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Assessing Non-Economic Loss and Damages from Climate-related Disasters

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Adaptation Task

Natural Resources and Ecosystem Services Area

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Outline

- Background of loss an damage (L&D)
- Need for focusing on non-economic loss and damage (NELD)
- L&D methodologies and limitations
- Measuring the NELD effectiveness of practices
  - Bangladesh case study
  - Japan case study
- Way forward

L&Ds in the Context of Climate Change

Loss is the negative impact that cannot be recoverable;
Damage is the negative impact that can be recoverable.

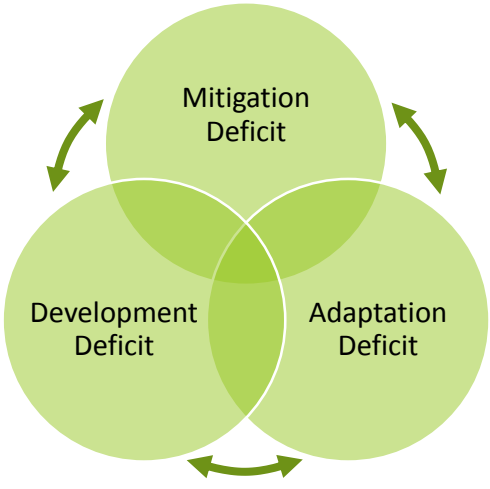
Among DRR communities:

- **Negative consequence of a natural phenomenon or human activity**, including the loss of life or injury, property damage.

Among CCA communities:

- **Residual impacts** "that still occur **after** adaptation measures have been taken" (CDKN)
- **Negative effects of climate change** "that people have **not** been able to cope with or adapt to" (Warner & Geest, 2013)

Why Loss and Damage?



Why Loss and Damage?

Inability to scale <u>effective</u> adaptation

1. **Insufficient understanding on the long-term efficacy of interventions**
2. **Uncertainty in future climate change impacts**
3. **Improper design of the project interventions**
4. **Poor participation and ownership**
5. **Changes in magnitude and intensities beyond capacities created**
6. **Insufficient funding**

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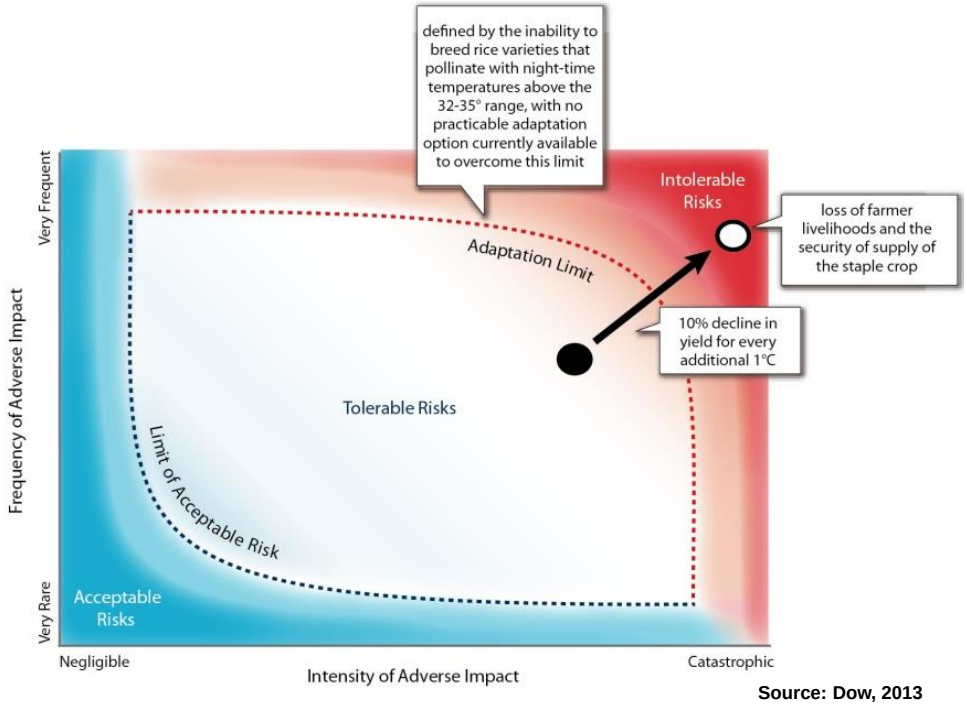
Reaching Adaptation Limits

- A*daptation Limit:* a point at which an actor can no longer secure valued objectives from intolerable risk through adaptive action.
- *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 for risk reduction within reasonable levels
- *Intolerable risks* are those which exceed a socially-negotiated norm (e.g., the availability of clean drinking water) or value (e.g. a persistence of a way of life) *despite adaptive action*.

