

Current knowledge on relevant methodologies and data requirements as well as lessons learned and gaps identified at different levels, in assessing the risk of loss and damage associated with the adverse effects of climate change

Executive summary

The concept of loss and damage associated with the adverse effects of climate change, while being widely discussed and analyzed, has not been clearly defined under the Convention. In addition, no comprehensive risk assessment model for climate change loss and damages exists. This paper responds to the request of the Conference of the Parties (COP) at its seventeenth session to prepare a technical paper summarizing current knowledge on relevant methodologies, and addressing data and capacity requirements as well as lessons learned and gaps identified at different levels, in the context of the first thematic area of the work programme on loss and damage: Assessing the risk of loss and damage associated with the adverse effects of climate change and the current knowledge on the same.

The paper aims at supporting decision-makers and adaptation practitioners in understanding the challenges of assessing loss and damage and providing an overview and analysis of some of the key existing methods and tools that can be employed.

The selected approaches are rooted in two major schools of thought: disaster risk reduction (DRR) and climate change adaptation (CCA). The recent analysis provided by the IPCC Special Report “Managing the Risk of Extreme Events and Disasters to Advance Climate Change Adaptation” (SREX 2011) can be seen as an effort to combine the two different schools of thought in the context of extreme events.

Within these different frameworks, a range of perspectives on loss and damage assessment has emerged, ranging from purely quantitative calculations of economic loss to more holistic approaches, incorporating qualitative analysis and capturing intangible impacts. An interesting new dimension of tools is emerging from those schools and concepts, combining knowledge and technical skills from DRR, catastrophe modeling and the newer but fast emerging field of climate change assessment.

To illustrate this, the paper provides an initial overview of 18 different approaches focusing on the assessment of loss, damages and risks – outlining their scale, scope, conceptual background and analytical context. The paper provides a closer review of six approaches and tools, in light of the availability of information on the methodologies as well as their relevance in the context of loss and damage:

- Catastrophe risk models, specifically the (CATSIM) model;
- Comprehensive Approach for Probabilistic Risk Assessment (CAPRA);
- Integrated assessment models;
- Scenario-driven approach;
- UK Climate Change Risk Assessment;
- WorldRiskIndex.

Investigating the data requirements, capacity needs and applicability for decision-making of those different methods and tools, the following challenges are identified:

- The scarcity of quality climate and vulnerability information in developing countries is a major barrier for furthering the understanding of loss and damages;
- Capacity needs for conducting risk assessments in developing countries are linked to overall adaptive capacity, yet some very specific technical needs exist for loss and damage;
- Some of the impacts of climatic change, such as sea-level rise, are not sufficiently represented in global loss data bases since the corresponding slow-onset impacts are rather difficult to capture (e.g. losses due salinization, forced migration);
- Most of the approaches analyzed focus on a relative narrow definition and quantification of loss and damage, which may lead to some underestimation of the full impacts;
- All the tools and methods come with clear limitations that need to be recognized and understood – particularly in the context of uncertainty (climatic and non-climatic) and the scope and extent of capturing direct and indirect losses. Transparency in terms of limitations and uncertainties of the models is important, as is clear communication with the end-user community;
- The majority of the models and approaches presented are quite complex and require technical skills and in-depth knowledge that have to be developed especially in developing countries. Capacities need to be developed within the country, such as at national universities, to ensure that knowledge and expertise will also increase in these countries that are at high risk for loss and damage in the face of climate change;
- National, sub-national and local loss databases need to be enhanced, as well as the continued monitoring of environmental and climatic stimuli and of socio-economic transformation processes at those levels.

The analysis concludes that complex systems, such as communities, societies or social-ecological systems, involve multiple facets (physical, social, cultural, economic, institutional and environmental) which require a holistic perspective. Integrating various socio-economic and environmental factors and combining risk and vulnerability assessment (including scenarios for vulnerability and exposure) with climatic changes, plus recognizing dynamic processes while meeting the needs of decision-makers at various different levels and within different sectors is challenging.

Full quantification may not be needed in all decision-making contexts, however, the choice of tool must be matched to the intended application and the relevant loss and damage categories – which differ between countries and regions, taking into account local constraints of time, resources, human capacity and supporting infrastructure. A sequential step-wise application of different methods and tools may offer best value to developing countries. To this end, it is important to improve the linkages and synergies between qualitative and quantitative approaches at various scales.

The paper concludes with potential issues for further consideration in the context of the UNFCCC work programme on loss and damage.