Assessing and Addressing Non-Economic Loss and Damages from Climatic Disasters

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Adaptation Task

Natural Resources and Ecosystem Services Area

Institute for Global Environmental Strategies

Outline of the Presentation

What are NE L&Ds?

What are issues on NE L&Ds?

What are criteria for identifying indicators on NE L&Ds?

What are areas and indicators of NE L&Ds?

Objectives of workshop

What are Non-Economic L&Ds

Economic L&Ds:

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

Non-economic L&Ds:

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

What are 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: lives killed • Human health deterioration • Forced displacement • Destruction of cultural heritages (e.g. historic building)
Slow onset events: *e.g. Sea level rise, Salinization, Drought, etc.*	• Damages to buildings • Loss of wages • Loss of crops • Reduction in tourism revenue	• Human health deterioration • Forced displacement • Uninhabitable territory • Damages to cultural heritages • Loss of indigenous knowledge • 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?

- Non-economic L&Ds can be more significant than economic L&Ds; Unreported non-economic L&Ds can constitute as much as 50% or more than the reported economic L&Ds especially in developing countries.

- However, non-economic L&Ds are currently less understood, and there are not sufficient assessment frameworks for addressing non-economic L&Ds.

- This poses greater challenge, including underestimation of actual total loss and damage.

- This leads to insufficient recovery, limited progress in DRR and CCA, and limited information (e.g., disaster database & reports) for decision-making by practitioners and policymakers on DRR and CCA.

- Non-economic L&Ds have not been well considered in climatic & non-climatic risk assessments and in designing insurance and compensation mechanisms (Hoffmaister & Stabinsky, 2012). Non-economic L&Ds has not been sufficiently reported in the most post-disaster reports and databases (Swiss Re, 2013).

What is need to be measured vs what is actually measured

Three categories of NELD: Human functions, socio-cultural assets and environmental assets

Non-economic impacts	Bangladesh			Japan
	Cyclones	Droughts	Salinity intrusion	Typhoons
Human functions	• Death • Injury • Infectious diseases • Skin diseases • Waterborne diseases • Malnutrition • Post-traumatic stress, depression	• Death • Illness, vector-borne diseases • Dehydration • Water-borne diseases	• Water-borne diseases • Kidney stone, rheumatism, pre-eclampsia, gestational hypertension	• Death • Injury • Infectious diseases • Mental stress, psychological stress, such as PTSD

(Source: authors; based on multiple sources)

Need vs Actual Measured Indicators

Non-economic impacts	Bangladesh			Japan
	Cyclones	Droughts	Salinity intrusion	Typhoons
Sociocultural assets	• Displacement • Suicide • Crime • Adverse pregnancy outcome	• Social disruption • Migration	• Women hardship • Social harassment to women • Conflicts, disputes • Relocation • Reproductive health issues	• Displacement • Damages to cultural heritages • Conflicts, disputes • Disagreement in cultural festivals • Increase in children not going to school
Environmental assets	• Damage to coastal ecosystems	• Land degradation • Fish distribution, growth	• Damage to ecosystem • Adverse impacts on fish growth	• Impacts to biodiversity and ecosystem

Need vs Actually Measured NEL&D

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)

Questions to be Addressed

Important observations:

- There is more emphasis on economic L&Ds in data from countries.
- There are more number of non-economic L&Ds that are never been reported; e.g. physical/mental diseases, people displaced, damages to social and cultural capitals, damages to biodiversity/ecosystem, and others.

Questions:

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

Loss and Damage Assessment Methodologies: DRR, Pre-disaster

Quantitative or Qualitative	Examples of Approaches	Overview	Hazard type
Quantitative	Comprehensive approach for probabilistic risk assessment	Probabilistic risk assessment based on GIS platform	Earthquakes; Tsunamis; Hurricanes; Floods; Landslides; Volcanoes
	Catastrophe simulation model of the IIASA	Monte Carlo simulation of disaster risks which examines fiscal and economic risk	Floods; Hurricanes; Weather and climate-related hazards; Earthquakes
Qualitative	Community based disaster risk management (CBDRM)	Application of measures in risk analysis, disaster prevention and mitigation and disaster preparedness by local actors	Droughts; Heatwaves; Floods; Hurricanes; Earthquakes; Volcanoes
	Vulnerability and capacity assessment (VCA)	Basic process used to identify the strengths and weaknesses of households, communities, and institutions to support decisions made in the development of mitigation programmes.	Droughts; Floods; Earthquakes