Source: Dow, 2013



Source: Dow, 2013

Types of Loss and Damages

Economic L&Ds:

- "The loss of resources, goods and services that are commonly traded in markets" (UNFCCC, 2013).
- Economic damages can be "objectively verifiable monetary losses" (Fischer, J. M., 2010)

Non-economic L&Ds:

- The loss of "those that are not commonly traded in markets" (UNFCCC, 2013).
- Non-economic damages can be "subjective and non-verifiable losses" (Fischer, J. M., 2010)
- L&Ds on human functions, and L&Ds of social, cultural and environmental assets which are often not valued by the existing markets

Examples of Non-economic L&Ds

Climate-related disasters	Example of Economic L&Ds	Examples of Non-economic L&Ds
Extreme weather/climatic events: *e.g. Typhoons, Storms, Floods, Cyclones, etc.*	•Damages to buildings •Loss of wages •Loss of crops •Reduction in tourism revenue	•Loss of life •Health deterioration •Forced displacement •Destruction of cultural heritages (e.g. historic building)
Slow onset events: *e.g. Sea level rise, Salinization, Drought, etc.*	•Loss of livelihoods •Loss of crops •Reduction in tourism revenue	•Human health deterioration •Forced displacement •Uninhabitable territory •Loss of biodiversity and ecosystem (e.g. extinction of frog species, destruction of coral reefs, etc.)

(Source: authors; based on UNFCCC, 2013)

Why Bother Non-economic L&Ds?

- Unreported non-economic L&Ds can constitute as much as 50% or more of the reported economic L&Ds.
- Non-economic L&Ds can be more significant than economic L&Ds especially in developing countries.
- Non-economic L&Ds have not been well considered in climatic & non-climatic risk and vulnerability assessments and in designing insurance and compensation mechanisms (UNISDR, n.d.; Hoffmaister, J. P., & Stabinsky, D., 2012).
- Non-economic L&Ds has not been sufficiently reported in the most post-disaster reports and databases (Swiss Re, 2013).

Non-economic L&D in Various Databases

Number of economic and non-economic L&D indicators reported at various international and national disaster reporting databases

Database	Number of indicators reported	
	Economic	Non-economic
EM-DAT	1	5
Japan (Database covering natural disasters during 2003-2011)	10	5
Bangladesh (database covering floods, cyclones and landslides)	8	3

(Source: Compiled by authors)

Important Research Questions

- Is all that currently recorded and reported sufficient for decision-making on DRR and CCA measures?
- What non-economic L&Ds need to be recorded and reported?
- How do we identify, prioritize and measure non-economic L&Ds?
- How DRR and CCA measures can differ for addressing NE L&Ds, and how different interventions (e.g., risk insurance, compensation) can be re-designed for effectively addressing NE L&Ds, by measuring NE L&Ds, compared with economic L&Ds?

L&D Assessment Methodologies: DRR (Pre)

Type	Examples of Approaches	Overview
Quantitative	Probabilistic risk assessments	Probabilistic risk assessment based on GIS platform
	Catastrophe simulation (e.g. IIASA model)	Monte Carlo simulation of fiscal and economic risks
	Vulnerability and capacity assessment (VCA) [Quantitative methods exist as well using indices]	Basic process used to identify the strengths and weaknesses of households, communities, and institutions to support decisions made in the development of mitigation programmes
Qualitative	Community based disaster risk management (CBDRM)	Application of measures in risk analysis, disaster prevention and mitigation and disaster preparedness by local actors

Methodologies: DRR (post-)

Quantitative or Qualitative	Examples of Approaches	Overview
Quantitative	Economic Commission for Latin America and the Caribbean	Handbook that describes the methods required to assess the social, economic and environmental effects of disasters.
	Emergency Management Australia (EMA)	Guidelines that explain the process of loss assessment, through the steps required to carry out an economic assessment of disaster losses.

