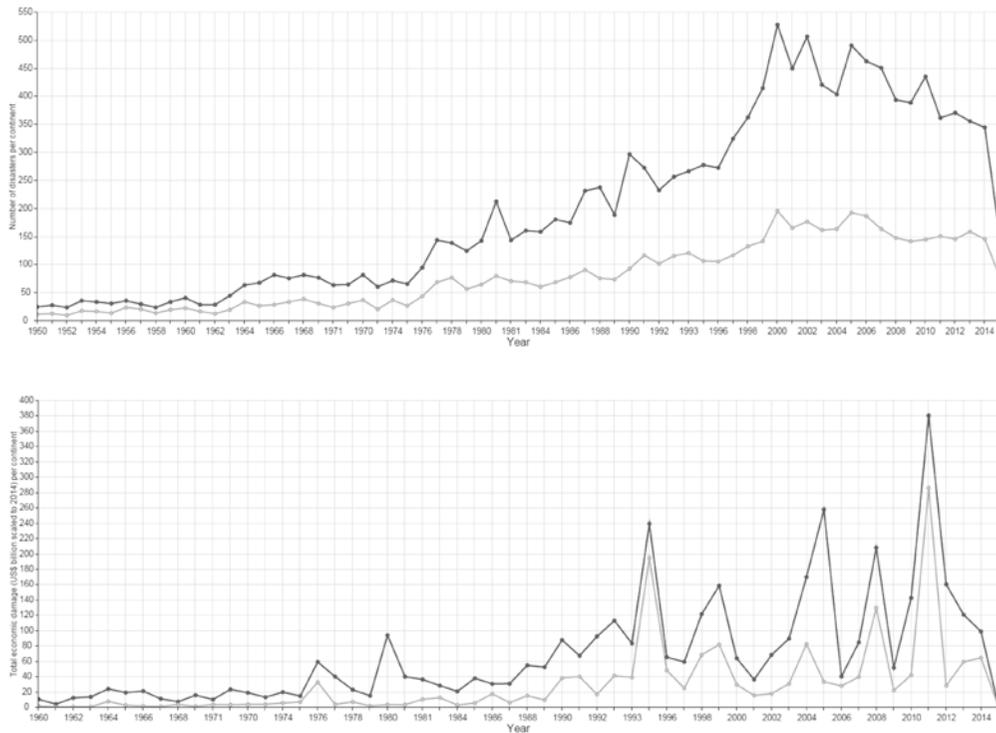
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Key Messages

- Loss and damage (L&D) associated with climate change is inevitable due to a combination of factors operating in tangent with each other. These include the failure to achieve desired greenhouse gas (GHG) mitigation levels by a set period of time beyond which there are high risks of the climate system entering into an irreversible phase, and failure to achieve effective adaptation amongst vulnerable people.
- Stakeholders engaged in L&D have a clear but diverse understanding of the definition of L&D and how it can be mitigated. While there appears to be some agreement on L&D being defined as the residual losses and damages after implementing adaptation actions, others call for the need to apply a more broadly-based definition, with L&D providing the impetus for stronger mitigation and adaptation outcomes.
- Several proposals to address L&D were made to the processes under the United Nations Framework Convention on Climate Change (UNFCCC). It has been found that the principles which countries support for international negotiations and the scope of L&D for a country are largely governed by its potential vulnerability to climate change and the predicted impact of climate change. It is evident that the economic power of a country largely determined its support of risk insurance and related funding mechanisms.
- Despite the high emphasis on risk insurance and related financial risk management options, in the current discussion on L&D there is little evidence on how risk insurance will help reduce L&D, especially non-economic L&D (NELD). There is a need in the design of risk insurance products to optimise L&D reduction outcomes.
- Decision makers need to be provided with a set of simple tools/formats to help capture major NELD that impacts decision-making for optimal climate change adaptation (CCA) and disaster risk reduction (DRR) outcomes.

1. Introduction

Until recently, the focus of international negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) has largely been on climate change mitigation. It was the Bali Action Plan in 2007 that shed a spotlight on the need to enhance climate change adaptation (CCA). One of the factors that contributed to the focus on CCA has been the fact that a significant increase has been observed in the number of disasters and their impacts over the past several decades (see Figure 7.1). This increase has largely been attributed to weather-related events. The realisation that emissions reduction efforts have not been enough to prevent climate change impacts is now evident.



Source: EMDAT 2015

Figure 7.1 *The number of natural disasters (above graph) and their economic impact (lower graph) on all continents (black line) and in Asia (gray line)*

The loss and damage (L&D) associated with climate change has emerged as one of the important issues needing urgent attention at both national and international levels for a number of reasons. Important factors contributing to L&D are associated with limitations in curtailing greenhouse gases (GHG) emissions (to levels that will not exacerbate the climate change impacts), limitations in scaling and ability to maximise effective adaptation, and the inability to develop effective mitigation and adaptation interventions. While there are no definitive research findings that provide an indication of the extent of the L&D that may occur (due to deficits in mitigation and adaptation), it is expected that there will still be significant residual L&D. It will be crucial to take this scenario into

consideration in all kinds of developmental planning interventions because it will enhance the capacity of stakeholders to deeply understand the issues associated with mitigation and adaptation, and possibly develop innovative solutions to push the boundary of mitigation and adaptation to levels that have not been considered before. The concept of L&D has been developed within the UNFCCC's adaptation framework in the context of climate change and is one of the more recent work streams of the international climate change regime (Surminski and Eldridge 2013).

Keeping in view the fact that L&D has emerged as an urgent issue to be addressed, this chapter aims to review the ongoing discussion on L&D, to identify adaptation barriers and limitations of the current L&D approaches, and to suggest a way forward to overcome such limitations, drawing on the findings of ongoing IGES work on stakeholder positions and perceptions related to L&D. The remainder of this chapter is organised as follows. Section 2 begins by describing the what and why of L&D, including factors that may have led to L&D, stakeholder perceptions on L&D as found in the literature, and the barriers to adaptation that have implications for L&D. Sections 3 and 4 present the methodology and the results of two sets of IGES research on L&D: one is a survey of stakeholders engaged in CCA and disaster risk reduction (DRR) about how different stakeholders perceive the issues of L&D and related solutions; and the other is a regression study on factors that may explain the position taken by various countries in the L&D related negotiations under the UNFCCC. Based on observations from these surveys, Section 5 discusses the limitations of the current approaches being promoted to address L&D, and Section 6 suggests a way forward for addressing L&D.

2. What and why of loss and damage

The term loss and damage has often been referred to by both the DRR and CCA communities. However, there is no common definition that all stakeholders agree upon and hence the understanding about L&D can vary from stakeholder to stakeholder engaged with development, CCA and mitigation fields. Under the UNFCCC, L&D has often been referred to as 'L&D associated with the adverse effects of climate change.' In addition, UNFCCC literature indicates that L&D has also often been placed within the context of extreme events, both slow and sudden onset disasters. To a certain extent, this comes from the observation that most often the DRR community looks at L&D from the perspective of dealing with sudden onset disasters while the CCA community tends to focus more on the slow-onset disasters. Since it is being discussed within the context of climate change, many issues raised in relation to adaptation and mitigation also have relevance to L&D; issues such as historical responsibility, vulnerability, polluter pays principle, common but differentiated responsibilities, etc. For the CCA community, L&D has emerged as an issue that could undermine the adaptation achieved on the ground. This is a critical issue that questions the sustainability of interventions and one that could leapfrog the adaptation to a level from incremental to transformative gains in achieving significant reductions in climate risk.