Methodologies: DRR, Post-Disaster

Quantitative or Qualitative	Examples of Approaches	Overview	Hazard type
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.	Floods; Hurricanes; Weather and climate-related hazards; Earthquakes
	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.	Floods; Hurricanes; Weather and climate-related hazards; Earthquakes
Qualitative	CBDRM	Same as above	Same as above
	VCA	Same as above	Same as above

Methodologies: CCA

Quantitative	Integrated impact assessment models	Model for the dynamics of carbon accumulation in the atmosphere and their influence on the economy	No specific hazard
	Country environmental analysis (CEA), Strategic environmental assessment (SEA)	Analytical tools on the prioritization of environmental issues in terms of their effect on economic development and poverty	Droughts; Land degradation; Floods; Hurricanes
Qualitative	UKCCRA	Same as above	Same as above

Limitations

- Often complex in nature
- Require steep learning curve as actors engaged in DRR (and to an extent in CCA) are not well-versed with the non-economic valuations of impacts
- Institutional and social systems are not well developed to adopt and value NELD in decision making
- Lack of experiences with methodologies providing decision-relevant information in CCA and DRR decision making

Prioritizing Adaptation Interventions using MCA Methodologies

- 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;
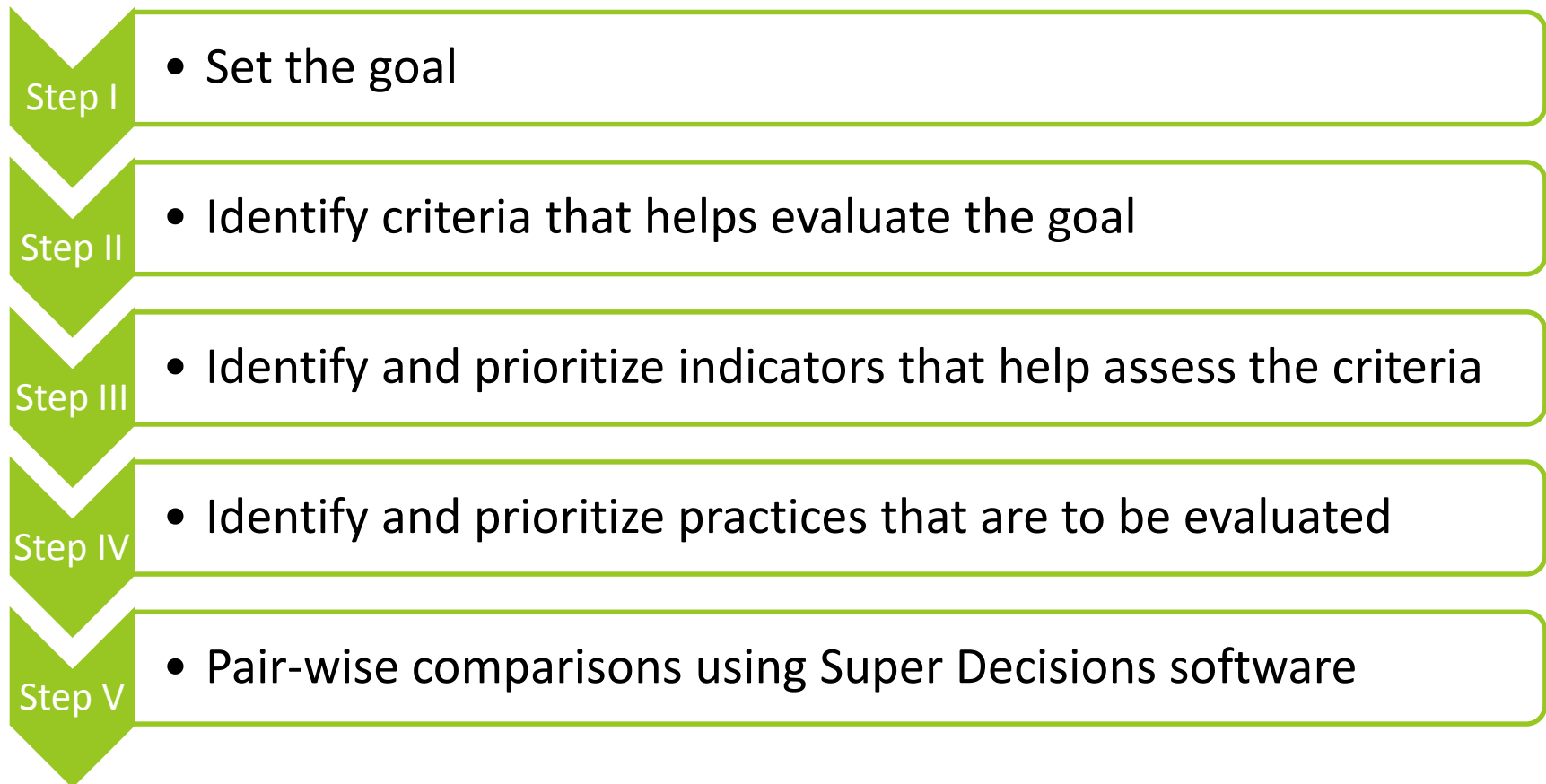   - Analytic hierarchy process (AHP)

