Approaches to reducing and managing losses and damages from climate change

Background document

15 April 2021, 13.00 – 18.00 Central European Time (CET)

1. Introduction

1. The climate is changing with increasingly severe impacts on human and natural systems. Extreme weather events such as floods, droughts and hurricanes are becoming more intense and frequent (Zhai, Zhou and Chen, 2018[1]); slow-onset changes, such as sea-level rise are transforming the conditions under which humans live (Frederikse et al., 2020[2]); and the probability of large-scale irreversible changes to the climate system are increasing (Caesar et al., 2021[3]). At risk are the lives and livelihoods of hundreds of millions if not billions of people, development gains and economic prosperity. Poorer countries are disproportionately affected by the impacts of climate change, and within countries groups marginalised by, for example, their gender, race, age, disability, class identities or geographic locations (Eriksen et al., 2021[4]). Estimates suggest that by 2030, more than 130 million people may be pushed into poverty by climate change (Jafino et al., 2020[5]). In several regions, these changes may undermine political stability and social cohesion.

2. In an interconnected world, the impacts experienced in one country may impose threats beyond its borders, for example through disruptions of value chains, which could affect the price, quality and availability of goods and services around the globe (IPCC, 2019[6]), the spread of infectious diseases (Liang and Gong, 2017[7]), and the movement of people responding to the impacts of climate change (McLeman, 2019[8]). Some adverse impacts from climate change that could potentially be avoided may not be as illustrated by the expansion of urban and sub-urban developments into forested areas increasing wildfire risk (Goss et al., 2020[9]). In addition, the scale and characteristics of other impacts may result in far-reaching and permanent losses (e.g. sea-level rise for low-lying islands or coastal areas).

3. Climate risks are conceptualised by the IPCC as a function of hazards, exposures and vulnerabilities (IPCC, 2019[6]). While connected in determining climate risks, different factors regulate each of the three components and the potential and extent to which they will be realised. This implies that efforts to reduce and manage climate risks must consider efforts to:

- avert the drivers that contribute to the hazards, the emission of greenhouse gasses in particular;
- minimise the exposure of lives, livelihoods, produced and natural assets to those hazards;
- address the underlying vulnerabilities of exposed human and natural systems to these hazards.

4. Underpinning each of the three components and how they interact with each other are different types of uncertainties, including in the responses of physical and socio-economic systems to climate change. A good understanding of these uncertainties is needed to inform efforts to reduce and manage the associated risks of losses and damages from climate change. In fact, the nature and scale of the observed and projected socio-economic impacts suggest the need for a precautionary approach to managing the risks where lack of scientific certainty does not postpone action in response to the serious threats and potentially irreversible damages (Barnett et al., 2016[10]) (Farber, 2015[11]).

5. This note aims to serve as background for the workshop on 15 April 2021, *Approaches to reducing and managing losses and damages from climate change*, highlighting the role of policy and finance. As such, it provides some insights on different issues that may arise during the course of the workshop without aiming to provide a complete overview. Section 2 first highlights the role of policy in supporting efforts aimed at reducing and managing the losses and damages from climate change, whereas section 3 focuses on the role of finance. Section 4 outlines questions that will guide the discussion during the workshop.

2. The role of policy in reducing and managing climate risks

6. For governments individually and the international community collectively, the central question for managing climate risks is the scale and sequence of climate action needed, particularly with the

uncertain nature of the risks. With the adoption of the Paris Agreement, countries have agreed on the goal of “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C” (UNFCCC, 2015[12]). To address the underlying drivers of climate risks, the Paris Agreement further highlights the importance of achieving “a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty”. Many countries have now committed to reach by mid-century or shortly thereafter net-zero carbon dioxide (CO_2) or greenhouse gas (GHG) emissions goals. Despite important progress in the number of countries with such net-zero goals, a review of countries’ climate commitments presented in their Nationally Determined Contributions (NDC) finds that emission levels are so far insufficient to put the world on a trajectory towards carbon neutrality by mid-century (UNFCCC, 2021[13]).