Limitations

- There are no known methods and examples that assess the effectiveness of interventions in reducing NELD impacts
- Actors engaged in DRR and CCA are not well-versed with the non-economic valuations of impacts
- Insufficient data available and limited use of existing data for identifying interventions.
- Areas where limited progress made are non-economic impacts on societies, environmental services of natural assets, loss of IK, cultural heritage etc.
- Existing disaster databases often consider only economic losses and damages

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Assessing NELD Effectiveness of Interventions

Assessing interventions for their NELD efficacy using AHP methodology

- Multi-criteria methodologies:
  - MCA methodologies aid in selecting the 'best' alternative from the number of feasible choice-alternatives under the presence of many criteria and diverse criterion priorities
  - Examples:
    - Cost-benefit analysis;
    - Cost-effectiveness analysis;
    - Analytic hierarchy process (AHP)

Analytic Hierarchy Process

- Developed by Prof Thomas L Saaty in 1990.
- AHP helps in structuring of a multi-dimensional problem into a hierarchical tree with criteria and alternatives.
- Most robust MCA method.
- Easy to interpret the results and efficient for project and policy evaluation.
- Helps evaluates measures and alternatives.

AHP Advantages

- Helps capturing both subjective and objective evaluation measures and alternatives. Pair-wise comparison is easy to understand.
- Group decision is supported through consensus by calculating geometric mean of the individual pair-wise comparisons.
- Reduces bias in decision-making. Offers effective means in situations of uncertainty and risk through derivation of scale where measures do not exist.

Bangladesh Workshop

Japan Workshop

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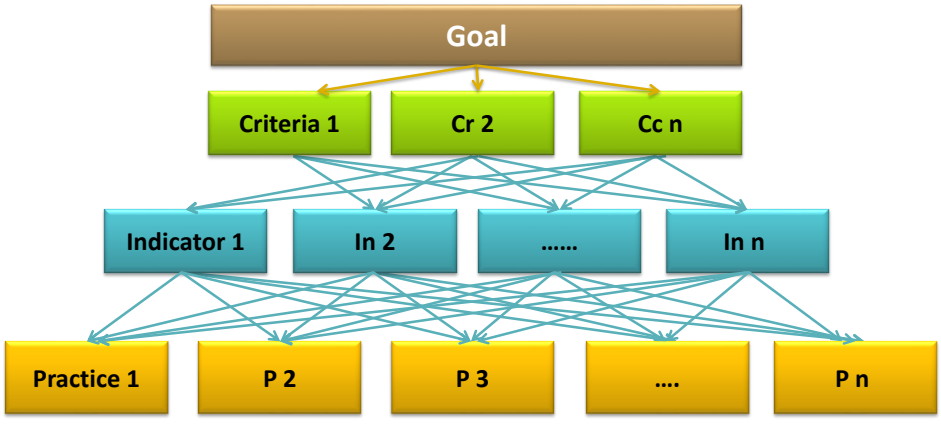
AHP Process

- Step I: • Identify the goal [e.g. reducing the NELD impacts]
- Step II: • Identify criteria that helps evaluate the goal
- Step III: • Identify and prioritize indicators that help assess the criteria
- Step IV: • Identify and prioritize practices that are to be evaluated
- Step V: • Pair-wise comparisons using SuperDecisions software

Pairwise Comparisons



Criteria for Assessing NELD Effectiveness

1. Value given by society
2. Significant impact on the larger well-being of family/society in the long-run
3. Cost of measuring the effectiveness
4. Policy relevance
5. Relevance to DRR-CCA planning
6. Measurability
7. Verifiability
8. Familiarity
9. Exclusivity

Prioritized Indicators (prior to the workshop)

Area of NE L&Ds	Indicators
Human life	• No. of people killed
Human health	• No. of people injured • No. of people suffered infectious diseases • No. of people suffered chronic diseases • No. of people suffered mental diseases • No. of people suffered malnutrition
Education	• School bullying • No of schools discontinued • No of children dropped out school • No of children temporary discontinued school
Human mobility	• No. of people displaced
Territory	• Place identity to the area felt by people • Place dependence on the area felt by people

