

Climate Change Adaptation: Governance, Goals and Metrics

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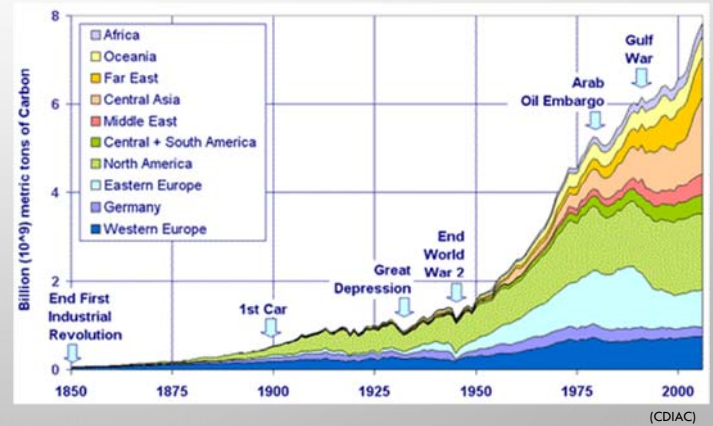
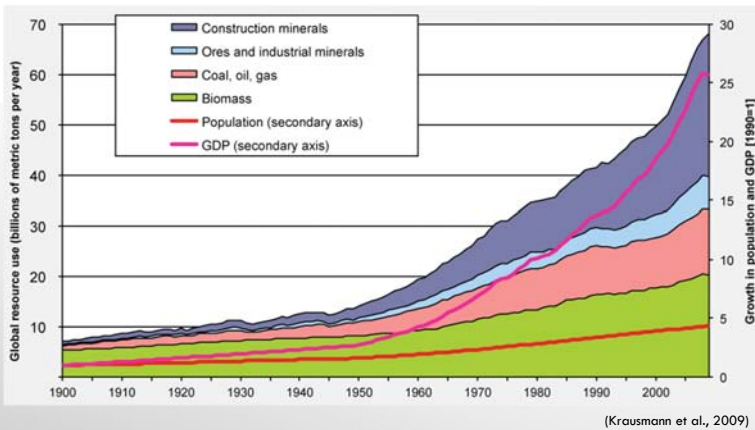
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OUTLINE

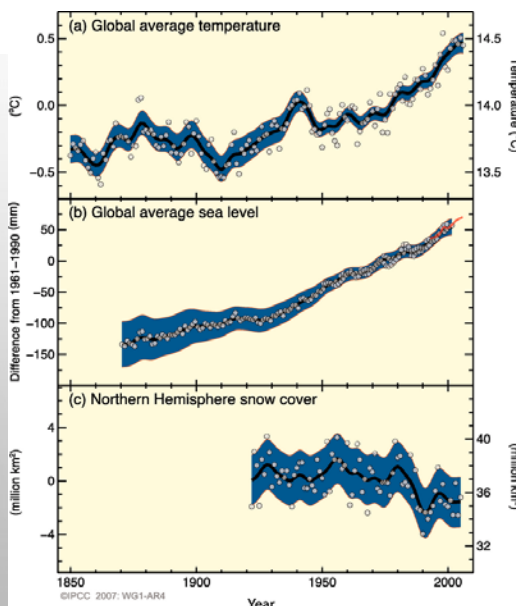
- CLIMATE RISK REDUCTION IS ABOUT BOTH ADAPTATION AND MITIGATION
- NEED FOR ADAPTATION IN DEVELOPING COUNTRIES
- STRATEGIES FOR PROMOTING ADAPTATION
 - ADAPTATION GOVERNANCE
 - ADAPTATION DECISION MAKING AND METRICS
- COMPOUNDING OF RISKS & ADAPTATION PLANNING
- CONCLUSION & WAY FORWARD

RESOURCE CONSUMPTION AND GHG EMISSIONS



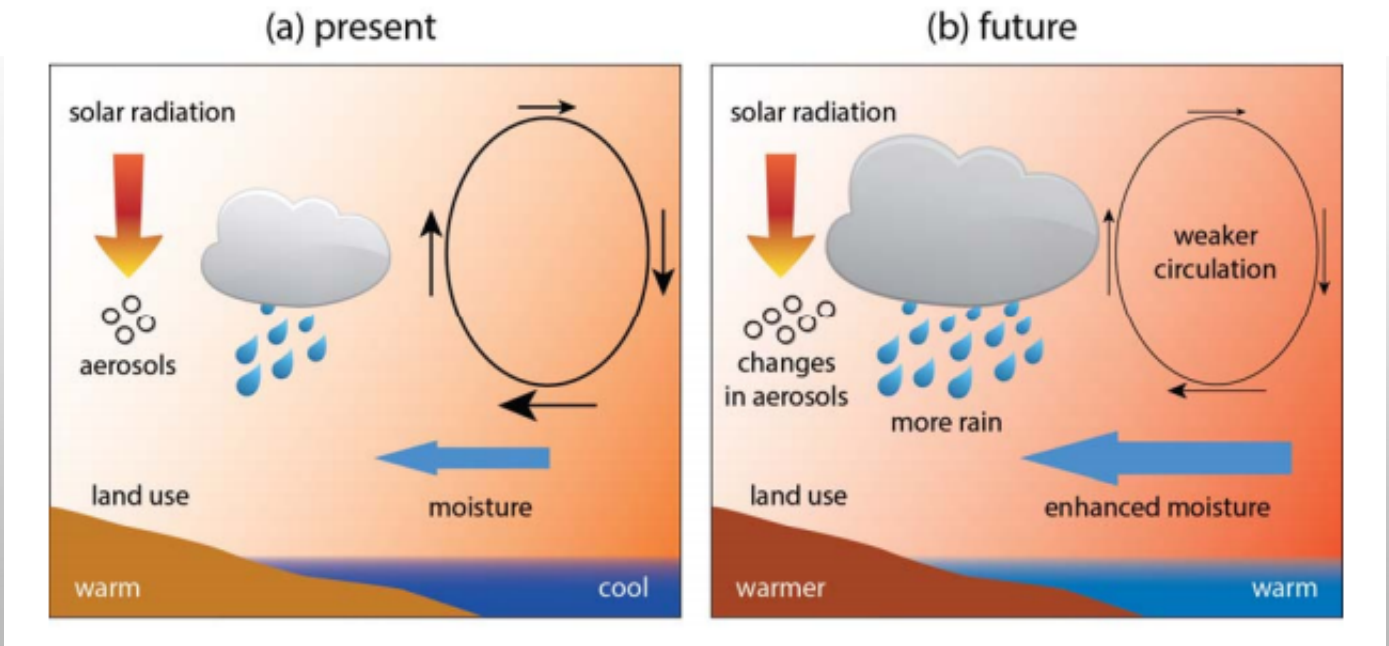
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GLOBAL WARMING AND CLIMATE CHANGE