7. A complementary focus must therefore be on reducing and managing the risks that will occur due to current and future concentrations of GHGs in the atmosphere overlaid on the natural internal variability of the climate system. Such efforts do not occur in isolation, but within given socio-economic contexts. In countries and communities where employment and income directly or indirectly rely on the natural environment (e.g. through the agriculture or tourism sectors), weather events and climate can have important and direct impacts on peoples’ livelihoods. For some, this can contribute to an oscillation in and out of poverty, sometimes on a seasonal basis, or worse a transition into chronic poverty. For others, it may result in adjustments to, or a shift in livelihood choices (e.g. change of crop choices or from farming into other income generating activities). In countries less directly reliant on the natural environment, the focus may instead be on limiting the adverse impact of natural hazards through, for example, adjustments in the exposure or vulnerability of people and assets (e.g. infrastructure developments and land use management measures). Despite individual country efforts, the adverse physical and socio-economic impacts from climate and weather hazards can result in losses and damages that are expected to worsen with climate change.

8. This section provides illustrative examples of how policy can support efforts to reducing and managing climate risks. This includes a focus on: i) approaches to decision making under uncertainty and ii) policy as a lever for action.

2.1. Decision making under uncertainty

9. Uncertainties about the response of the climate system to GHG emissions, compounded by uncertainties about how those responses translate to impacts, limits the applicability of historical data to understand future climate risks (Cavallo and Ireland, 2014[14]). This has called into question the traditionally top-down “predict then act” approach, especially since no amount of additional information in the present would resolve these uncertainties. Instead, policy processes and decisions must be guided by the resilience of choices to the range of potential future climate conditions (Vincent and Conway, 2021[15]).

10. The past couple of decades have seen a rise in decision-driven approaches that recognise that long-term decisions will need to be made despite these inherent uncertainties. Such approaches explicitly recognise the interconnectedness, non-linearity, feedbacks and thresholds across different systems and impacts, and the need to take a broader systems approach (OECD, 2021[16]). Further, they rely on institutional structures that facilitate an iterative approach informed by learning and a recognition that choices can both reduce or exacerbate current and future vulnerability; facilitate or constrain future responses (IPCC, 2012[17]) (OECD, 2021[16]).

11. Theoretical tools (e.g. exploratory modelling, scenario discovery) and approaches (e.g. adaptive policy approaches) have been put forward to address the need to act in an uncertain, evolving environment, with experimentation and increasing application in the real world (Molina-Perez et al., 2019[18]) (Haasnoot et al., 2020[19]) (Borgomeo et al., 2018[20]). To illustrate, three such approaches are highlighted here, with a more in-depth overview of different approaches provided in (Marchau et al., 2019[21]):

- ***Robust Decision Making (RDM)***: A set of concepts, processes, and tools that use computation to yield better decisions, rather the predictions, under conditions of uncertainty (Lempert, 2019[22]). RDM combines decision analysis, scenarios, and modelling approaches to stress test different policy approaches against a wide range plausible future pathways. Analysis of the model runs then help decision makers identify the key features that distinguish those futures in which their plans meet or miss set policy goals (Lempert, 2019[22]).
- ***Dynamic Adaptive Policy Pathways (DAPP)***: Recognising the myriad of uncertainties that decision makers face (i.e. climate change and broader socio-economic factors), this approach calls on planners to establish a framework for action that is informed by a strategic vision of the future and guided by short-term actions that can be adjusted to reflect changing circumstances (Haasnoot et al., 2013[23]). This provides a decision space that can be effective in overcoming policy paralysis in the context of uncertainty (Haasnoot, Warren and Kwakkel, 2019[24]). The opportunities and constraints that determine why, how, when and who takes action on climate, referred to as the "solution space", are shaped by biophysical, cultural, socio-economic, and political-institutional dimensions with "hard" (unsurpassable) and "soft" (surpassable) limits (Haasnoot et al., 2020[25]).
- ***Storylines approach***: This approach aims to identify plausible climatic and socio-economic factors that drive risks to assess the impact of particular actions in a context where future changes in the climate are uncertain (Shepherd, 2019[26]). The storylines approach may be informed by particular types of (historical or plausible) events with high societal impacts, or particularly dangerous physical pathways of the climate system (e.g. tipping points) (Shepherd et al., 2018[27]). The emphasis on plausibility and the event-based nature of the storyline approach makes it well suited for improving risk awareness, strengthening decision-making, exploring the boundaries of plausibility of certain climate projections, providing a physical basis for partitioning uncertainty, and linking physical climate information with human aspects of climate change (Shepherd et al., 2018[27]).