The term loss and damage has also been widely used within the DRR community to refer to the impacts that disasters cause on society, infrastructure and the natural environment. However, as in the case of the climate change community, no common definition is adhered to in the assessment of L&D, and reaching a consensus has become a critical component of the work of professionals engaged in DRR. Often, the L&D caused by disasters in the immediate past has determined the resources to be allocated for preparing for future disasters within the planning cycles of governments, although such planning has largely been limited to the '3Rs' of DRR (rescue, relief and rehabilitation).

Only recently, efforts have been made to understand the available information to design and implement robust risk reduction strategies from a strategic point of view.

While there is no agreed definition of the term loss and damage under the UNFCCC, the Cancun Agreement reached in 2010 set boundaries by referring to impacts from extreme weather and slow onset events (UNFCCC 2015). These include sea level rise, increasing temperatures, ocean acidification, glacial retreat and related impacts, salinisation, loss of biodiversity, land and forest degradation as well as desertification.

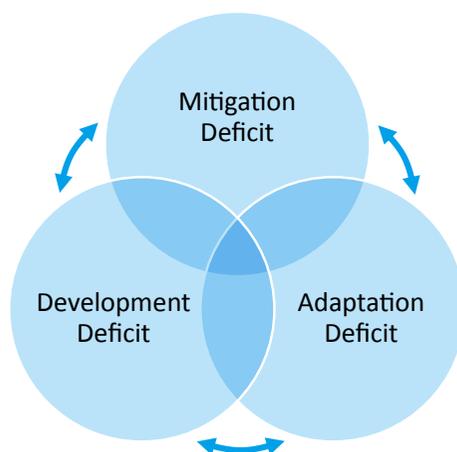
Some attempts at elaborating the meaning of L&D have been made. According to Germanwatch (2012), the concept of L&D represents the actual and/or potential indication of negative impacts caused by climate change that affect human and natural systems. The term “damage” is classified as negative impacts that can be repaired and/or restored; an example would be damage to coastal embankments caused by severe flooding. The term ‘loss’ can be characterised as negative impacts that cannot be repaired or restored; an example would be loss of culture or heritage, loss of local habitat etc. due to climate change.

Warner et al. (2012), under the work supported by the Climate and Development Knowledge Network (CDKN), examined L&D as a result of inability to adapt or insufficiency in the adaptation process itself. Warner concluded that the existing CCA measures are not enough to avoid L&D and that these measures have costs that are not strictly economic but also social, cultural and associated with health. Non-economic loss and damage (NELD) even though fuzzy and hard to measure can have one of the most “significant and far reaching consequences” (Warner et al. 2013). Economic loss and damage refers to all those losses and damages accrued to assets and resources that have direct economic value in the market. NELD refers to losses and damages accrued to those elements of society that do not have direct economic value in the current market but still play an important role in the overall wellbeing of the society, often socially.

Based on the above discussion, this section illustrates the factors that lead to L&D. This is done by describing three deficits leading to L&D in the first sub-section. The second sub-section further elaborates on various barriers and limits to adaptation that hinder us from achieving the fullest adaptation possible leading to L&D. The third sub-section further elaborates on the governance issues that reflect how various stakeholders approach the issues of adaptation and L&D.

2.1 Three deficits leading to loss and damage

L&D associated with climate change can be attributed to three deficits: a) development deficit; b) mitigation deficit; and c) adaptation deficit (Figure 7.2). These three deficits are related with each other (overlaps in the Venn diagram) and one deficit can have impact on other kinds of deficits (hence the bi-directional arrows in Figure 7.2).



Source: Authors

Figure 7.2 *The three deficits leading to loss and damage associated with climate change*

Development deficit refers to development that is needed in a country but has not taken place largely due to information imperfections (players often may not know what works the best), governance failures (failures in organising and implementing actions on the ground) and limited capacities (financial, human resources etc.). The mitigation deficit is the gap between global temperature increase that is likely to occur as a result of current mitigation efforts and the target of no more than 2°C temperature rise by the end of the 21st century. It is becoming clearer that reaching this goal does not seem to be possible when judged by current GHG emissions trends (Sanford et al. 2014). GHG emissions continue to rise, with emissions in the past decade accounting for more than 50% of the total emissions from 1,750 to 2,010 (IPCC 2014). Several countries have failed to achieve carbon emission targets agreed under the Kyoto Protocol (UNFCCC 2012a) and the pledges made under intended nationally determined contributions (INDCs) fall well below the levels required to stabilise GHG emissions at 2°C (CAT 2015). Hence, GHG emissions are likely to exceed the 2°C target as per Representative Concentration Pathway scenarios 4.5, 6.0 and 8.5 (IPCC 2014). This is expected to have serious consequences in terms of climate change impacts.

The adaptation deficit refers to the gap between actual adaptation and the level of adaptation that is required to adjust to climate change impacts (without incurring L&D) that are the consequence of a mitigation deficit. The adaptation deficit has been widely discussed in a discontented manner among the climate change community in terms of the deficit in financing for adaptation (Prabhakar 2013), insufficient scaling up of adaptation (Nambi et al. 2015) and lack of capacity to plan, design and implement appropriate adaptation interventions (ND-GAIN 2015). The adaptation deficit could also be understood in terms of how poor countries are disproportionately impacted by climate change compared to rich countries due to the differences in vulnerabilities and associated risks (Frankhauser and McDermott 2013) and the possible negative outcomes of adaptation including maladaptation (Barnet and O'Neill 2013). It is to be noted that developed countries are also prone to adaptation deficit as is evident from the increasing impacts of climatic events and growing emphasis on adaptation planning in these countries. Adaptation deficit could also occur due to our limited understanding as to what

extent technologies could contribute to reducing vulnerabilities and the related shortfall in their performance when they are actually implemented on the ground. All these situations will only exacerbate the climate change impacts leading to higher L&D outcomes.

2.2 Barriers for addressing L&D

The development, mitigation and adaptation deficits all have implications for L&D. Building upon the previous section, this section elaborates barriers that hinder adaptation leading to L&D.

According to Adger et al. (2008), on a larger scale there are three dimensions that could characterise CCA limits: ecological and physical limits; economic limits; and technological limits. Analysing CCA from the point of view of ecological and physical limits to adaptation provides the possibility of investigating agriculture and biodiversity under changing climates with the help of physical modelling. In terms of economic limits to adaptation, one could investigate cost-effectiveness and cost-benefit of the adaptation in connection to L&D. Finally, approaching limits to adaptation from a technological point of view gives an insight into future construction and innovation analysis, for example coastal defence or building design.

Given the unpredictable and ever-changing nature of the global climate, adaptation will always be challenging. The process of adaptation must be continuous, where lessons are drawn from the past and different aspects of CCA can be equally investigated for their future relevance. The greater the increase in temperature the more damage can be anticipated; consequently the less prepared we are for adaptation, the more L&D we experience (ActionAid et al. 2012). The limits of how far humans and ecosystems can adapt to some slow-onset impacts such as rises in sea levels, rises in temperature, loss of biodiversity and desertification are very real. Because of the magnitude of these impacts such as sea level rise, *in situ* adaptation becomes gradually impossible since the territory itself will become uninhabitable.