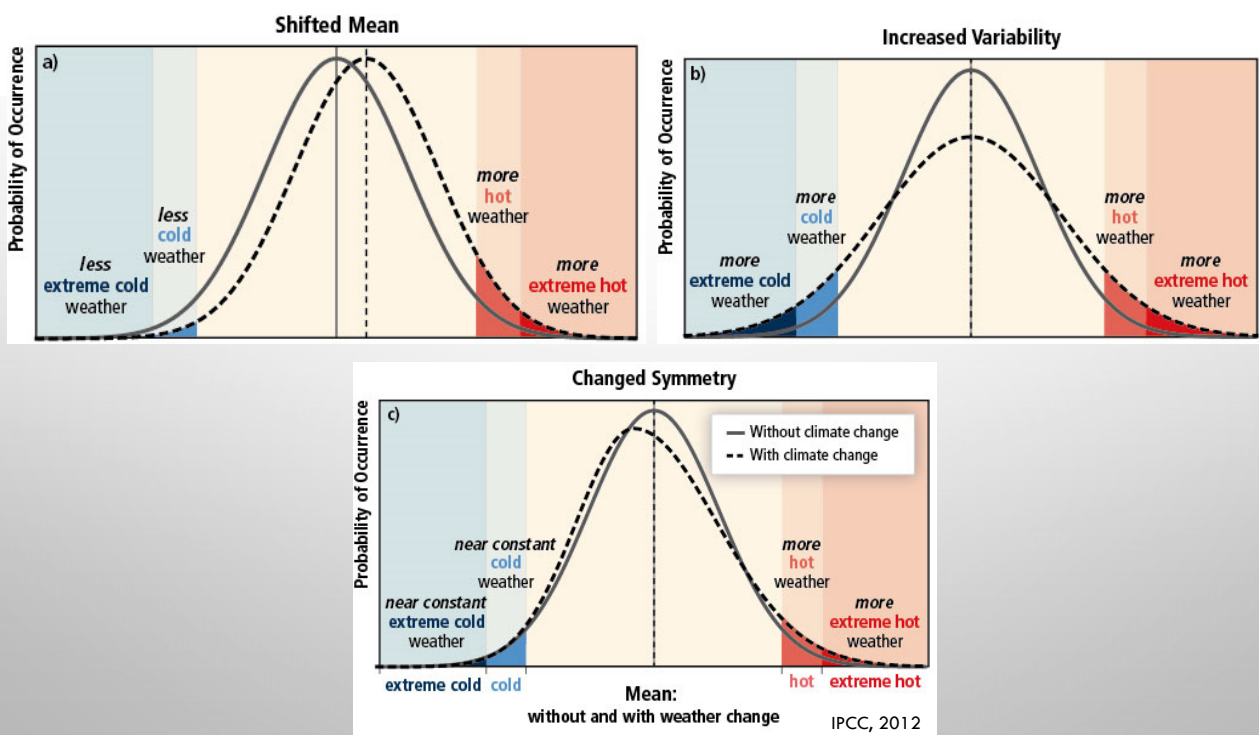
- “WARMING OF THE CLIMATE SYSTEM IS UNEQUIVOCAL, AS IS NOW EVIDENT FROM OBSERVATIONS OF INCREASES IN GLOBAL AVERAGE AIR AND OCEAN TEMPERATURES, WIDESPREAD MELTING OF SNOW AND ICE, AND RISING GLOBAL AVERAGE SEA LEVEL” (IPCC 2007)

IMPACT OF GLOBAL WARMING ON RAINFALL PATTERNS

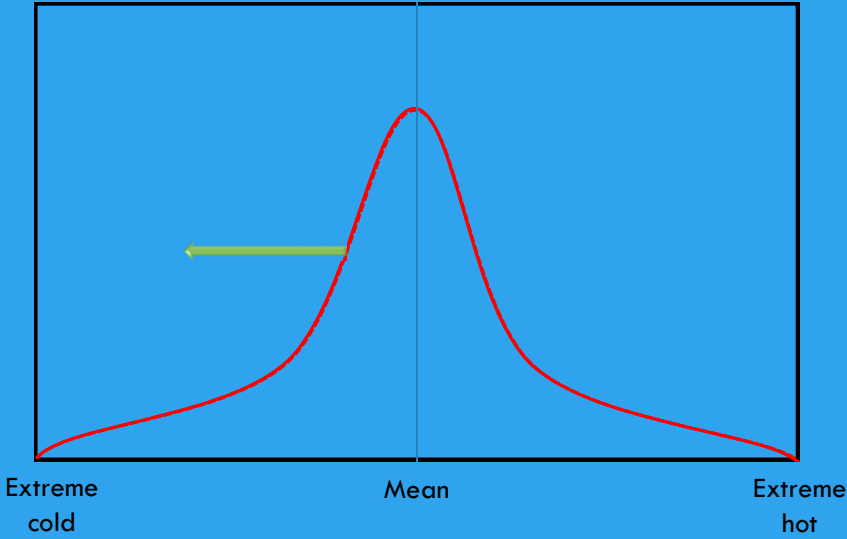


(IPCC 2007, WG I, Ch14)