2.2. Policy as a lever for action

12. Policy and norms play an important role in providing a framework for decision-making processes on climate risk management by state and non-state actors. In the context of decision-making under uncertainty, the role of policy to guide decision-making processes by different sets of actors that may not always have access to relevant data and information or the capacity to fully process it, is particularly important.

13. At the international level, the Paris Agreement provides a framework for global action and collaboration on climate change. As noted above, however, collective progress has to date been insufficient to put the world on a trajectory consistent with the temperature goal of the Agreement (Herz, 2019[28]) (UNFCCC, 2021[13]). The challenge is that achieving this goal with essential future benefits requires long-term changes made under conditions of uncertainty but with costs that start to occur in the short-term (Evans, Rowell and Semazzi, 2020[29]). For elected officials, this poses a challenge. Research has, for example, shown that voters are more likely to reward an incumbent presidential party for delivering disaster relief spending than for investing in disaster preparedness (Healy and Malhotra, 2009[31]). Similarly, despite mounting evidence of the high returns on investments into climate adaptation, funding gaps remain (GCA, 2019[30]). Most decision-makers also respond to budgetary planning cycles that often do not favour a focus on long-term goals (Evans, Rowell and Semazzi, 2020[29])

14. Despite these challenges, the past few years have seen an increasing level of climate action by national and sub-national actors, the private sector, civil society organisations, providers of international finance and by individuals. A notable transition is the sharp decrease in the cost of electricity generation

from renewables that is now in many countries competitive[1] with fossil fuel alternatives (NEA/IEA, 2020[32]). This transition has in part come about in response to commitments by countries to increase the share of renewable energy in the energy mix, associated demand-led innovation and learning by producers and users (IRENA, 2020[33]). Similarly, car manufacturers are responding to pollution regulation and government incentives to bet their futures on electric vehicles, with General Motors, for example, announcing a goal of ending gasoline and diesel-fuelled passenger vehicles by 2035 and to become carbon neutral by 2040 (GM, 2021[34]).

15. The cost of mitigation will in many cases not be the primary factor driving action. Individual decisions will also be influenced by policy choices. Land-use management and the enforcement of related policies, for example, will inform decisions on where people settle or assets are located, and in turn their exposure to climate hazards (Dissanayake, Hettiarachchi and Siriwardana, 2018[35]). Policy choices on whether to invest in flood management measures (e.g. dams, levees and diversion channels) or rely on flood-mitigation measures will similarly influence individual decision-making processes. Research from Bangladesh finds that flood death rates associated with the 2017 flooding were lower in areas with lower protection level (Ferdous et al., 2020[36]). This highlights the importance of complementing risk management measures with a focus on creating incentives for individuals to reduce their exposure and vulnerability to the risks.

16. Policy makers have at their disposal different tools that can make climate risks tangible and inform decision making processes. These range from engineering design standards and environmental labelling to land management and economic incentives including taxation. Application of these policy tools, must be guided by transparency, a good understanding of the synergies, trade-offs and feedbacks between them, the interaction of climate-related impacts with social, environmental and economic drivers across spatial and temporal scales (OECD, 2021[16]). The applicability of such policy tools, however, is less well understood in the context of socio-economic tipping points, defined as “a climate change induced, abrupt change of a socio-economic system, into a new, fundamentally different state” (van Ginkel et al., 2020[37]).