Analytic Hierarchy Process

- Developed by Prof Thomas Saaty in 1990.
- AHP helps in structuring of a multi-dimensional problem into a hierarchical tree with criteria and alternatives.
- Most reliable MCA method. Easy to interpret. Efficient for project and policy evaluation.
- Intuitive and flexible over other methods. Helps evaluates measures and alternatives.

AHP

- 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.

AHP Workshops in Bangladesh, Japan, Thailand, India and Philippines

Step I
- Set the goal

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 Super Decisions software

Bangladesh Workshop

Indicators for Assessing NELD

Area of NE L&Ds	Overview	Indicators
Human life	Loss of life (death)	• No. of people killed
Human health	Health deterioration	• 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	Loss of educational opportunity	• School bullying • No of schools discontinued • No of children dropped out school • No of children temporary discontinued school
Human mobility	Displacement	• No. of people displaced
Territory	Loss of place attachment	• Place identity to the area felt by people • Place dependence on the area felt by people

Important indicators

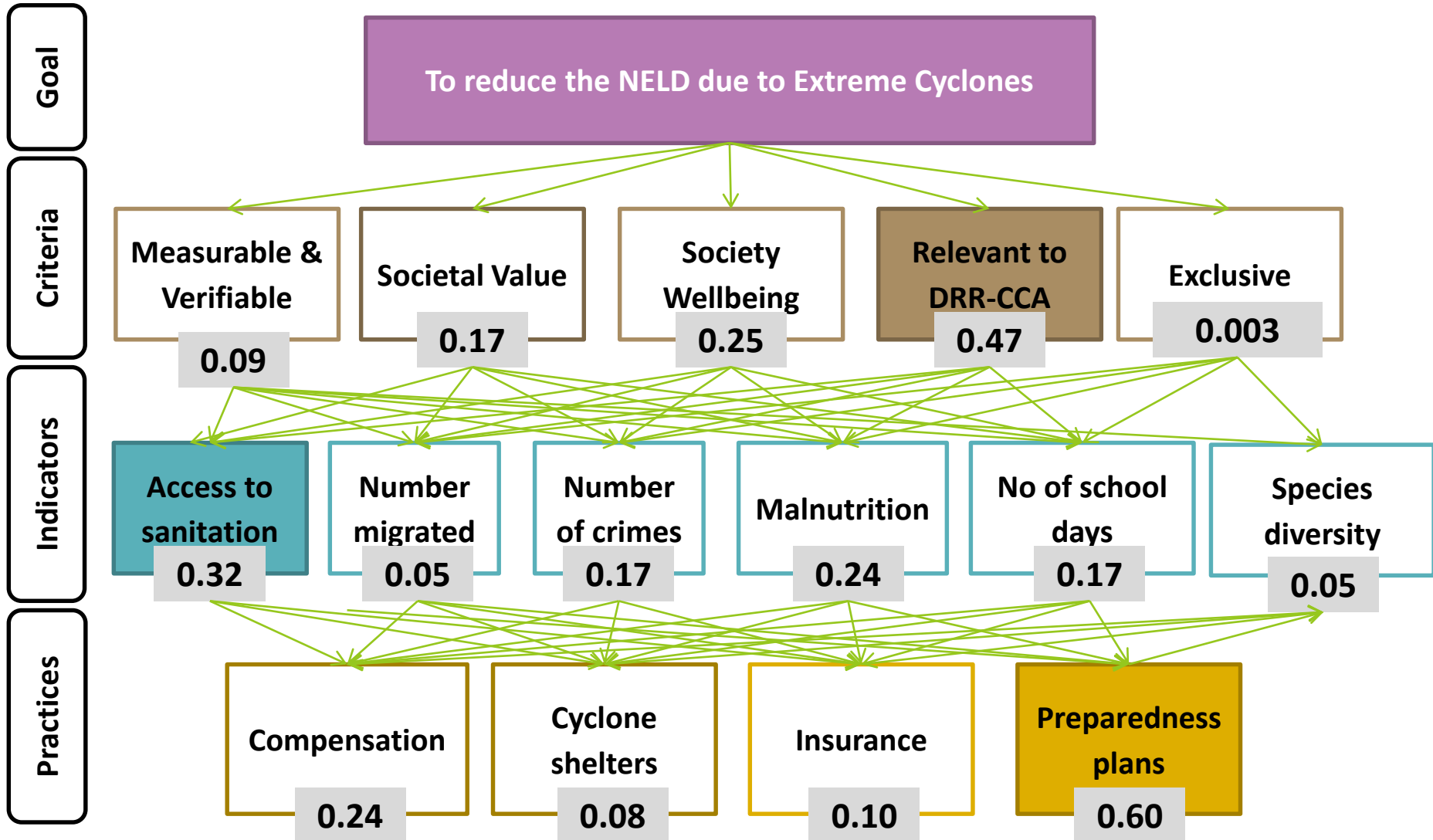| Area of NE L&Ds	Overview	Indicators
Social capital	Break of social network	• Participation to local/social activities • Acceptance of community leaders • Social hostilities • Ability to build consensus • No. of cooperatives/membership in societies • No. of households migrating (seasonally) • No. of women with migrated husband
Cultural heritage	Loss of cultural attachment	• Cultural identity to cultural heritage sites felt by people • Cultural dependence on cultural heritage sites felt by people
Indigenous knowledge	Loss of indigenous knowledge	• Availability of indigenous knowledge (IK) • Availability of people with IK