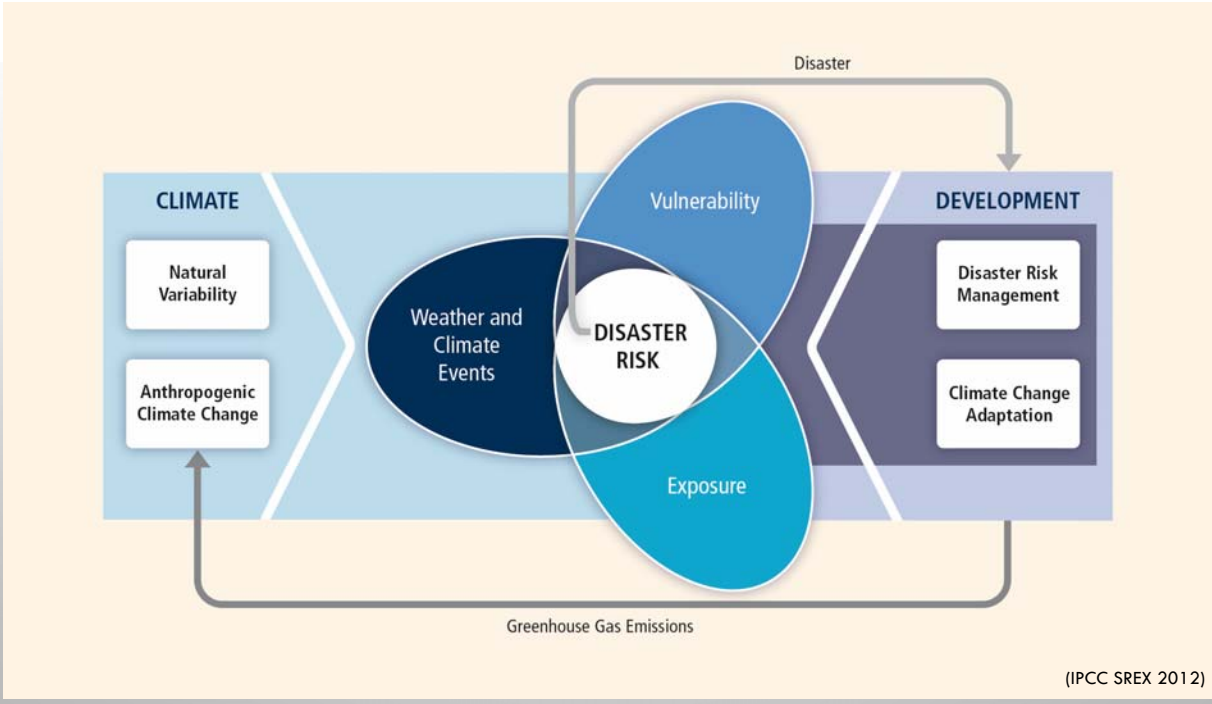
CHANGE IN EXTREMES



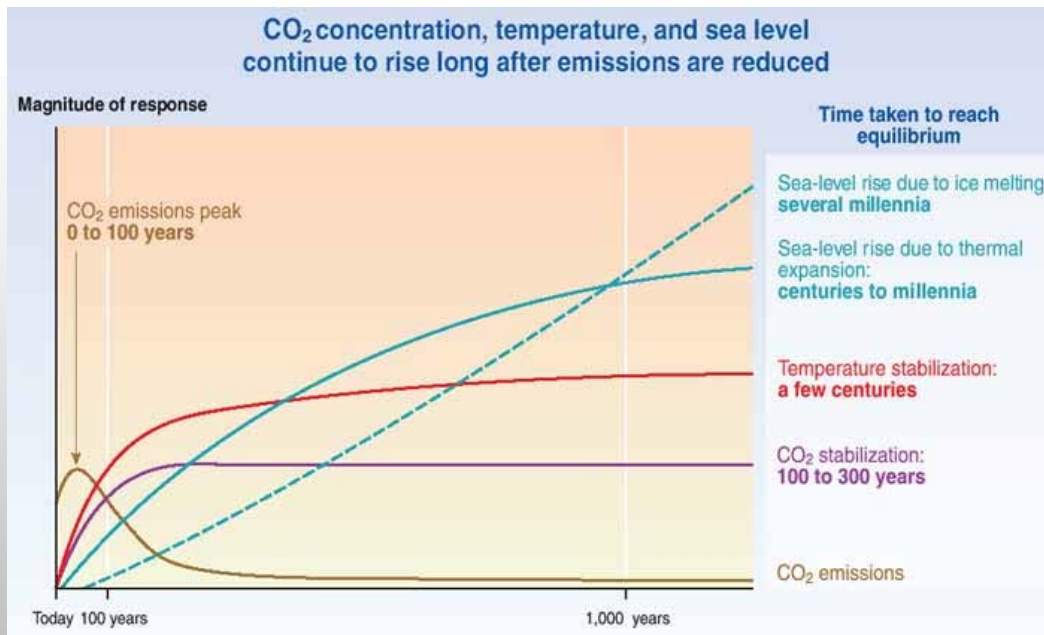
Fat Tails!



