Understanding and Reducing Loss and Damage Associated with Adaptation Limits

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The amounts of loss and damage associated with climate change will reflect the collective effectiveness of mitigation efforts while the experiences will be locally grounded and different among people, societies, and environmental systems based on the vulnerability of the systems and what can be accomplished through adaptation. A growing body of work is documenting the challenges of mitigation and the commitment to change in the climate system resulting in more pressure on the understanding the potential of adaptation. As more attention is directed to the adaptation process, it is increasingly clear that it will not be able to achieve all desired results and that there will be losses and damages associated with exceeding adaptation limits. For example, communities in Alaska are working to relocate because the shoreline retreat threatening them cannot be controlled.

Given the uncertainties and threats of climate change, many have argued for a risk-based approach to adaptation (IPCC-SREX 2012; ACC 2010). The risk-based approach needed for climate change is not only the probabilistic risk analysis that often comes first to mind, but also the broader risk approach which emerged to inform societal risk judgments on policy questions (Hultman, Hassenzahl, and Rayner 2010). This approach engages the issues of societal choice, values, equity, communication, perception, and other nonquantitative dimensions (Hultman, Hassenzahl, and Rayner 2010). The broader risk approach is also consistent with the understanding that adaption is "fundamentally an ethical issue because the aim of adaptation is to protect that which we value'' Hartzell-Nichols (xx:690) and encompasses the role of social values in understanding limits to adaptation (Adger et al. 2012; O'Brien in Adger et al. 2009).

In considering risk governance strategies, Klinke and Renn (2002; 2012; 2013) identify 3 categories of response that can also be usefully applied to the adaptation process. This classification is based in part on perceptions of the potential frequency and severity of harm including losses and damages and includes social criteria in evaluating the threats and benefits.

- Acceptable risks are risks deemed so low that additional risk reduction efforts [adaptations] are not seen as necessary.
- Tolerable risks relate to activities seen as worth pursuing for their benefits, but where additional efforts [adaptations] are required
- Intolerable risks are those which exceed a socially negotiated norm (e.g., the availability of safe drinking water) or a value (e.g., cultural continuity) despite adaptive action (based on Renn 2008: 149).

The simple classification of acceptable, tolerable, and intolerable effectively highlights the role of judgment based on values and evidence that are common to all actors' assessments of risks (Renn 2008). The diversity of views across society makes defining, what is tolerable or intolerable one of the most challenging aspects of risk governance (Renn 2008). The history of risk research and policy also shows that risk estimation and negotiating norms about societal objectives and risks are not novel issues. At the international scale, numerous declarations set objectives, such as the Millennium Development Goals, while others address universal human rights, and others such as the Montreal Protocol on Substances that Deplete the Ozone address issues of risk in the environment.

These three categories of risk management can be brought into closer relationship with adaptation discussions by recognizing that the efforts to manage risks connect directly to the issues of adaptive capacity and constraints to adaptation. The ability to undertake these efforts may be constrained by an actor's capacity and dynamic combinations of economic, financial, social, institutional, technological, environmental, and political factors that influence their capacity to undertake adaptive responses to emerging risks, once they have been recognized. Adaptation limits themselves are "mutable, subjective, and socially- constructed" (Adger 2012) as are the 'intolerable risks' which are defined in relation to a socially negotiated norms.

Applying the concept of these 3 socially-negiotiated realms of risk management to the issue of adaptation, Dow et al. (2013 a, 2013b) define a limit to adaptation is "the point at which an actor's objectives cannot be secured from intolerable risks through adaptive actions" (Dow, Berkhout, and Preston 2013 COES: 387).

Arriving at an adaptation limit and intolerable levels of risk, marks a time when existing strategies are no longer achieving a tolerable level of security for significant objectives, when no practicable alternative adaptation options are available to the actor, and some major change is inevitable. An actor may choose to relinquish the objective that kept them in harm's way (e.g. choose to give up farming or living along the coast). Broader governance responses to intolerable risks include banning the risk perhaps through prohibition or substitution (Klinke and Renn 2002; Renn 2008). Perhaps, the threat will motivate a transformative adaptation that results in fundamental changes to their livelihood or behavior (O'Brien xx; Kates et al 2012; Preston et al 2013). If an actor has no options or is unwilling to give up an objective, they may remain in the threatening situation and face increasing losses and damages. For example, the UK Foresight report suggests that while environmentally-motivated migration will pose challenges, the issues raised by people unable to leave dangerous circumstances may be more or equally significant (Foresight xx).