3. The role of finance in reducing and managing risks from climate change[2]

17. The impact of climate risks can have severe fiscal and economic implications for governments, and entail significant social and economic losses for businesses and households through both direct damages and indirect consequences. Economic estimates do not reflect the full costs associated with disasters, such as disruptions to value chains and energy price shocks, number of lives lost, temporary or permanent displacement of people, and other social and psychological consequences (Tschakert et al., 2019[38]). The impacts may also hamper level and growth of economic activity and in some country contexts adversely affect debt sustainability (IMF, 2019[39]).

18. Governments are the primary sources of finance for both structural (e.g. resilient infrastructure investment) and non-structural (development of capacity, information and policies) measures that in different ways contribute to efforts that reduce and manage the risks of losses and damages from climate change (OECD, 2021[16]). Governments also tend to shoulder a significant share of the costs of extreme events in particular (Mahul et al., 2019[40]). This, for example, includes fiscal transfers to sub-national governments, relief and livelihood support to affected or uninsured households, assistance to small enterprises and stabilisation of the private sector (Mahul et al., 2019[40]). While providing a crucial source

[1] In terms of levelised cost of electricity (NEA/IEA, 2020[32]).

[2] This section focuses primarily on disaster finance. An important complementary focus is the role of finance in reducing risks.

of support to those affected, this role by the government can under certain conditions create disincentives for acquiring individual insurance, or worse, for reducing disaster risks.

19. Governments have different disaster financing instruments they can draw upon, including national budget processes, budget reallocation, borrowing, taxation and in some cases also development and humanitarian finance (see Table 1). Such *ex post* financing instruments, however, may in some cases be relatively expensive (e.g. when borrowing on unfavourable terms) or only available too late to prevent hazards from turning into disasters (Mahul et al., 2019[40]). To better prepare financially for disaster risks, governments are increasingly implementing risk financing strategies that also include pre-arranged (or *ex ante*) instruments that can quickly disburse finance (Mahul et al., 2019[40]) (Clarke et al., 2017[41]). This reflects the evolving need of funds to reduce and manage risks, ranging from emergency response to long-term reconstruction. Several simulations also show that pre-disaster transfers would ease the recovery after an extreme event (Marto, Papageorgiou and Klyuev, 2018[42]). A combination of different instruments is therefore needed to effectively address the diversity of hazards, their frequency and severity (Martinez-Diaz, Sidner and McClamrock, 2019[43]). It is, however, financially not efficient to eliminate all risks. Questions such as acceptable levels of risks therefore inevitably have to be answered or choices between competing demands made (OECD, 2014[44]).

Table 1. Disaster risk financing instruments

***Ex ante* financing instruments**	***Ex post* financing instruments**
Disaster reserve fund: A dedicated disaster response fund, where undisbursed funds can be rolled over	**Budget reallocation**: Redistribution of funds from other programs to cover emergency response and recovery needs
Contingency budget: A separate budget line that is drawn down in the event of a disaster shock.	**Borrowing**: Raising of funds by issuing bonds or contracting loans for recovery and reconstruction
Contingent credit: A loan arranged in advance that provides immediate liquidity once a predetermined trigger is met	**Tax increase**: Temporary or permanent tax increase as a last resort to finance post-disaster activities
(Sovereign) risk transfer instruments: Instruments such as insurance and catastrophe bonds that allow governments to transfer disaster risks to the markets and rapidly access pay-outs in the event of a major disaster	**International aid**: External development partners' assistance, which is often unpredictable

Source: (Mahul et al., 2019[40])

20. Recognising the role of both domestic and international finance, this section briefly highlights the role of: i) insurance and ii) social protection as examples of financing mechanisms that governments can draw on for reducing and managing the risks of losses and damages from climate change. While not discussed in this note, development and, to some extent, humanitarian finance play an important role in supporting many developing countries in putting in place such financing mechanisms.