RELATION BETWEEN CLIMATE CHANGE, DEVELOPMENT AND GHG EMISSIONS

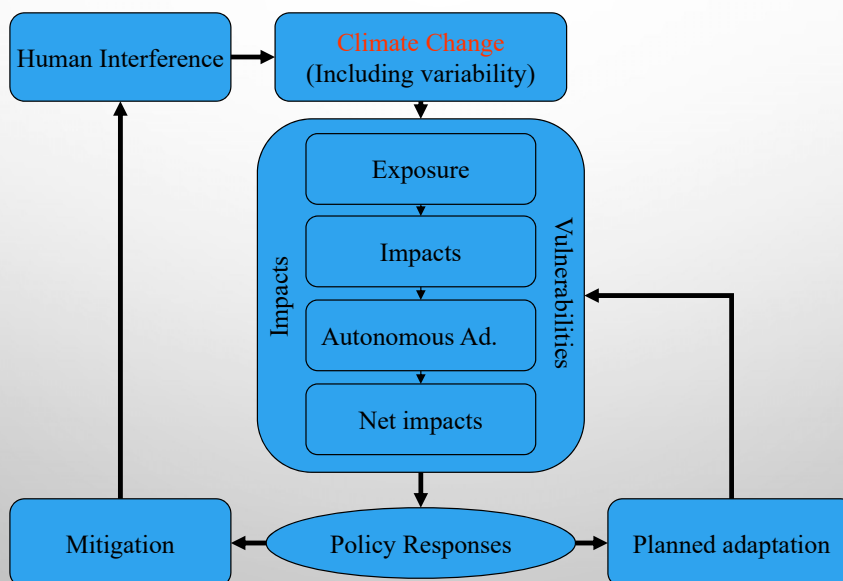


GLOBALLY, ADAPTATION IS IMPORTANT FOR CENTURIES TO COME

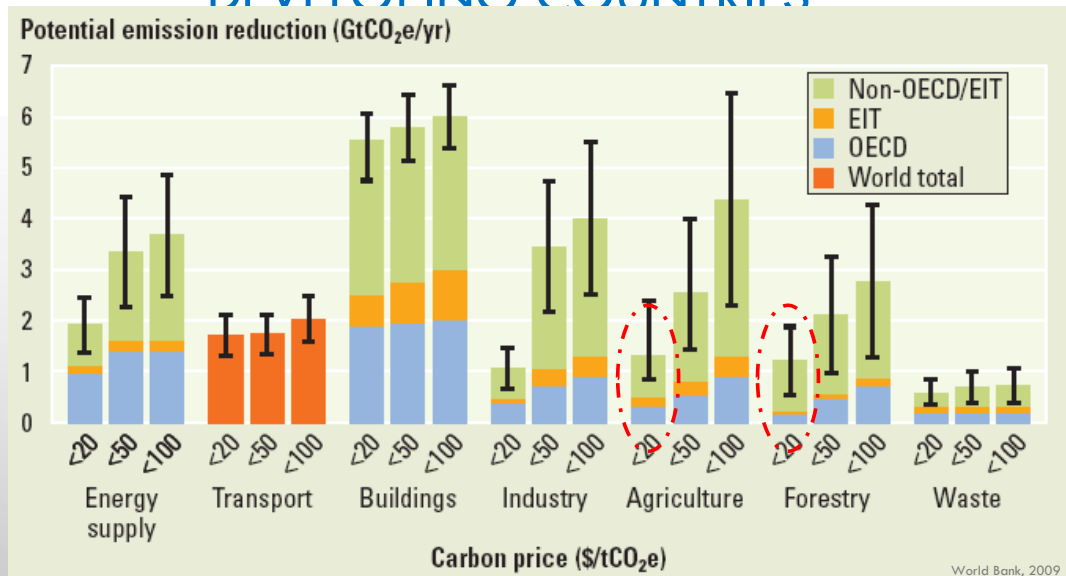


After CO₂ emissions are reduced and atmospheric concentrations stabilized, climate change impacts will continue to be felt several years into the future

CLIMATE CHANGE ADAPTATION AND MITIGATION ARE LINKED



POTENTIAL SECTORS FOR GHG MITIGATION IN DEVELOPING COUNTRIES



- There is high potential for low cost mitigation options in developing countries
- Relatively low potential for low cost mitigation in agriculture and forestry for developing countries

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DEVELOPMENTAL NEEDS OF DEVELOPING COUNTRIES

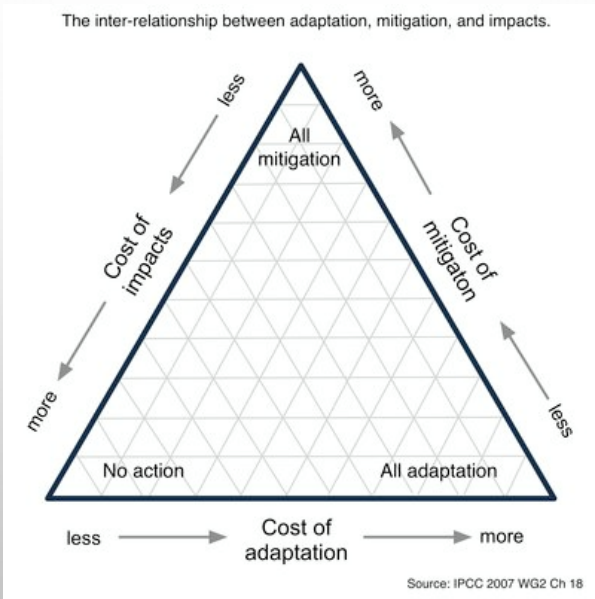
| | GNI per capita (PPP in 2014, US\$) | Electricity Cons. kWh per capita | Fixed telephones per 100 people (Mobiles) | Access to improved water source (% of rural pop.) |
|-----------|------------------------------------|----------------------------------|---|---|
| IDA&IBRD | 9250 | 1960 | 9.8 (92) | 25 |
| Developed | 41410 | 8832 | 42.1 (123) | 90 |