There is also a view among some researchers concerning climate change and its limitations in terms of scientific predictability. It is very hard to scientifically predict and evaluate exactly the course of events for the future when dealing with climate change. According to Dessai et al. (2009), the uncertainties arise from limitations in knowledge, such as cloud physics, randomness (due to the chaotic nature of the climate system) and intentionality. All these factors combined make it very hard to quantify and model the future of climate change, which leaves predictions based heavily on assumptions. This so-called 'explosion of uncertainty' becomes even more evident when conducting climate change impact assessments with the purpose of devising national or local planning for CCA.

Climate science has proven that unless both natural and anthropogenic forcing are included, climate model simulations cannot simulate the observed global changes in the surface temperature and other phenomena related to climate and its bio-geophysical factors of the last 100 years. There will always be a trade-off between accuracy and precision, where certain projections can have high accuracy (being correct in all details) but low precision, which can be characterised as the standard deviation of the measurements (Desai et al. 2009). This makes forecasts harder to analyse for scientists and harder for policymakers to take appropriate measures for CCA.

Lack of technical and scientific information and the capacity to use it at the local level is one of the most important barriers to adaptation. This is why decision makers need to assess adaptation options in the context of climate change effects on the local community

and infrastructure (Corfee-Morlot et al. 2010). Engaging the local stakeholders in CCA discussions is a challenge in itself. There is no single approach that can work in different contexts since CCA is highly contextualised. In addition, adaptation is also a multi- and inter-sectoral issue which could raise governance challenges akin to other environmental issues.

Society and social values also impact adaptive capacity and adaptation options chosen. The structure of societies, values, knowledge, relationship between individuals, institutions and the state all affect adaptation (Adger et al. 2008). Since change is going to be evident between different societies, the limits to adaptation may vary as well. Social structure can be divided into four metadomains that need to be explored from a social perspective: ethics (how and what we value); knowledge (how and what we know); risk (how and what we perceive); and culture (how and why we live) (Adger et al. 2008). Together, these domains represent how we view and value risks and impacts connected to climate change, and also how much we know about them. This is also influenced by how we live.

Social barriers to adaptation are generally associated with the social and cultural processes that govern how individuals respond to climate change related stimuli. According to Jones and Boyd (2011), there are three types of barriers in connection to social adaptation: cognitive, normative and institutional characteristics. The cognitive barriers to adaptation relate to the thought processes and psychological effect on the actions of different actors in a climate debate. How individuals act in accordance to climate change and adaptation will depend on their thought processes, values and ethics, as well as how well they adapt psychologically. For instance in many regions of South Asia, gender and caste are two of the main social institutions which inherit many predefined norms, rules and values that have an influence over how the individual may behave in response to unexpected (extreme) event and deal with the shock and stress.

2.3 Adaptation governance and the role of stakeholders

Adaptation is essentially an issue where multiple stakeholders, who may differ in their opinions and positions, are engaged to find solutions and hence it is pertinent here to discuss the roles of different stakeholders in the overall governance of adaptation in general and L&D specifically, at international and national levels. This sub-section elaborates various adaptation governance issues and the role played by various stakeholders. In particular, the section stresses the need for greater agreement and continuity of actions between international and national levels for effective adaptation governance.

Climate change issues are governed through national and international level structures. These are influenced by various stakeholders and hence their opinions assume importance in the way issues are addressed. International cooperation in general has not been very successful when it comes to the issue of global commons due to the conflict and asymmetry between countries that bear the cost of action and those who benefit from action (Corfee-Morlot et al. 2010). The issue of international cooperation is even more pronounced in the case of CCA and mitigation, as this deals with a global common where actions have to be taken both globally and locally, creating tensions over who should invest resources where. L&D faces a similar challenge to that of adaptation and mitigation regarding international governance.

At the international level, the UNFCCC, the decisions of the Conferences of the Parties (COPs) such as Kyoto Protocol and Warsaw International Mechanism for Loss and Damage, constitute important mechanisms for addressing these issues. At the national

level, laws and guidelines are set by various ministries and departments, and work is implemented by government agencies, non-governmental organisations, consortiums and networks. These constitute important stakeholders that could influence the way adaptation and mitigation interventions are designed and implemented. At the local level, adaptation actions and decisions are taken in an uncoordinated manner by households, firms and organisations; there is no governance beyond this.

The governance of adaptation manifests itself at all levels, from international to local. Hence, interaction is important across all these levels including between national and local governments as well as nongovernmental organisations (Paavola and Adger 2005). At the local level, community organisations, businesses as well as urban planners or water resources managers invest in adaptation measures that influence the decision-making and policy-planning process. Without continuity and agreement on decisions made from higher levels to local levels, there could be a negative impact on the collective response to climate change (Corfee-Morlot et al. 2010).

According to Corfee-Morlot et al. (2010), there are three basic layers of decision-making and influence that are divided across different levels of policymaking. The outer periphery consists of public decision-making by institutions that represent the government, such as city authorities, judicial system and or parliamentary bodies. The inner periphery is made up of a range of self-governing institutions such as universities, professional agencies, associations and foundations. There is no one level where decision-making should happen. These complex hierarchical institutional structures and engagement of multiple stakeholders complicates matters when addressing the issue of adaptation and L&D.

The institutional hierarchy could affect the ability of local institutions to adapt to climate change. The main limit could be that policy plans are usually set at higher levels of governance, leaving local level authorities with limited freedom as their roles are often limited to implementing plans and policies set by those higher up the hierarchy with not much room for innovation in addressing emerging issues such as climate change. Municipalities are often highly constrained in terms of their financial capacity; they are in a way just delegate agents of a higher power (Measham et al. 2011). However, things are changing with local governments becoming proactive in addressing long-term climate change impacts in response to local needs (Tsurita et al. 2013). Another related governance challenge in adaptation and climate change governance is the fact that much of it includes long-term policy problems with time lags between policy planning and implementation, and the effects of the policies; it could take several generations before effects are manifested. The policy planning and measures are a part of a very complex system and our understanding of this particular system is still incomplete and filled with uncertainties (Underdal 2010).

Due to above described hierarchies and related governance challenges, reaching an agreement at international and national levels could be challenging especially for contentious issues such as liability and compensation for L&D. The issue of "liability" assumes importance both at the international and national level. At the international level, liability has been discussed in the context of providing support to vulnerable countries for the damages caused through climate change (Huq 2014). In fact, negotiations to evolve a mechanism to address climate change have been taking place under UNFCCC since 1992 (UN 1992) and more specifically on L&D from 2007 onwards (Schafer and Kreft 2014). In Article 4 of the UNFCCC Convention, Paragraph 3 states that developed countries are liable to cover the costs of developing countries to meet their obligations under the Convention. This includes preparing national inventories of sources and sinks of GHGs (Paavola and Adger 2005). At the national level, national governments are

expected to provide support mechanisms for the affected individuals and communities that have experienced some sort of L&D due to climate change. However, it is not clear how national governments should address the issue of supporting those affected in the context of L&D and it looks like the issue is expected to be covered by the existing DRR (to a large extent) and CCA (to a limited extent) processes which necessitates greater coordination between these communities.

