Expert Briefing
“Climate Risk Assessment for Loss and Damage”

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Loss & Damage Network

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Overview

1. Scope: what we want to achieve with this talk
2. Official terminologies around ‘climate risk assessment’ – why the confusion?
3. Reflection on existing approaches to climate risk assessment
4. Climate Risk Assessment and the L&D space – unique requirements?
5. Challenges and next steps
1. Scope
Scope of the talk

• Starting point: Concern from L&D policy makers that the wide range of different concepts, approaches and methods creates confusion.

• Why CRA?
  – Risk assessment a process for identifying, analysing, and evaluating risks, with the aim to inform those with the ability to reduce or manage the risk.
  – It should allow decision-advisors to weigh choices for action under uncertainty and to provide a process to evaluate threats, probabilities, outcomes, and courses of action with incomplete information.

• How to move forward with CRA for the L&D Workplan development?
2. Terminologies and concepts: What is climate risk assessment?
Climate Risks
IPCC Working group I&II perspective

IPCC, 2014
IPCC definition of climate-related risk

- The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values.
- Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur.
- Risk results from the interaction of vulnerability, exposure, and hazard.

IPCC, 2014 (WG II)
IPCC 2014 identifies 3 constructions of climate-related risk

1. *Risk of dangerous interference*: the conceptual framing of the problem at hand - dangerous anthropogenic interference with the climate system as dominant framing
   → informing mitigation

2. *Calculated risk*: the product of a model based on a mixture of historical (observed) and theoretical information
   → informing adaptation

3. *Risk perception and tolerance*: the judgment agents make about risk
   → informing adaptation
1. Dangerous Climate Change

The Reasons for Concern

- Risks to Unique and Threatened Systems
- Risks from Extreme Climate Events
- Distribution of Impacts
- Aggregate Impacts
- Risks from Future Large-Scale Discontinuities

IPCC, 2001
2. Calculated risk

Hazard → Qualified by intensity and probability → Hazard potential → Vulnerability

- Exposed elements
- Susceptibility
- Coping capacity → Risk
Considering a continuum of slow to sudden onset events

$$R = H \times E \times V$$

- **Risk based approach**
- **Sudden-onset events**
  - shocks
  - examples: landslides, storms, floods...
  - timescale: hours, days
- **Slow-onset events**
  - creeping in, gradual change
  - timescale: weeks, months, years, decades

Huggel et al., 2016
Challenges and opportunities: Understanding the risk space

- Downscaled climate projections with climate variability
- Hazard analysis and probability of recurrence

IPCC, 2012
Calculated risk and trends
Example Bangladesh

Hazard occurrence with climate change

Losses for hazard intensity

Exposure assets exposed to hazards

Source: Mechler and Bouwer, 2015
Climate risk assessment – status quo

Hazard
*Intensities, duration and frequencies of some hazards changing* (IPCC 2012&14)
*Extreme event attribution in early stages* (James et al., 2014; Trenberth et al., 2015)

Exposure
*Dominating Factor - currently* (IPCC, 2012&14)

Vulnerability
*Key driver, knowledge gaps, significant adaptation deficit* (IPCC, 2012)
3. Risk perception and tolerance

Dow et al., 2013
3. Existing approaches for climate risk assessment
Two schools of thought

CCA
- Loss and damage assessment
  - Pre disaster
    - quantitative
      - IAM
      - UKCRA
      - CEA/SEA
      - Mumbai
      - Bangladesh
    - qualitative
      - UKCRA
  - Post disaster
    - quantitative
      - CAPRA
      - CatSiM
      - Hazus
      - ECLAC
      - EMA
      - Catastrophic Risk Models
    - qualitative
      - CBDRM
      - Red Cross
      - VCA

DRR
- Risk assessment
  - Loss and damage assessment
    - Pre disaster
      - quantitative
        - ECLAC
        - EMA
        - DesInventar
        - CRED-EMDAT
      - qualitative
        - CBDRM
        - Red Cross
        - VCA
    - Post disaster
      - Natural Disaster HotSpots
      - WorldRiskIndex

Source: Surminski et al. 2012
# Climate Change and Disaster Risk Assessment - Comparing Terminology

Climate change and disaster risk assessments use sometimes overlapping terminology in defining what contributes to risk. The following table summarizes these differences and similarities. (See below for sources of quotations)