Important indicators

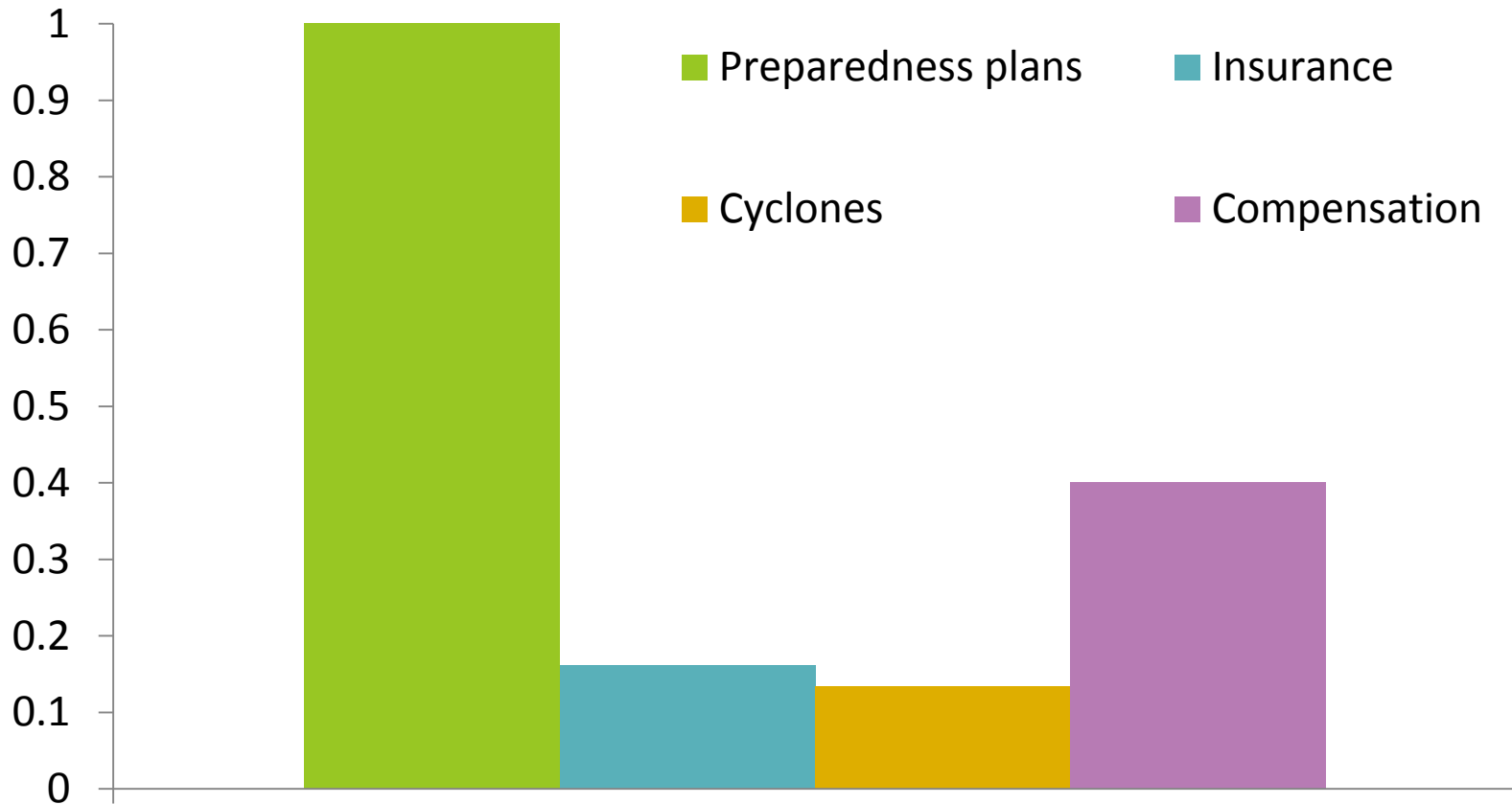| Area of NE L&Ds	Overview	Indicators
Local governance	Break of institutional network	• Collaboration • Organizational conflicts • Ability to facilitate external coordination
Biodiversity/ Ecosystem	Biodiversity/ecosystem deterioration	• Species abundance • Species diversity • Area of forest • Amount of water available in rivers and lakes