The compensation issue in itself is very complicated since it is difficult to scientifically pinpoint the exact cause and effect factor with climate change (Trenberth et al. 2015). Because of this complexity, there is a chance that countries which contribute the most GHG emissions can easily deny that their emissions are associated with specific weather events. Science and policy aspects play an important role here; the policy-science interaction has to involve three main criteria: credibility, legitimacy and finally salience. All three factors depend on the reliability and accuracy of science predictions in a field of uncertainty and ambiguity that are a part of climate change predictions (Corfee-Morlot et al. 2010). Despite their importance, science-policy linkages are poorly developed in most countries, and policy making has often been based on political promises made by the elected constituents, rather than based on objective assessment of policy options at hand for the overall wellbeing of the society. This could mean a greater failure in adaptation interventions, necessitating an even greater science-policy linkage.

3. Methodology for analysing stakeholder perspectives on loss and damage

As set out in the introduction, insights into the stakeholder positions and opinions on the issue of L&D can help us to obtain greater understanding so as to develop appropriate solutions. Two approaches were followed to assess the stakeholder perceptions associated with the issue of L&D: a) analysis of submissions made to the Conference of the Parties to the UNFCCC (UNFCCC-COP); and b) an online structured questionnaire survey of stakeholders engaged in CCA and DRR. While the first approach is based on an analysis of submissions made to the UNFCCC on the subject of L&D (indirect), the second approach is based on a survey of stakeholders engaged in CCA and DRR (direct). The difference in approach was partly due to conducting these studies under different projects, as well as a lack of sufficient means to approach stakeholders engaged in climate change negotiations under the UNFCCC. The methodology adopted in both these studies is presented in this section.

3.1 Analysis of submissions to UNFCCC-COP

The submissions to UNFCCC-COP were analysed with the aim of understanding factors influencing country positions on L&D. Whereas most related studies have environmental output variables as their subject of analysis (e.g. carbon dioxide emissions or the number of environmental treaties signed) (Bailer and Weiler 2014), this analysis focused on the choice of bargaining positions in climate change negotiations and the question of which factors explain the choice of these positions. The study used a multiple linear regression method to assess the potential relation between the country positions on L&D in international negotiations and selected independent variables. The reason for choosing multiple linear regression as against methods such as document analysis and interview, among others, has been that these methods suffer from several limitations as outlined by Bailer and Weiler (2014). In addition, regression analysis provides a means of statistically testing the relationship between factors that may influence the negotiation positions and the specific positions taken by countries.

The UNFCCC work programme on L&D has on several occasions called for submissions asking participating countries and observers to give their views and inputs on specific topics. The data for country positions on L&D derives from individual and group submissions to UNFCCC in the years 2011 and 2012: a) on possible elements to be included in the recommendations on L&D (UNFCCC 2012b); b) on what to consider under the three thematic areas of the work programme on L&D; and c) views and information on elements to be included in the work programme on L&D.

For the purpose of this study, data from 31 countries including the group submissions for the European Union (EU), the Alliance of Small Island States (AOSIS) and Least Developed Countries (LDCs) was scored. It is important to highlight the limitation of data at this point as this is a very marginal representation of the 190-plus countries participating in international negotiations. It should be noted that economically similar countries have submitted group submissions which for this study have been considered as single submission. Based on the elements emerging from the text of these submissions, the data for the 31 countries was coded for the dependent variables presented in Table 7.1. Table 7.2 presents the list of explanatory factors that could possibly provide a logical framework to explain the position taken by different Parties to the Convention on the subject of L&D.

The predictors of a forecasting analysis of UNFCCC agreements should reflect the variables most pointed to as explanatory factors of climate change negotiations (Genovese 2012). The underlying arguments for choosing these explanatory factors are discussed below.

The most economically powerful countries drive the negotiation strategies. The first explanatory factor emerging from the literature is the endowment of economic resources, otherwise referred to as economic capabilities. Power dynamics undoubtedly play an important role in climate change negotiations (Bailer 2012). Most argue that 'rich' states face the highest opportunity costs from bargaining, which leads them to have more influential positions over climate policy integration than 'poor' states (Ott et al. 2008).

It is economic power that steers countries to take less cooperative positions in international negotiations. International negotiations bring countries to a common consensus in addressing crucial environmental issues such as CCA. To understand the influence of the future trends on these discussions and countries' decisions, projected economic growth and predicted impact of climate change have also been considered as explanatory factors.

Countries highly vulnerable to climate change will take a more cooperative stand in climate change negotiations. Another significant factor emerging in the climate change negotiations literature is the risk of natural devastation, or what can be referred to as climate vulnerability. This factor, contingent to climate change, represents a strong bargaining power (Genovese 2012; Bailer 2014).

The predicted impact of climate change on the country will influence the countries' position. Countries tend to position their arguments and negotiations depending on the expected climate change impacts on their country to safeguard their future interests.

Countries with stronger democracy will be less aggressive in negotiation positions. Strong domestic interest in environmental negotiations might funnel a state to use rather hard strategies in order to demonstrate its determination to constituents. Accountability to voters might result in representatives being more resolved to reach their negotiation goals (Bailer 2012; Jung 2004).

The dependent variable scores were categorised on a scale of 0-3; where 0 is for least ambitious goal, 1 for low ambitious goal, 2 for moderate goal and 3 for ambitious goal. Although efforts were made to ensure gradual hierarchical scores, due to the varying principle on which the countries have based their opinions, it was difficult to get clear hierarchical scores. Based on this scale, all the 31 country submissions were scored independently for each of the eight elements. Regression analysis was carried out to verify the influence of various explanatory factors on the elements of the UNFCCC submissions on L&D.

Table 7.1 List of dependent variables and meaning of the scale assigned

Dependent variable	Scale and its meaning
1. Principle supported by the country	0 - Countries have not clearly identified any principle 1 - Countries showed least dependence on principles such as polluter pays principle 2 - Common but differential responsibility 3 - Principle of historic burden, with demand for financial contribution from the developed nations.
2. Scope of loss and damage (L&D)	0 - No mention of definite scope for L&D 1 - L&D is the residual risk after mitigation and adaptation efforts have been implemented 2 - L&D after the implementation of mitigation efforts 3 - Need for assistance from the developed nations for L&D.
3. Gaps in assessing L&D	0 - No clear gaps are identified 1 - Lack technical knowledge and tools to assess L&D 2 - Lack of data to assess L&D 3 - Financial and technical capacity to initiate data collection and knowledge of tools to assess L&D
4. Risk insurance and risk management	0 - Least supportive or negative approach towards risk insurance as a tool for risk management 1 - Countries supporting risk insurance if it is nested along with the existing risk management approaches 2 - Increased support for risk insurance mechanism with low burden on the developing countries 3 - Complete support for a separate risk insurance for L&D funded but the developed countries
5. Compensation and rehabilitation	0 - Emphasis on prevention through mitigation and adaptation efforts than on measures for compensation 1 - Consider compensation as post disaster measure already addressed in CCA 2 - Expressed need for further discussion on L&D 3 - Compensation as an essential component for losses due to impacts of climate change with funding from the developed nations
6. Funding mechanism for L&D	0 - Not in favour of compensation as funding mechanism 1 - Consider rehabilitation funding to be drawn from the existing CCA funds 2 - Support compensation and willing to voluntary contribute for separate fund for rehabilitation and post disaster L&D 3 - Funding for rehabilitation and compensation should be met by the developed nations
7. Institutional setup for L&D	0 - No specific mention for the institutional setup 1 - Continue with the current setup to of the work programme for L&D 2 - Assign the role to the 'Adaptation Committee' 3 - Create a separate subsidiary body under the convention
8. Stakeholder involvement in international climate change negotiations	0 - No stress on involvement of stakeholders for discussions under UNFCCC 1 - Involvement of private stakeholders in the discussions at UNFCCC 2 - Involvement of experts and private stakeholders 3 - Engagement of all stakeholders including citizens, implementing authorities and experts