<table>
<thead>
<tr>
<th>Term</th>
<th>As Applies to Climate Change Assessment</th>
<th>As Applies to Disaster Risk Assessment</th>
</tr>
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<tbody>
<tr>
<td>Exposure</td>
<td>“…background climate conditions against which a system operates, and any changes in those conditions…”</td>
<td>Whether someone or something is in a location which can be affected by a hazard.</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>“…the responsiveness of a system to climatic influences, and the degree to which changes in climate might affect it in its current form…”</td>
<td>Incorporated as part of vulnerability.</td>
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<td>Potential Outcome</td>
<td>Exposure and sensitivity</td>
<td>Incorporated as part of vulnerability.</td>
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<tr>
<td>Adaptive Capacity</td>
<td>“Adaptation reflects the ability of a system to change in a way that makes it better equipped to deal with external influences.”</td>
<td>Incorporated as part of vulnerability, but only to potential damage and not to risk reduction.</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>Exposure, sensitivity, potential outcome and adaptive capacity, as defined in climate change assessment.</td>
<td>The damage which can be done by a hazard event of a specific magnitude, frequency and timing.</td>
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<td>Hazard</td>
<td>The change between the current and future climate (e.g., increase in average temperature).</td>
<td>An event which can lead to negative consequences on humans.</td>
</tr>
<tr>
<td>Hazard Event</td>
<td>Incorporated in Exposure – “…any changes in those conditions”</td>
<td>A occurrence of a hazard of a specific magnitude, timing and frequency</td>
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<tr>
<td>Frequency</td>
<td>Incorporated in Exposure – “…any changes in those conditions”</td>
<td>How often a hazard of a specific magnitude will occur.</td>
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<td>Magnitude</td>
<td>Incorporated in exposure – “…any changes in those conditions”</td>
<td>The physical scale of a hazard event, measured in a standard metric (e.g., mm of precipitation)</td>
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<td>Resilience</td>
<td>Similar to Adaptive Capacity but only in relation of a hazard event, not reducing the likelihood of future hazard events.</td>
<td>The means which reduce the initial outcome of a hazard event on six capitals; the means to reduce vulnerability.</td>
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Source: UNDP 2013
Figure 1. Stages of risk assessment compared with EIA/SEA (‘environmental assessment’)

Source: Authors’ own diagram, adapted from (Eduljee, 1999)

Source: Fankhauser et al. 2013
Risk Assessment, Management and Adaptation

Bowyer et al., 2014
### IPCC expert-based climate risk assessment
Linking climate risk, adaptation deficit and projections

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<th>Timeframe</th>
<th>Risk &amp; potential for adaptation</th>
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<td>Very low</td>
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- **Africa and Agriculture**

IPCC, 2014
## IPCC expert-based climate risk assessment

Linking climate risk, adaptation deficit and projections

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Biodiversity and loss of coral reefs

Limits to adaptation

IPCC, 2014
3.1 Disaster risk reduction

3.1.1 Comprehensive impact and risk assessment
- Natural disaster HotSpot
- World Risk Index
- Global Climate Risk Index

3.1.2 Pre-disaster risk assessment
- Comprehensive Approach for Probabilistic Risk Assessment (CAPRA)
- Catastrophe Simulation model (CATSIM)
- Handbook for Estimating the Socioeconomic and Environmental Effects of Disasters (also for post-disaster)
- Community based disaster risk management (also for post-disaster)

3.1.3 Post-disaster risk assessment
- Disaster Loss Assessment Guidelines
- DesInventar
- Climate Vulnerability and Capacity Analysis (CVCA)
- Assessing Damage after Disasters: A participatory Framework and Toolkit

3.2 Climate change adaptation and vulnerability assessment

3.2.1 Vulnerability assessment
- Climate Vulnerability Monitor
- Participatory Vulnerability and capacity assessment (part of Participatory Assessment of Disaster Risk (PADR))
- The vulnerability sourcebook

3.2.2 Climate change adaptation assessment
- Climate Change Risk Assessment
- Climate change and Environmental Degradation Risk and Adaptation Assessment (CEDRA)
- Climate Risk Assessment Guide