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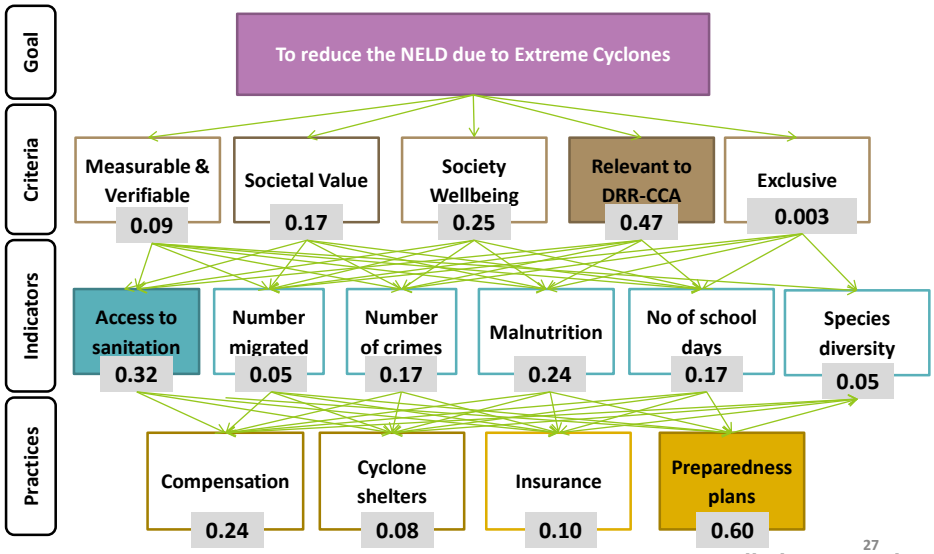
Area of NE L&Ds	Indicators
Social capital	• Participation to local/social activities • Acceptance of community leaders • Social hostilities • Ability to build consensus • No. of cooperatives/membership in societies • No. of households migrating (seasonally) • No. of women with migrated husband
Cultural heritage	• Cultural identity to cultural heritage sites felt by people • Cultural dependence on cultural heritage sites felt by people
Indigenous knowledge	• Availability of indigenous knowledge (IK) • Availability of people with IK
Local governance	• Collaboration • Organizational conflicts • Ability to facilitate external coordination
Biodiversity/ Ecosystem	• Species abundance • Species diversity • Area of forest • Amount of water available in rivers and lakes

AHP Results: Bangladesh



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Preliminary results

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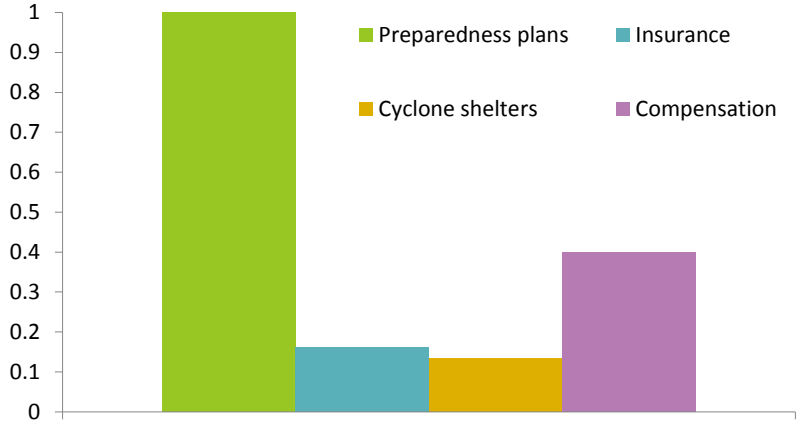
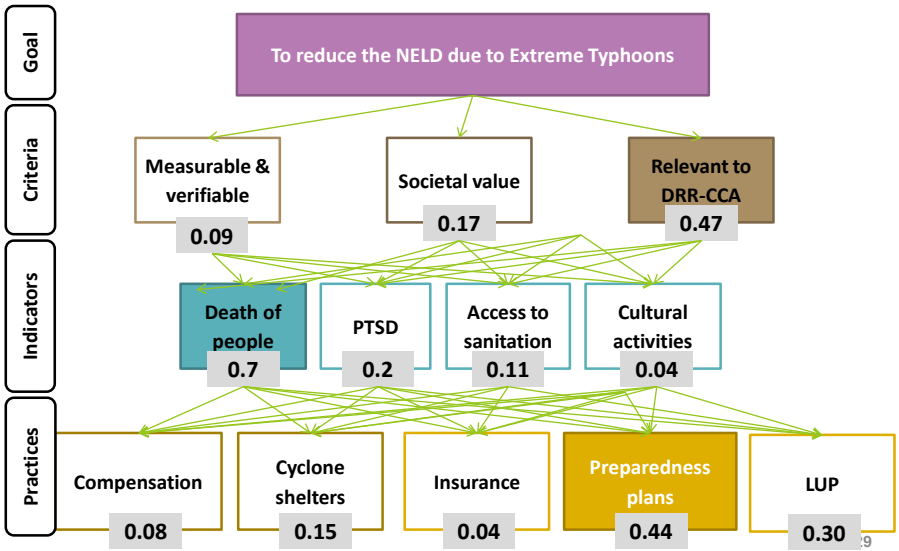
Efficacy of Practices Compared