Source: Authors

Table 7.2 *Details of the explanatory factors and the null hypothesis (H₀) used for this study*

Name	H ₀	Data	Source
Environmental standards in the country	Environmental standards have no association with L&D positions of parties	Environmental Performance Index	2012 Environmental Performance Index (Yale University)
Countries' potential vulnerability to climate change	Potential vulnerability does not influence L&D positions of parties	Climate Vulnerability Index	ND-GAIN Vulnerability Index (2013)
Countries' commitment to climate change mitigation	Commitment to mitigation does not influence L&D positions of parties	Share of renewable energy in the total energy consumed	Renewable Energy Status Report, 2013 (REN21)
Countries' democratic status	Democratic status does not influence L&D positions of parties	Economic Freedom Index	World Economic Freedom Index 2012 (The Heritage Foundation)
Economic status of the country	Economic status does not influence L&D positions of parties	GDP per capita value	World bank GDP data, 2013
Projected economic status of the country	Projected economic status does not influence L&D positions of parties	Projected GDP per capita	World bank projected GDP (2013 data projected for 2030)
Predicted impact of climate change	Predicted impacts do not influence the L&D positions of parties	Maximum temperature rise due to climate change	IPCC Fourth Assessment Report (A2 Storyline scenario, 2045-2056)

Source: Authors

3.2 Online structured questionnaire survey

An online structured questionnaire survey was conducted, using surveymonkey, to elicit the opinions of practitioners engaged in DRR and CCA on various issues associated with L&D (Prabhakar and Nakata 2014). The questionnaire consisted of 13 subject-related questions, out of which 12 were multiple choice questions, and nine were questions related to the background of respondents. Specific questions were included to understand the current scientific knowledge to address L&D, areas where significant knowledge gaps exist, as well as current institutional mechanisms that could help in addressing L&D and identifying pertinent gaps. Although the survey uses largely multiple choice questions, an option was also given to respondents to note additional information and thereby capture details that may have not been envisaged by the study team when designing the questionnaire. Analysis was done only on specific questions for the purpose of comparison and presentation in this chapter. Responses were analysed using Microsoft Excel and the results were expressed as a percentage of total responses and a percentage of the analysed groups wherever applicable.

The survey was completed by 102 respondents (n=102) representing governmental departments, non-governmental organisations, universities and academic institutions, donor agencies, and the United Nations (UN) and intergovernmental agencies. Most respondents were from non-governmental developmental organisations (38%) followed by government departments (15%), independent think tanks (14%), universities (11%) and governmental think tanks (9%). Most respondents were in the age group of 30-50 (56%) followed by 50-60 (21%) and 18-30 (17%). 38% of the respondents have worked in CCA,

30% in environmental management and 12% in DRR. For the purpose of analysis, the responses were grouped into those associated with the Asia Pacific Adaptation Network (APAN) and those not associated with APAN, governmental and non-governmental respondents and respondents representing countries from Australia (4%), Bangladesh (13%), India (17%), the Philippines (13%) and Viet Nam (6%) as these were the largest representing groups among the survey responses. Analysis was done for selected questions for the purpose of focus and the results were presented as the percentage of responses.

4. Results and discussion

4.1 Submissions to UNFCCC

Tables 7.3, 7.4 and 7.5 provide the results obtained from the multiple linear regression analysis between the country positions as dependent variables with various explanatory factors using the R software. The result of the country position analysis shows that potential vulnerability to climate change and economic drivers tend to determine the kind of principle supported by the country (Table 7.3). The regression analysis highlights that more importance is given to a country's potential vulnerability to climate change than merely its economic power. The analysis brings to light the stronger influence of vulnerability to climate change among LDCs and AOSIS. Highly vulnerable countries have been rather bold and expressive in the negotiations (in some cases probably out of despair) (Bailer 2012). Although not very significant, projected economic growth could also influence what principle the country supports.

Scope of L&D: Regression analysis reflects less significant R-squared values. However, it could be observed that there was a stronger influence of actual potential vulnerability of the countries and the environmental protection standards in supporting the scope and definition for L&D of a country. Political and democratic freedom was found to have no significant role in defining the countries views on L&D. The negative estimate of the vulnerability index implies that less developed countries have supported a more ambitious scope, defining that any loss due to extreme events or slow onset events should be considered in the scope of L&D to impacts of climate change.

Table 7.3 Explanatory factors and the association with the country positions

Independent Variables	Country positions											
	Scope of L&D		Compensation and Post disaster rehabilitation		Funding mechanisms		Gaps in addressing L&D		Institutional Setup			
	P	R ²	P	R ²	P	R ²	P	R ²	P	R ²		
Environmental Standards	0.6890	0.0056	0.5033	0.0150	0.2256	0.0502	0.0729	0.1060	0.4121	0.0233		
Vulnerability to climate change	0.0137 *	0.1920	0.0045 **	0.2460	0.0000 ***	0.4770	0.0852	0.0980	0.1899	0.0580		
Commitment to mitigation	0.9150	0.0004	0.5480	0.0125	0.9140	0.0004	0.8840	0.0007	0.2642	0.0420		
Democratic status	0.0869	0.0970	0.0053 **	0.2380	0.0008 ***	0.3250	0.2880	0.0380	0.0461 *	0.1300		
Current economic status	0.0400 *	0.1375	0.0231 *	0.1650	0.0001 ***	0.4110	0.0194 *	0.1740	0.5254	0.0140		
Projected economic status	0.0440 *	0.1320	0.0185 *	0.1760	0.0001 ***	0.4200	0.0209 *	0.1700	0.5010	0.0157		
Projected climate change impact	0.0419 *	0.1350	0.1465	0.0710	0.0429 *	0.1330	0.1100	0.0855	0.8200	0.0018		

Note: *** significance level (P) at 0.001, ** significance level at 0.01, * significance level at 0.05. Values without stars are non-significant

Source: Authors

Risk insurance: Factors having significant influence in determining countries' positions on risk insurance are climate vulnerability and the predicted impact of climate change in terms of temperature rise (Table 7.4). Countries assess the need for assistance and mechanisms to deal with global environmental challenges based on their potential vulnerability and the predicted impact due to climate change.