(World Bank, 2018)

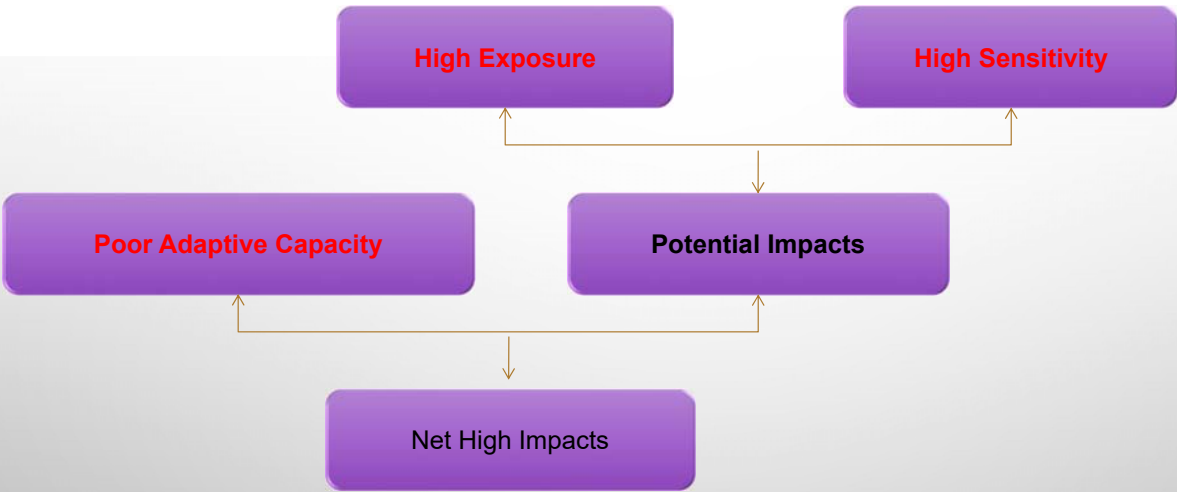
So, adaptation supporting their development is important for developing countries!

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CLIMATE CHANGE ADAPTATION AND MITIGATION LINK TO IMPACTS



HIGH CC IMPACTS IN DEVELOPING COUNTRIES



- Net high impacts in Asia Pacific region due to high exposure, high sensitivity and poor adaptive capacity
- Climate change impacts are function of exposure, sensitivity, and adaptive capacity.
- Impacts are directly proportional to exposure and sensitivity and indirectly proportional to adaptive capacity.

ADAPTATION IS IMPORTANT FOR DEVELOPING COUNTRIES: HIGH SENSITIVITY

- **HIGH POVERTY LEVELS**, ESPECIALLY IN RURAL AREAS (500 MILLION SUBSISTENCE FARMERS IN AP REGION), CHARACTERIZED BY LOW HUMAN DEVELOPMENT INDEX
- **HIGH DEPENDENCY ON PRIMARY PRODUCTION SECTORS** SUCH AS AGRICULTURE AND ANIMAL HUSBANDRY (NEARLY 60% OF TOTAL POPULATION), THAT ARE DIRECTLY IMPACTED BY CLIMATE CHANGE, COUPLED WITH LACK OF DIVERSIFIED LIVELIHOOD OPTIONS
- **LEAST ACCESS TO RESOURCES** (INEQUALITY) COUPLED WITH RAPID DEGRADATION OF NATURAL RESOURCE BASE INCLUDING FORESTS
- **POOR GOVERNANCE** AND INSTITUTIONAL SYSTEMS (POLITICAL, SOCIAL, ENVIRONMENTAL AND ECONOMIC) REFLECTING FRAGMENTED AND SLOW PROGRESS IN DEVELOPMENT

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PRIORITY AREAS FOR ADAPTATION IN ASIA

- ANALYSIS OF NAPAS INDICATE THAT HIGHEST IMPORTANCE HAS BEEN GIVEN TO THE FOLLOWING SECTORS BY MOST NON-ANNEX I COUNTRIES:
 - AGRICULTURE
 - WATER
 - COASTAL ZONE MANAGEMENT (ESPECIALLY FOR PACIFIC ISLAND COUNTRIES)
- PRIORITY SECTORS AND COSTS DIFFERS FROM COUNTRY TO COUNTRY

| Country | Priority area | NAPA Costs (USD Million) | |
|----------------------------|--------------------------|--------------------------|----------------|
| | | Priority area | National Total |
| Bangladesh | Coastal Zone Management | 23 | 41.67 |
| Bhutan | GLOF mitigation | 3.19 | 7.53 |
| Cambodia | Irrigation systems | 45 | 128.85 |
| Maldives | Fresh water availability | 9.3 | 24.04 |
| 4 Pacific Island Countries | Coastal areas resilience | 25.3 | 48.2 |

Source: UNFCCC, 2009

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HIGH EXPOSURE OF ASIA TO CLIMATIC EVENTS

Table 29-5 | Top ten countries in the Asia–Pacific region based on absolute and relative physical exposure to storms and impact on GDP (between 1998 and 2009; after Tables 1.10 and 1.11 of ESCAP and UNISDR, 2010).