Preliminary results

Japan



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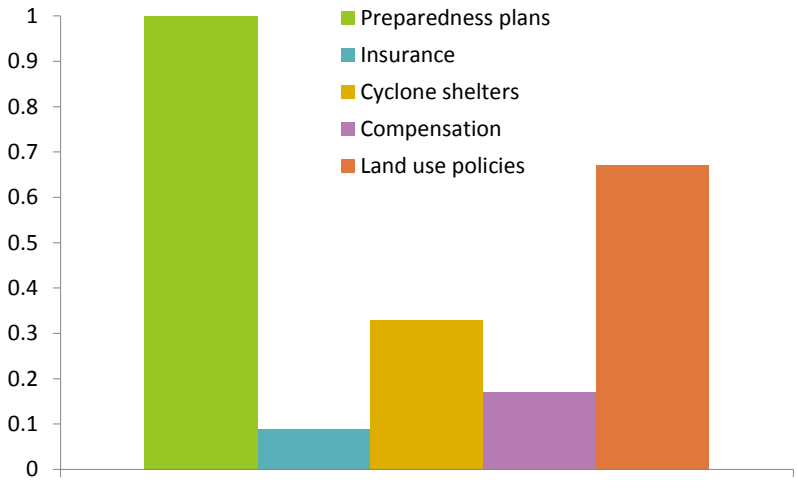

Why Low Performance of Insurance?

- High opportunity and operational costs
  - At community and government levels
- Delayed benefits compared to compensation
- Design elements: No guarantee of payouts invested in NELD-relevant areas
- Improved income stabilization doesn't necessarily lead to improvements in NELD

The Beginnings those Can be Made

- **Uncertainty about climate change impacts.**
  - Address events with high probability; stress on scientific research.
  - Focus on low-/no-regret options that work in wide range of future conditions/scenarios.
- **Lack of confidence in assessing non-economic loss and damage.**
  - Focus on impacts for which methodologies exist (e.g. ecosystem services).
  - Immediate response to avoid cascading impacts due to delay.

Beginnings…

- **Lack of community support to address potential impacts**
  - Design and implement pilot community-level interventions and integrate NELD indicators into vulnerability assessments.
  - Incentivize loss reduction by risk transfer.
- **Lack of agreement about evaluative criteria/effectiveness of interventions**
  - Focus on known low cost, “no-regret” and “win-win” measures.

Beginnings…

- **Quantification problems**
  - Do not be stuck with the quantification problem, qualitative assessments may prove more useful for some areas than economic evaluations.
  - Incorporate important NELD indicators at local level disaster data collection formats
- **Lack of political support on high cost interventions**
  - Awareness of policy makers; emphasize costs of no action; focus on “low regrets” options.
  - Estimate the true-costs of climate change impacts (cascading impacts on other sectors).

Source:

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