Table 7.4 Explanatory factors found to have significant association with the principle supported by the countries

Independent Variables	P value	R ²
Environmental Standards	0.2058	0.0546
Potential Vulnerability to Climate Change	0.0000 ***	0.4438
Commitment to Climate Change Mitigation	0.7620	0.0032
Democratic status	0.0035 **	0.2581
Economic status	0.0012 **	0.3060
Projected Economic status	0.0009 ***	0.3186
Predicted impact of Climate Change	0.3201	0.0340

Note: *** significance level (P) at 0.001, ** significance level at 0.01, * significance level at 0.05. Values without stars are non-significant

Source: Authors

When comparing environmental standards, mitigation measures and economic factors, it was seen that the current economic status of a country is a strong determining factor for influencing the importance assigned to risk insurance (Table 7.5). In comparison to the potential vulnerability of the country, the driver that influences negotiation decisions is the future impact of climate change on the country. AOSIS and Gambia, on behalf of least developed countries, have voiced very strong opinions for the requirement of international risk insurance based on the future impacts the countries will face due to climate change.

Table 7.5 Explanatory factors found to have significant association with the position on risk insurance mechanism

Independent Variables	P value	R ²
Environmental Standards	0.2196	0.0080
Potential Vulnerability to Climate Change	0.0000 ***	0.4860
Commitment to Climate Change Mitigation	0.6370	0.0070
Democratic status	0.0042 **	0.2490
Economic status	0.0001 ***	0.4020
Projected Economic status	0.0001 ***	0.4060
Predicted impact of Climate Change	0.0091 **	0.2120

Note: *** significance level (P) at 0.001, ** significance level at 0.01, * significance level at 0.05. Values without stars are non-significant

Source: Authors

Compensation: Here the results were found to be not significant. No explanatory factors have shown to have influence on the countries' choice of compensation for L&D due to climate change. However, the political and democratic freedom of countries could be highlighted as key drivers of parties' position on compensation for L&D.

Funding mechanism: This reflects countries' views on the sourcing for the funding mechanism. Vulnerability to climate change, predicted temperature rise or existing environmental protection standards are found to have very low significance in determining the funding mechanism. However, existing economic power could play a crucial role in influencing the opinions of countries. It was seen that Annex I countries have chosen funding for more mitigation oriented approaches to address L&D.

Institutional setup and stakeholder involvement: None of the explanatory factors were found to influence the position of Parties on the nature of institutional setup and the necessity to have stakeholder involvement. The coefficients were rather small and insignificant. Considering the complexity of negotiations, and the number of factors influencing the choices a government has to make, this is not surprising. Certainly, this study suffers – as do other quantitative studies – from methodological shortcomings and the possibility that country behaviour in any international negotiations can only be measured approximately (Bailer 2012).

4.2 Eliciting expert views on loss and damage

In general, the results have indicated differences in opinion among the analysis groups i.e. nature of association with a network (such as APAN), representing country and organisational affiliation, while few responses for questions were uniform across the groups which is understandable in a survey of this nature. In terms of definition of L&D, most respondents preferred the definition to cover the entire actual and potential impacts rather than to limit the definition only to residual impacts after implementing adaptation and mitigation actions (Prabhakar and Nakata 2014). Lack of sufficient modelling tools and insufficient understanding on the past and current climate change impacts appeared to be the most important bottlenecks in understanding the L&D associated with climate change. While most respondents felt the need for improved understanding and knowledge in all the key sectors relevant to adaptation, those not associated with APAN activities preferred to focus on livelihoods and urban areas while those related to APAN thought that the knowledge gap is higher in the area of biodiversity and agriculture. Most governmental respondents (17%) thought there is a significant dearth of knowledge to address L&D in the agriculture sector while most non-governmental respondents (11%) felt biodiversity needs more attention for understanding L&D.

All is not lost in terms of institutional capacities. The survey has revealed that current institutional capacities created to address CCA and DRR could come in handy in addressing L&D. Most respondents felt that the experience from DRR and indigenous knowledge could be helpful in addressing L&D while the governmental respondents opined that only CCA specific experience will be helpful to address L&D. Most respondents have opined that investing in capacity building and implementing mechanism for collection and dissemination of data would be most effective in addressing L&D. The current institutional mechanisms were reported to be helpful, but issues such as lack of coordination at the local governments and among non-environmental ministries appeared to pose major limitations.

In response to the question on important intervention that could be effective in addressing the L&D, capacity building (45%) was chosen followed by data and information

gathering and sharing (41%) and financial measures such as insurance (15%). Trends were similar among the governmental and non-governmental respondents, both preferred data gathering and sharing followed by capacity building and insurance approaches. Respondents felt greater need for investing in early warning systems, information sharing not just among the scientists but also among vulnerable communities impacted by the climate change through networks by reaching out to the needy.

Respondents also thought that research and academic organisations constitute important stakeholders for working with national governments in effectively addressing L&D, followed by NGOs and other CCA-related institutions. Others felt that existing institutions lacked access to grassroots level issues and thus there is a need to implement local level climate change action plans which will enable concerted actions to be put in place at the local level. Surprisingly, very few respondents, irrespective of the group they belonged to, selected the private sector as an important ally in assisting governments in addressing L&D.

The survey participants asked the network to focus more on sharing scientific knowledge (climate change impacts and vulnerability assessments) and sharing on-the ground experiences of implementing adaptation projects and initiating pilot research projects on L&D. The need for implementing pilot projects to address L&D appeared significantly as an important gap in the current agenda of the network.

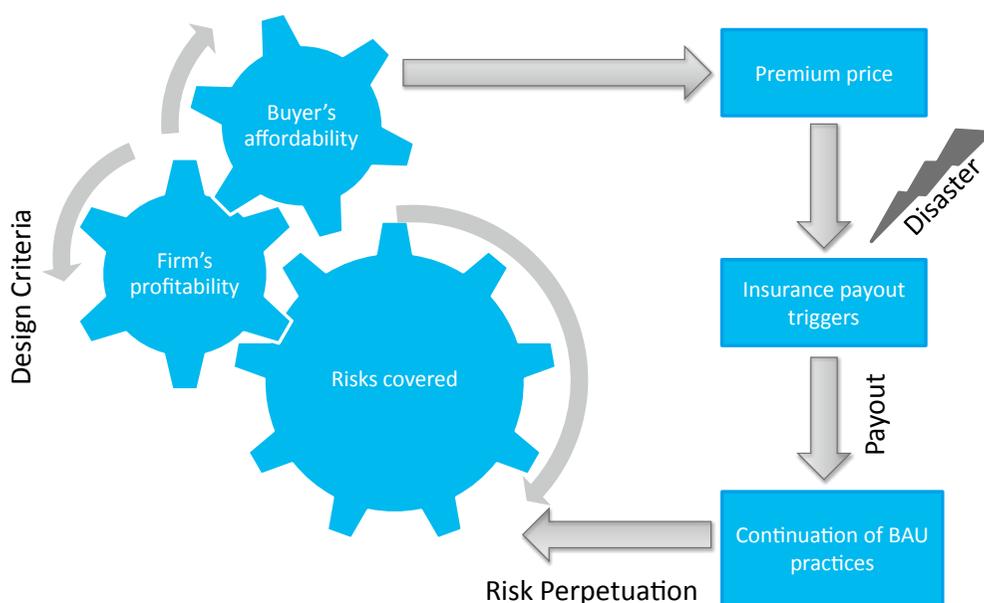
Among the individual countries, all respondents from Australia (100%) felt that there is insufficient scientific understanding on the issue of L&D. Respondents from India (94%), Bangladesh (85%) and Philippines (69%) reported a lack of scientific understanding to address L&D more in terms of insufficient modelling tools to project the future climate and impacts, insufficient understanding on the past and current climate change impacts, a lack of tools for downscaling the projected risks to a specific location, and no means to address the uncertainty. Others felt that tools related to estimating economic L&D are equally lacking, as are tools for projecting the physical impacts. Respondents from Australia identified livelihoods as an important area lacking sufficient understanding and knowledge to address L&D while respondents from other countries chose multiple areas lacking scientific knowledge. For example, respondents from India identified the water sector as lacking sufficient scientific knowledge while responses from Viet Nam identified water and livelihoods as important areas needing scientific research to generate knowledge.