| Rank | Absolute exposure (millions affected) | Relative exposure (% of population affected) | Absolute GDP loss (US\$ billions) | Loss (% of GDP) |
|------|---------------------------------------|--|-----------------------------------|---------------------------------|
| 1 | Japan (30.9) | Northern Mariana Islands (58.2) | Japan (1,226.7) | Northern Mariana Islands (59.4) |
| 2 | Philippines (12.1) | Niue (25.4) | Republic of Korea (35.6) | Vanuatu (27.1) |
| 3 | China (11.1) | Japan (24.2) | China (28.5) | Niue (24.9) |
| 4 | India (10.7) | Philippines (23.6) | Philippines (24.3) | Fiji (24.1) |
| 5 | Bangladesh (7.5) | Fiji (23.1) | Hong Kong (13.3) | Japan (23.9) |
| 6 | Republic of Korea (2.4) | Samoa (21.4) | India (8.0) | Philippines (23.9) |
| 7 | Myanmar (1.2) | New Caledonia (20.7) | Bangladesh (3.9) | New Caledonia (22.4) |
| 8 | Vietnam (0.8) | Vanuatu (18.3) | Northern Mariana Islands (1.5) | Samoa (19.2) |
| 9 | Hong Kong (0.4) | Tonga (18.1) | Australia (0.8) | Tonga (17.4) |
| 10 | Pakistan (0.3) | Cook Islands (10.5) | New Caledonia (0.7) | Bangladesh (5.9) |

Note: Small islands are highlighted in yellow.

IPCC, 2014

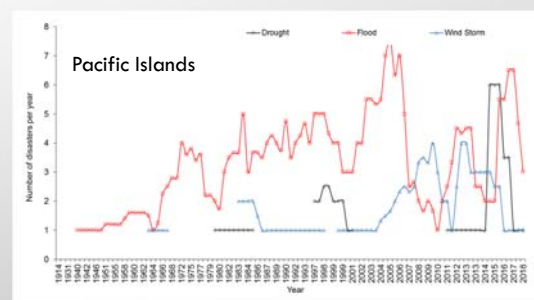
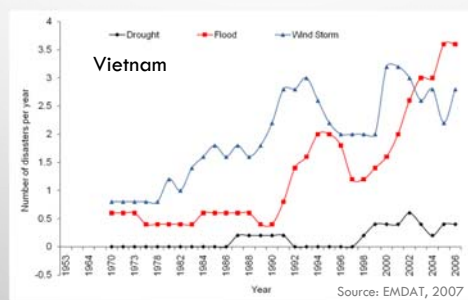
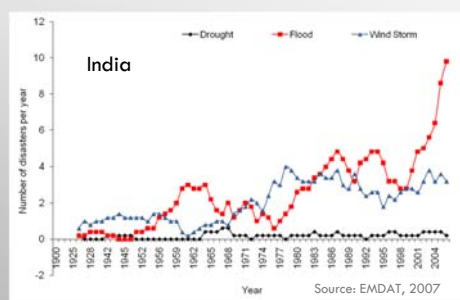
- HIGH INCIDENCE OF HYDRO-MET EVENTS SUCH AS DROUGHTS, FLOODS, CYCLONES/TYPHOONS, HEAT WAVES ETC IN ASIA.
- PACIFIC ISLAND COUNTRIES HAVE HIGH RELATIVE EXPOSURE

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CURRENT IMPACTS: HYDRO-METEOROLOGICAL DISASTERS

| Country | GDP per capita (USD) | Population (million) | Number of typhoons | Fatalities | Fatalities per event |
|-------------|----------------------|----------------------|--------------------|------------|----------------------|
| Japan | 38,160 | 126 | 13 | 352 | 27 |
| Philippines | 1,200 | 74 | 39 | 6,835 | 175 |
| Bangladesh | 360 | 124 | 14 | 151,045 | 10,788 |

Sources: Mechler, 2004



5-year moving average of number of events in India, Vietnam and Pacific Island countries

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ADAPTIVE CAPACITY IN DEVELOPING ASIA AND PACIFIC

| Determinants of adaptive capacity | Developing South Asia | Developing East Asia Pacific | World |
|---|----------------------------|------------------------------|------------------------|
| Per capita GNI, PPP basis (USD) | 2733 | 5399 | 10,357 |
| Technology patent applications (total since 2000) | 129,035 | 1,214,326 | 12,420,319 |
| % of paved roads in total (proxy) | 30.8 (2000) [57 (2004)] | 11.4 (2000) | 36 (2000) |
| Resource allocation (IRAI, rated on 1-6 scale) | 3.5 (IDA countries) | 3.3 (IDA countries) | 3.3 (IDA countries) |

| | ND-GAIN (Readiness) |
|----------------------------------|---------------------|
| Top 50 countries (Developed) | 63 (0.62) |
| Bottom 50 countries (Developing) | 35 (0.24) |

The World Bank, 2009; WIPO, 2009

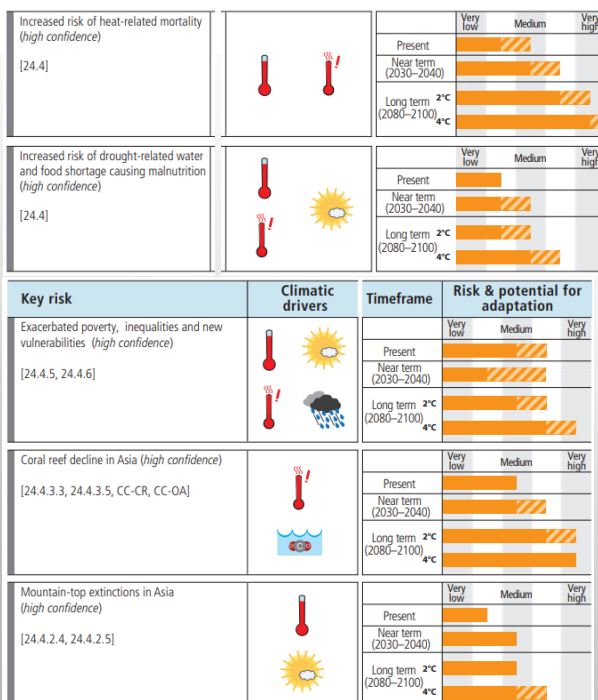
ND-GAIN, 2018

- Developing South Asia lag in economic development and technology exports
- Developing East Asia Pacific lag in infrastructure and resource allocation