Recognizing the linkages between adaptation limits and losses and damages brings a number of insights from risk and adaptation research into the further conceptualization of loss and damage. Either type of change at a limit – either relinquishing an objective and transforming behavior, or continuing in a situation - involves some loss and/or damage. If it is supported and facilitated, change may simultaneously bring benefits. For example, sea level rise threatening an island community can increase the risks of salinity intrusion. A farmer without means to prevent or avoid that intrusion would face greater likelihood of crop, food, and income losses. If other livelihood options are available, that farming household might give up their traditional farming livelihood as well as the food security associated with farming, and remain in their community. If there are not alternative livelihood options, that household may relocate and cope with the loss of community and its related impacts but perhaps find better health care and educational options in the new location. The potential to avoid some types of losses and damages and achieve some benefits in these transformations will require planning. As Oliver-Smith (2009:124) observes with respect to environmentally induced displacement and recovery, "In all too many cases, resettlement, particularly when done at a community level, ends up becoming a second disaster". deSherbinin et al. (2011) point to the need to anticipate population displacement and to garner lessons from research on development-forced displacement and resettlement and recommend seven significant actions to increase readiness and making these transitions as positive as possible.

One set of losses and damages may be easier to survive than the other, but both are meaningful and valuable. A basic dictionary distinction between loss and damage, that which is destroyed versus that which may be recovered or restored over time, is important in the context of the long period of climate commitment and the ongoing processes of adaptation. The absolute losses versus damage and recovery impacts may also differ. In the case above, it is possible that richness of community may, in many aspects, be restored over time given careful attention to what is needed and how it is handled (Oliver-Smith 2009). As Hultman, Hassenzahl, and Rayner (2010) observe, some of the major questions in risk analysis address tradeoffs like those posed in the hypothetical example. Equally challenging for managing

climate-related risks and adaptation, these questions include –What are the appropriate measures of harm (e.g., individual property, health, or community impacts)? Can disparate types of harm be made commensurate with each other? (Hultman, Hassenzahl, and Rayner 2010).

The issue of appropriate approaches for estimating risks, losses, and damages also arises as what is valued and important to diverse actors is not always what is included in scientific or policy analyses of risk and loss (Slovic 1979; Rayner and Cantor 1987; Klinke and Renn 2002; Renn 2008). The discussion of potential sea level rise-related losses and damages is often reported in terms of things that are easily measured, such as monetary losses or property, area potentially inundated by storms, number of households or communities potentially damaged or displaced (Graham et al. 2013). These measures capture some types of loss and damage directly, but serve as imperfect proxies for many indirect and non-economic losses to social and natural systems (Dassanayake, D.R. , A. Burzel, and H. Oumeraci 2012). Like many other impact measures, the sea level rise examples listed above do not adequately represent other significant social criteria considered in risk evaluation and the legitimacy of risk management approaches. These include inequity and injustice in the distribution of risks and benefits over time, space, and social status; potential for social conflict and mobilization; spill-over effects when symbolic losses have repercussions on other fields, such as markets, and psychological stress (Klinke and Renn 2002) or what Graham et al. refer to as "lived values". Natural disasters, for example, are often accompanied by the emotional toll of loss of family and loved ones, increased domestic violence and mental health issues, loss of education opportunities, damage to community support systems, and other widely acknowledged significant stress and loss with long lasting repercussions(Oliver –Smith 2009).

Sobering climate projections, including those up to 4°C, and current instances of climate-related risks motivating transformations, such as resettlement, suggest that more adaptation limits will be encountered. Building understanding of how to define and anticipate adaptation limits may allow us to avoid some limits, and where limits are unavoidable to plan and develop strategies to facilitate necessary transformative adaptations and assure that those transformations processes themselves do not lead to further harm.