5. Insurance potential for addressing loss and damage

Climate change has brought a new dimension to human development. Stakeholders across the broad spectrum of development have to address climate change concerns in their developmental efforts and various approaches have been tried and tested in pursuit of addressing the issue of CCA. From the foregone discussion, it is evident that risk insurance has emerged as an important approach among both the CCA and DRR communities. Risk insurance has been advocated as one of the most important measures to address issues of DRR and CCA (Warner et al. 2009) and L&D (Kreft 2013). The assumed benefits provided by insurance to the management of both climatic and non-climatic risks have attracted CCA and DRR practitioners to consider it as an important risk management tool. Despite the efforts by various stakeholders, the communities whose livelihoods are most vulnerable to climatic vagaries have often not been reached by insurance. Several bottlenecks remain unaddressed, such as the high cost of insurance relative to ability to pay, poor overall progress on risk mitigation, lack of awareness among

the communities, lack of an enabling policy environment etc. From a deeper perspective, there is a lack of robust evidence as to what CCA and DRR benefits accrue from risk insurance and how they compare with other risk management opportunities that exist or can be developed as an alternative to risk insurance (Prabhakar et al. 2015). There is a lack of clear assessment and recognition of insurance benefits and costs in terms of DRR, CCA and sustainable development in existing research. Specifically, there is no evidence to suggest that the current form of insurance provides long-term risk reduction. On the contrary, insurance programmes are currently designed and implemented in ways that do not provide the full potential benefits that risk insurance offers.

With regard to promoting risk insurance to address L&D, there is only a certain limit to which insurance can help in addressing L&D and hence it cannot be treated as a silver bullet. Figure 7.3 shows the elements in insurance design and implementation that pose limitations leading to a cycle of risk perpetuation rather than risk reduction. This is more pronounced in the case of agriculture insurance which is often implemented with limited resources, lower efficiency and often with limited reach. First and foremost, today's risk insurance products targeting the agriculture sector do not convey the proper risk price signal and suffer from moral hazards and adverse selection issues. Insurance pay-outs have not led to investments in risk mitigation options and the lack of sufficient incentives has rather led to continuing business as usual.



Source: Prabhakar et al. 2015

Figure 7.3 *Need for the current risk insurance regime to discourage risk perpetuation by addressing insurance design and motivational issues*

Insurance contracts have traditionally been designed largely to address economic losses. However, NELD that could account for as much as 50% or more of the total damages of a natural disaster, especially in the case of developing countries, are often not covered by the insurance products. There has been some advancement in measuring NELD including post-traumatic stress disorders, loss of social capital, ecosystem health and services as well as loss of cultural heritage, and insurance product designs must take advantage of

these advancements and start addressing NELD. Only then can the insurance industry contribute to holistic risk reduction.

Analysis of various adaptation options for their potential to address NELD was carried out by the authors using Analytic Hierarchy Process (AHP) in Bangladesh and Japan (Figure 7.4). The results indicated that risk insurance has the least potential to address any of the potential issues associated with NELD in both countries. It is interesting to see that insurance has not been shown to have potential irrespective of the economic status of the country in question. The main factors for insurance not being able to address NELD include: a) high opportunity and operational costs for communities, industry and governments which could have otherwise been invested in interventions that could directly address issues of NELD better than insurance can; and b) no guarantee of payouts being invested in NELD-relevant areas, and improved income stabilisation not necessarily leading to improvements in NELD outcomes. This raises questions on the extent to which this tool can be promoted as a solution, and caution is required in seeing it as the silver bullet, in the way it has been promoted both in DRR and CCA. From these results, it can be recommended that putting more emphasis on preparedness planning could be more effective than risk insurance (Figure 7.4) for addressing NELD.