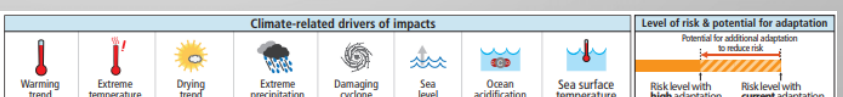
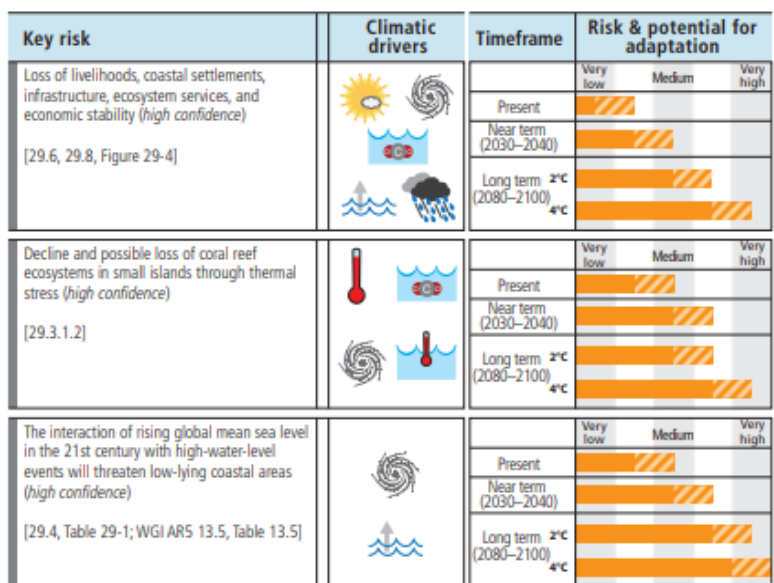
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FUTURE IMPACTS OF CLIMATE CHANGE

Asia



Pacific



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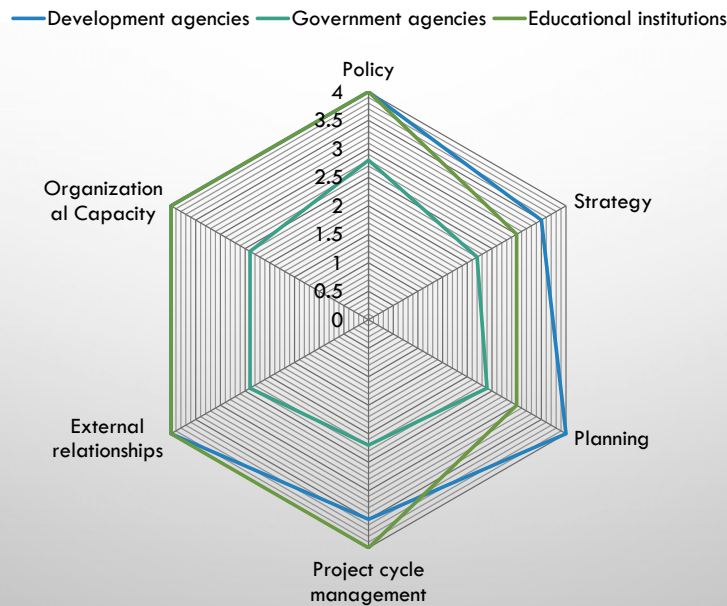
ADAPTATION DEFICIT AND BARRIERS TO ADAPTATION

- A gap between current and optimal levels of adaptation needed to adapt to the climate change
- It is a dynamic concept as what is an optimal level of adaptation may change from time to time as our understanding on future impacts evolve.
- A precursor to the loss and damage concept
- Several barriers to adaptation will increase the adaptation deficit.
 - Science and Technological
 - Social and economic
 - Policy and institutional

CRITICAL BARRIERS AND OPTIONS FOR ENHANCED ADAPTATION IN ASIA PACIFIC REGION

| | Barriers | Options |
|---------------------|---|---|
| Scientific Capacity | <ul style="list-style-type: none"> • Lack of dependable climate projections & vulnerability assessments • Limited understanding of mainstreaming adaptation | <ul style="list-style-type: none"> • Capacity building on downscaling climate projections & VA methods • Identification of win-win adaptation options with limited climate info • Sharing best practices (e.g. UNEP Global Adaptation Network) |
| Technology | <ul style="list-style-type: none"> • Limited scalability/highly location specific • Lack of technology options in critical sectors (NRM) | <ul style="list-style-type: none"> • South-South cooperation • Promoting local coping mechanisms and traditional knowledge |
| Financial | <ul style="list-style-type: none"> • Huge gap between financial needs and availability • High risk to investments | <ul style="list-style-type: none"> • Community-based adaptation as low-cost option • Public-private partnerships • Climate-proofing of investments and ODA |
| Governance | <ul style="list-style-type: none"> • Poor institutional frameworks for adaptation • Non-existent adaptation policy frameworks | <ul style="list-style-type: none"> • Measuring progress in adaptation (adaptation metrics) • Enhancing the grass-root participation, promoting transparency and accountability (on the lines of Paris Declaration on ODA) |

LEVEL OF MAINSTREAMING CLIMATE CHANGE



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Prabhakar, 2014

REASONS FOR POOR MAINSTREAMING CCA INTO INSTITUTIONAL PROCESSES

• Governments

- **Mandate-related issues** with the staff is a major problem. Lack of specific terms of reference in the job profile is indicative that these prefectures have not yet reached the level of operationalizing the climate change adaptation.
- Poor **knowledge** of staff on incorporating climate change aspects into planning is a major hindrance. In some states, though the environment departments are well aware about climate change aspects, other departments don't have necessary knowledge and skills to deal with this subject.
- Lack of **collaboration and cooperation** among city and prefectural governments.
- Limited **budget** hindering the progress in climate change adaptation.