3.1. Insurance

21. Insurance mechanisms allow insured parties to share certain weather and climate-related risks (risk sharing and pooling), or transfer them to third parties in exchange for premium payments (risk transfer). For individuals and businesses, this is usually in the form of indemnity insurance, i.e. where compensation is provided for losses incurred in response to pre-determined criteria. Insurance or risk transfer mechanisms for governments often makes use of parametric triggers, i.e. payments are triggered according to a pre-specified index such as levels of rainfall, length and intensity of drought, tropical cyclone wind speeds.

22. Individual and business insurance mechanisms can increase the reliability, predictability and speed of ex-post disaster financing flows. They can also – taking into account potential moral hazard issues – play an important role in reducing and managing climate risks through pricing of the risks. This can

incentivise individuals and communities to better understand the risks and take measures to either reduce their exposure or vulnerabilities them (Jarzabkowski et al., 2019[46]). For example (Wolfrom and Yokoi-Arai, 2016, p. 28[45]):

- Risk-based premiums and premium discounts for effective risk reduction can provide incentives for reducing risks by offsetting the costs of risk reduction with lower future premiums.
- Risk reduction measures implemented by policyholders, such as elevating a building to protect against floods or installing storm shutters to protect against wind damage, can make an important contribution to reducing losses from extreme events in the context of climate change.

23. Despite the positive impact of insurance on mitigating disaster risks, significant insurance gaps exist in terms of the economic losses from disasters that are covered by insurance (OECD, forthcoming[47]). In developing and emerging economies the proportion of insured losses from natural hazards[3] is still below 10% and in some cases close to zero (Munich Re, n.a.[48]). This creates fiscal exposures to disaster risks when governments are expected to compensate uninsured private losses in addition to the cost of recovery and restoration of public assets (OECD, forthcoming[47]). When governments are not in a position to be the insurer of last resort or alternative social protection measures are lacking, the costs or losses largely fall on individual citizens adversely impacting their welfare (Jarzabkowski et al., 2019[46]).

24. At the national level, high levels of insurance penetration have been found to reduce (Melecky and Raddatz, 2011[49]) or eliminate in the case of full insurance (Von Peter, Von Dahlen and Saxena, 2012[50]) contractions in economic activity after disaster events. A review of the economic implications of over 100 disaster events found that countries with higher insurance penetration recover on average within 12 months; for countries with lower penetration the recovery period was on average years (Cambridge Centre for Risk Studies and AXA XL, 2020[51]) in (OECD, forthcoming[47]). Similarly, higher insurance penetrations ease the disaster recovery burden on taxpayers (Lloyd's, 2012[52]) and the pressure on sovereign credit ratings (Standard & Poor's, 2015[53]).

25. Insurance is generally better suited for weather events that occur with low frequency but high intensity than those that occur with high frequency (e.g. recurrent excessive rainfall leading to floods) since the latter would result in disproportionately high insurance premiums (Väänänen et al., 2019[54]) (OECD, 2021[16]). On the uptake of insurance by governments, additional technical and political challenges that limit the uptake of insurance for climate risks (Martinez-Diaz, Sidner and McClamrock, 2019[43]; Väänänen et al., 2019[54]; OECD, 2020[55]) summarised in (OECD, 2021[16]) include:

- competing development priorities for potential beneficiaries, making it difficult to justify paying for the up-front premiums with uncertain returns;
- risk of increase in premiums and decrease in the viability of insurance mechanisms due to increased frequency and intensity of climate-related disasters in the mid- to long-term;
- insufficient uptake of a risk-layering approach whereby government reserves finance small losses and contingent credit and reinsurance provide additional capacity for moderate and catastrophic losses.