Important Criteria for Identifying NELD Indicators

Criteria for identifying indicators on non-economic L&Ds
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 indicator
4. Policy relevance
5. Relevance to DRR-CCA planning
6. Measurability
7. Verifiability
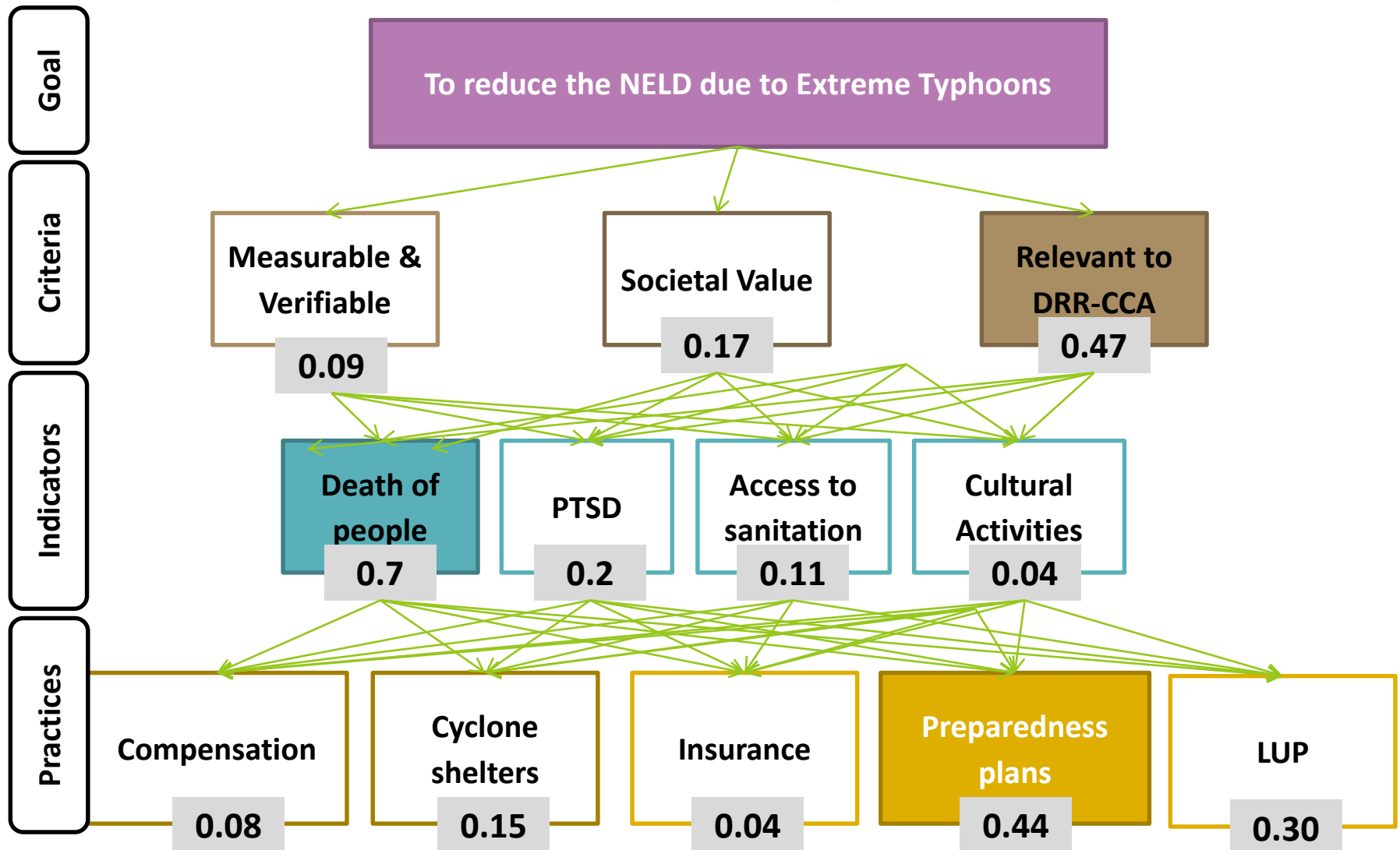8. Familiarity
9. Exclusivity

AHP Results

Goal: To reduce the NELD due to Extreme Cyclones

Criteria:
- Measurable & Verifiable — 0.09
- Societal Value — 0.17
- Society Wellbeing — 0.25
- Relevant to DRR-CCA — 0.47
- Exclusive — 0.003

Indicators:
- Access to sanitation — 0.32
- Number migrated — 0.05
- Number of crimes — 0.17
- Malnutrition — 0.24
- No of school days — 0.17
- Species diversity — 0.05

Practices:
- Compensation — 0.24
- Cyclone shelters — 0.08
- Insurance — 0.10
- Preparedness plans — 0.60