Source: Schaefer et.al. UNU-EHS 2015
| Differences in approach between the UK CCRA 2012 and 2017 Evidence Reports |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------|
| **Coverage of risks and opportunities**             | 100+ threats and opportunities, prioritised from a list of 700.                                  |
|                                                     | Around 60 threats and opportunities, chosen by Government and the report authors.                 |
| **Metric for summarising the results**              | Focused on magnitude and confidence                                                              |
|                                                     | Focused on urgency                                                                                |
| **Time periods covered**                            | 2020s, 2050s and 2080s                                                                          |
|                                                     | Current, 2020s 2050s and 2080s, post-2100 for sea-level rise                                    |
| **Type of analysis**                                | Mix of existing data and new analysis to create 'response functions' for risks and opportunities  |
|                                                     | Mostly synthesis of existing analysis with some new data from four new research projects          |
| **Use of climate science**                          | Used the UK Climate Projections, UKCP09, to explore different climate scenarios                   |
|                                                     | Literature used to inform the Evidence Report is based on a mixture of studies that use UKCP09, CMIP5, single models and other scenario approaches |
| **Consideration of drivers of risk**                | Did not include effects of planned adaptation or socio-economic change (beyond population growth) |
|                                                     | Includes evidence and analysis of the effects of adaptation and socio-economic change on risk     |
| **Cost**                                            | £3 million over three years                                                                      |
|                                                     | £650K over three years (not including existing ASC salaries)                                     |
Summarising risks based around concept of urgency
4. Climate Risk Assessment and the L&D space

• How is Loss and Damage different from CCA and DRR
• What is the space for Loss and Damage?
## What is ‘Loss & Damage’ risk?

<table>
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<tr>
<th>Avoided</th>
<th>Unavoided</th>
<th>Unavoidable</th>
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<tr>
<td><strong>Avoidable Damage Avoided</strong></td>
<td><strong>Avoidable Damage and Loss Not Avoided</strong></td>
<td><strong>Unavoidable Damage and Loss</strong></td>
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| → Damage prevented through mitigation and/or adaptation measures. | → Where the avoidance of further damage was possible through adequate mitigation and/or adaptation, but where adaptation measures were not implemented due to financial or technical constraints. | → (Im)possible Damage that could not be avoided through mitigation and/or adaptation measures;  
- slow onset changes such as sea level rise, glacial melting  
- damage due to extreme events where no adaptation efforts would have helped prevent the physical damage. |

Verheyen, 2012
Risk perception and tolerance

Dow et al., 2013
Managing DRR and CCA

Reduce Risks
- Reduce Vulnerability
  - Poverty reduction
  - Health improvements
  - Access to services and productive assets enhanced
  - Livelihood diversification
  - Access to decisionmaking increased
  - Community security improved

- Reduce Hazards and Exposure
  - Mainstream risk management into development processes
  - Building codes and retrofitting
  - Defensive infrastructure and environmental buffers
  - Land use planning
  - Catchment and other ecosystem management
  - Incentive mechanisms for individual actions to reduce exposure

Reduce Risks Threshold

Manage Residual Risks and Uncertainties
- Pool, Transfer, and Share Risks
  - Mutual and reserve funds
  - Financial Insurance
  - Social networks and social capital
  - Alternative forms of risk transfer

- Prepare and Respond Effectively
  - Early warning and communication
  - Evacuation plan
  - Humanitarian relief supplies
  - Post-disaster livelihood support and recovery

- Increase Capacity to Cope with “Surprises”
  - Flexibility in decisionmaking
  - Adaptive learning and management
  - Improved knowledge and skills
  - Systems transformation over time

IPCC, 2012
5. Challenges and next steps
Challenges and next steps

• Direct and indirect losses & growing interconnectedness of impacts (such as cascading effects) are recognized, but no clear methodology exists

• Non-economic losses: Quantification poses challenges, but can be addressed pragmatically (See: Vivid Economic 2013)

• Slow onset changes require a different perspective

• Linking qualitative and quantitative assessment approaches can be challenging
Challenges and next steps

• From global to local: different scales of data and assessment are needed – ‘If we have no idea how much of something has been lost, the loss assessment will be challenging’ (UNU-EHS 2015)
• We need to understand vulnerability & adaptation, the effectiveness and limitations – example: UK CCRA 2016
• Climate signal often weak or unclear - further understanding necessary
• Calculated risk: projecting probabilistic risk with challenges (return periods etc.)
• Limits to adaptation: Knowledge only emergent, part. for human systems
Next steps

- Find agreement for risk assessment “beyond adaptation”
- Further understanding for risks beyond adaptation needed (conduct mapping exercise based on IPCC, 2014 and other sources?)
- Identify instruments for the L&D space
References - IPCC


References - other

- Bowyer, P., Bender, S., Rechid, D., Schaller, M. (2014): Adapting to Climate Change: Methods and Tools for Climate Risk Management, Climate Service Center, Germany, 124 pages