26. Complementing the use of national risk transfer mechanisms, regional catastrophe risk pools and transfers can help countries access rapid financing for disaster response. Established mechanisms include the African Risk Capacity, Caribbean Catastrophic Risk Insurance Facility, and Pacific Catastrophe Risk Assessment and Financing Initiative Facility. Such mechanisms allow participating countries to (World Bank, 2017[56]): i) pool risks in a diversified portfolio, ii) retain some risk through joint reserves/capital; and iii) transfer excess risk to the reinsurance and capital markets. By putting a price on the risks and by using

[3] While this include meteorological, climatological, hydrological as well as geophysical, it is worth noting that insured losses globally from geophysical hazards accounted for only 9%

a parametric trigger they also create incentives for participating countries to better understand the risks and invest in reducing them (World Bank, 2017[56]).

3.2. *Social protection*

27. Recognising that insurance mechanisms will only be able to cover part of the climate risks, social protection mechanisms provide an important complementary source of finance that can support households in reducing and managing climate risks. Social protection refers to public and private initiatives that transfer income or assets to protect for different risks (Opondo et al., 2014[57]). Some definitions also highlight the role of social protection in enhancing the social status and rights of marginalised segments of the population, extending to them the benefits of economic growth and reducing their economic and social vulnerability (Sabates-Wheeler and Devereux, 2007[58]). Research suggests that social protection programmes can be effective in supporting people to cope with individual risks; assessments of their effectiveness in supporting people in chronic poverty to reduce risks or protect their assets during crises is less conclusive (Opondo et al., 2014[57]). Ethiopia's Productive Safety Net Programme, for example, has had a positive impact on food security and asset protection but it has been less effective in protecting participating households from severe shocks, drought in particular (Tenzing, 2019[59]). Malawi's Farm Input Support Programme similarly advanced food security by improving agricultural productivity but it was less effective in reducing long-term vulnerability to shocks and stresses as demonstrated by 2015 flooding and 2016 drought (Tenzing, 2019[59]).

28. This has led to the emergence of adaptive social protection, defined as measures that help "to build the resilience of poor and vulnerable households by investing in their capacity to prepare for, cope with, and adapt to shocks: protecting their wellbeing and ensuring that they do not fall into poverty or become trapped in poverty as a result of the impacts" (Bowen et al., 2020[60]). Adaptive social protection measures hold the potential to bring about change if they are effective in addressing the underlying inequalities that are the root causes of peoples' vulnerabilities to climate change. While there is limited evidence available on the effectiveness of such frameworks in addressing climate risks, research suggests that there is scope to further harness their potential to address the structural causes of vulnerability to climate change (Tenzing, 2019[59]).

4. Questions for discussion

29. The workshop on 15 April is organised in the context of the OECD project on losses and damages from climate change, a new area of work at the OECD. The aim of the project is to prepare a report that will explore climate impact projections as well as different types and levels of relevant uncertainties and what they mean for approaches to reducing and managing such impacts. On that basis, it will provide insights on existing and emerging approaches to limiting and managing the risks of losses and damages from climate change in the context of uncertainty. The role of policy and finance and technology will be highlighted. This will be complemented by a discussion on how these different approaches affect incentives for action at national, regional and international levels. The analysis will be global in scale but throughout the circumstances of different geographic areas or groupings will be highlighted with a particular focus on Least Developed Countries and Small Islands Developing States.

30. The objective of the OECD workshop on *Approaches to reducing and managing losses and damages from climate change* is to facilitate a discussion on the role of policy and finance in reducing and managing risks, pointing to examples of good practice, opportunities as well as challenges. Questions to guide the discussion include:

- What role can policy and finance play in limiting exposures to, and reducing the vulnerability of the risks of losses and damages from climate change?

- What are important policy and finance levers for action currently overlooked, underexplored or not prioritised?
- What are some innovative approaches for addressing in policy and finance decisions the uncertainties inherent in climate change projections?
- What are key insights and challenges for different countries and regions in mobilising finance and putting policy levers into action?
- How can national approaches to policy and finance reflect potentially large-scale irreversible changes?

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