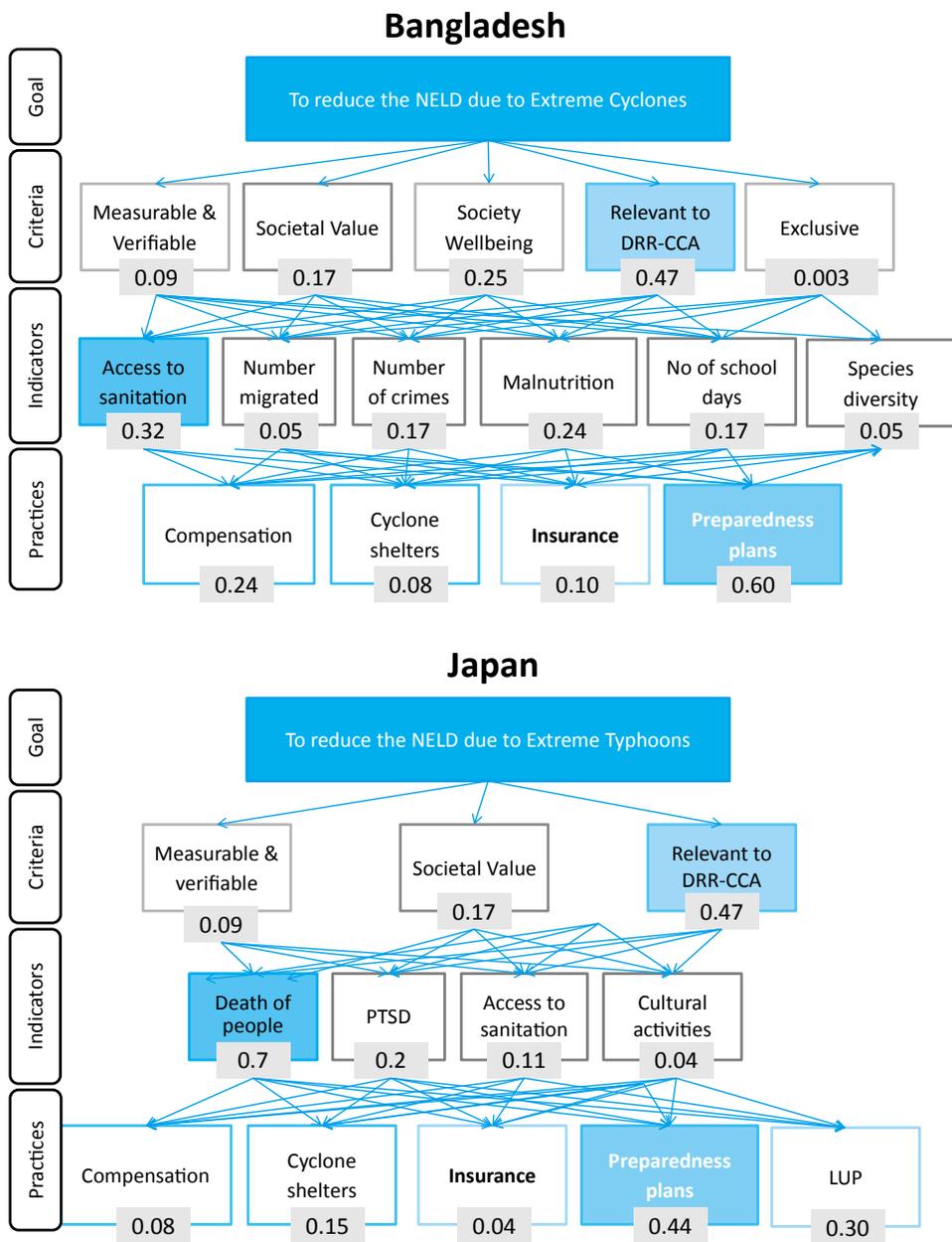
6. Summary and way forward

The global community has come to the recognition that there will still be considerable L&D irrespective of our current level of efforts to mitigate and adapt to climate change. Although the issue of L&D received attention in the sixteenth session of the Conference of Parties in Cancun in 2010 leading to its inclusion in the Cancun Agreements, scientists have long warned about the possibility of residual damages from climate change (Prabhakar and Nakata 2013). The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) released in 2007 clearly identified the reasons why CCA, as we know it today, may fall short of expectations.

Reasons for L&D could include the inability to implement adaptation actions to the degree and timing they are needed, policy imperfections that may work counter to adaptation practices, limited understanding on the effectiveness of known options, and inability of some adaptation practices to last longer. Barriers such as limited technical capacity to design and implement adaptation projects, limited financing and limited adaptation options further contribute to the problem. The inability to identify and scale good adaptation practices is a major limitation in itself.

It is evident that there is limited agreement towards forming a common definition of L&D at international and national levels. This makes it even more difficult for those stakeholders engaged in addressing the issues associated with L&D, often leading to ambiguity and disengagement. This may be symptomatic of the fact that research is still in the nascent stages, as is the relative understanding of the scope and extent of losses and damages that could occur.

The positions of 31 countries were analysed using multiple linear regression analysis. Based on the outputs of the regression, it has emerged that the principles which countries support for international negotiations and the scope of L&D is largely governed by the potential vulnerability to climate change and its predicted impact. A country's stance on risk insurance and funding mechanisms for L&D is determined by the economic power of the country. This is seen in particular in the Annex I countries which tend to support adaptation and mitigation actions. The strong influence of projected economic wellbeing



Source: Authors; PTSD: post-traumatic stress disorder; DRR: disaster risk reduction; CCA: climate change adaptation; LUP: land use planning

Figure 7.4 Relative position of risk insurance among various options tested for their efficacy to address non-economic loss and damage (NELD) in Bangladesh (above) and Japan (below)

and predicted temperature rise has highlighted the importance of scientific study and research when countries make choices in international negotiations. LDCs and AOSIS Parties have expressed strong opinions based on future impacts of climate change and their limitations due to existing vulnerabilities. More research is needed to determine what drivers influence country positions on institutional setups and stakeholder involvement in international discussion.

Research being carried out at IGES indicates that not all types of NELD have been measured and reported in the aftermath of a disaster in most countries (Prabhakar et al. 2015). Without knowing the nature of L&D and without measuring all the important variables, it is difficult to identify suitable interventions. For example, insurance and related mechanisms are not designed to fully compensate L&D if they only target the measurable and economic kinds of losses which may constitute only a part of the total L&D incurred in a particular disaster. We are already aware of the fact that not every insurance product being offered covers the full economic losses and the 'compensation deficit' will be even higher if we consider NELD from the perils under consideration. In order to address this gap, there is a need for the DRR measures to account for NELD as well.

It appears that preparedness planning could have greater impact on NELD. These measures have already been promoted by the DRR communities, although they are still in the beginning stages. It is not clear to what extent the currently available solutions, especially risk insurance, can help address L&D. Our assessment of available options using multi-criteria decision tools showed limited potential for risk insurance to address NELD which could constitute a large proportion of the total L&D caused by climatic events. On the contrary, approaches such as preparedness planning could have greater impact on NELD.

Decision makers need to be provided with a set of simple tools/formats to help them capture major NELD that make a major difference in decision-making and in CCA and DRR outcomes. There is a need to develop cases of identifying, prioritising and quantifying important NELD and incorporating them into the decision-making at all levels by working closely with the relevant stakeholders. IGES in collaboration with its partners aims to achieve these outcomes one step at a time.

Science-policy linkages should be strengthened, since they are becoming more important. Strengthening these linkages could be facilitated through national, regional and international networks. They could play a greater role in bringing together various stakeholders and engage them towards developing problem-specific and location-specific solutions.

There is a need to build the capacities of stakeholders engaged in DRR and CCA to handle NELD-related issues including understanding, measuring and using the related data in decision-making. The qualitative and non-economic quantification work being done in the fields of biodiversity and ecosystem services, social sciences and other related fields could provide us with useful tools for quantifying NELD. However, the actors engaged in DRR, especially those who collect the data using rapid assessment tools on the ground and those who use this data for decision-making are not well versed in these techniques and hence need certain capacity building.

The data collection formats at the local level and data archival systems at the national and sub-national systems need major revisions to accommodate important NELD indicators that are currently missing. The national level guidelines pertaining to insurance and other

risk management tools also need revisions in order to accommodate NELD into decision-making.

The process of policymaking and future planning concerning L&D and CCA is also heavily dependent on the aspect of science, which at the moment has many gaps in knowledge, and our understanding and projections are far from accurate. This poses a very serious limit, even though many researchers argue that it should not affect CCA policymaking and planning.

Developing win-win solutions that work well across a wide range of uncertainties and have several outcomes and scenarios is crucial. Despite the uncertainty associated with climate change projections, policy measures and policy planning cannot be delayed. Institutions and policymakers can take decisions and plan according to the several model scenarios that are presented, similar to the procedure in other fields of policy planning such as finance and budget (Dessai et al. 2009). Therefore, it is still plausible to use climate change scenarios based on assumptions and in fact it is assumed that the predictions are not necessarily realised in the future.

One should not forget the role of international cooperation where countries have to collaborate and help each other on the subject of CCA. International cooperation is important in areas of strengthening adaptation planning based on science and evidence including addressing uncertainties associated with climate projections for adaptation decision-making, putting in place regional and international risk reduction and financing mechanisms, not just limiting to risk insurance, that are effective in addressing both economic and NELD and sharing related experiences for developing location- and issue-specific solutions on the ground.

In conclusion, there are many adaptations to CCA and there are many limitations to the extent to which adaptation can take place. Many of them involve hard, physical as well as ecological limits, factors that are potentially out of our control. There are also the soft, intangible factors that play a major role when devising policies for future CCA. The way the public perceives the threats and risks, how the problem is communicated to the people, the culture of the society as well as society's current knowledge play an important role in the extent we can address the problem of L&D.

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