Efficacy of Practices Compared

Addressing non-economic loss and damage: Japan

Efficacy of Practices Compared: Japan

Legend:
- Preparedness plans
- Insurance
- Cyclone shelters
- Compensation
- Land use policies
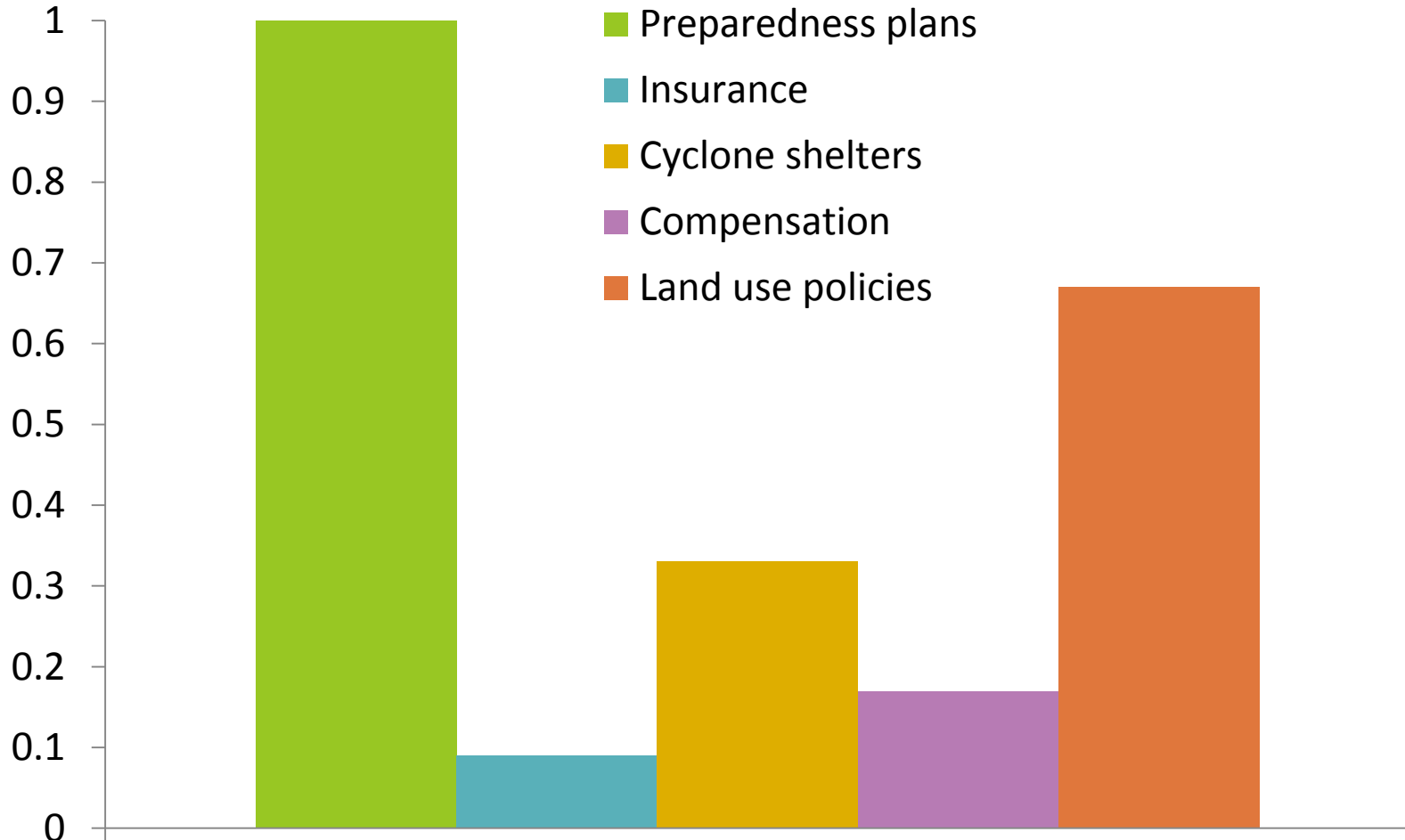
Why?

Low Performance of Insurance

- Insurance is seldom consider NELD and hence don't address NEDL

- No guarantee of payouts invested in NELD-relevant areas

- Improved income stabilization doesn't necessarily lead to immediate improvements in non-economic aspects of life

- Traditional issues: High opportunity and operational costs, insufficient loss coverage, high price, trust issues

What about Compensation?

- No opportunity costs (no need to pay to get it)

- Mostly certain that some form of compensation will arrive soon

Way Forward

- Handholding exercises with governments in measuring NELD and incorporating that information into CCA and DRR decision making
    - Provide compelling evidence for importance of NELD by comparing NELD with ELD on comparable terms (tough task)
    - Incorporating NELD indicators into local data collection formats of governments
    - Assess CCA and DRR initiatives based on NELD efficacy and update priorities assigned to them
    - Quantification problem Focus on impacts for which methodologies exist (e.g. ecosystem services)

Acknowledgement

Thank You!
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