• Development agencies

- One important limitation is finding is **lack of data** to assess climate change risks at the level of implementing the projects/programs.

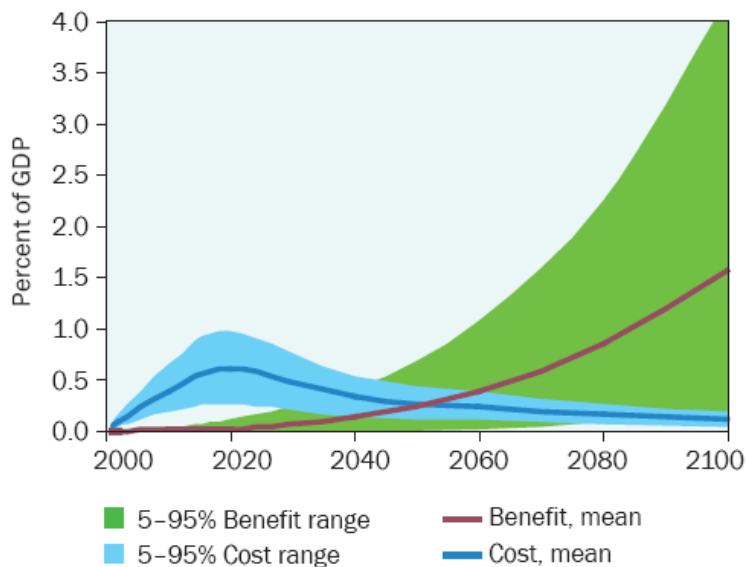
• Universities

- **Limited budget and lack of agenda** in some graduate schools is the reason behind limited research in climate change adaptation though most relevant graduate schools have ongoing research on other aspects of climate change. These universities do not have specific departments to address exclusively climate change.

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Prabhakar, 2014

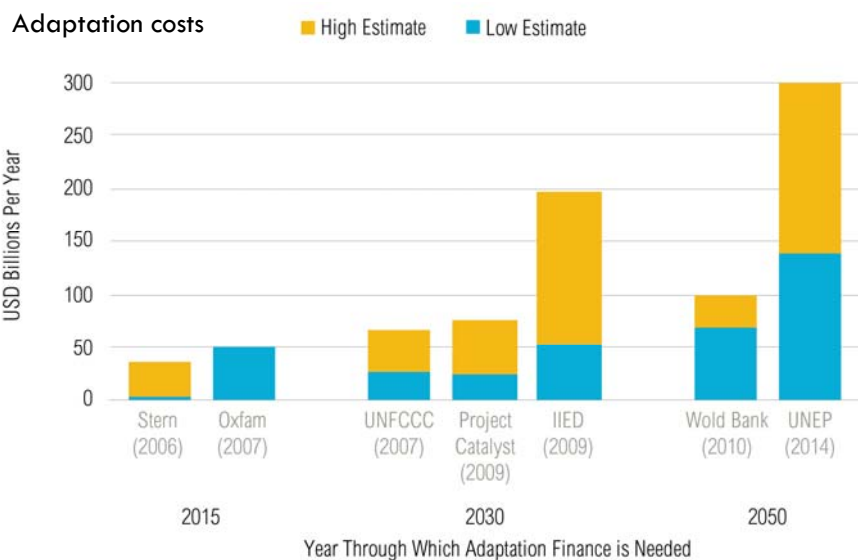
COSTS NOW FOR BENEFITS IN THE FUTURE!



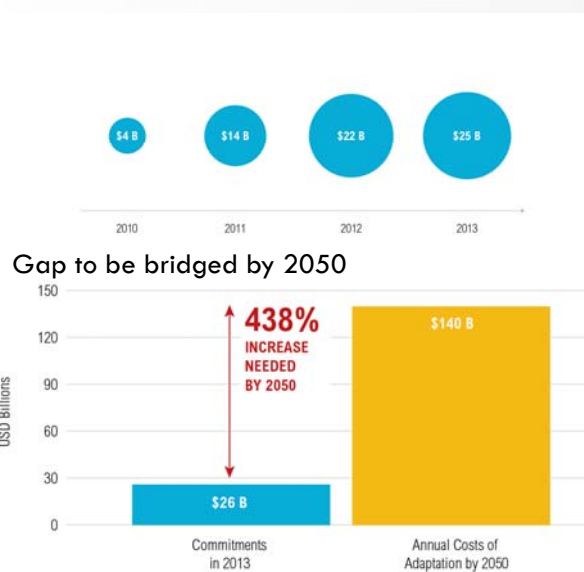
- Adaptation benefits are much higher than the costs in the 4 countries of South East Asia (Indonesia, Philippines, Thailand, and Vietnam; Figure on left)
- By 2100, the benefits of adaptation would reach to the tune of 1.9% of GDP when compared to costs at 0.2%

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BRIDGING THE GAP BETWEEN ADAPTATION COSTS AND COMMITMENTS



Public finance commitments (2010-2013)

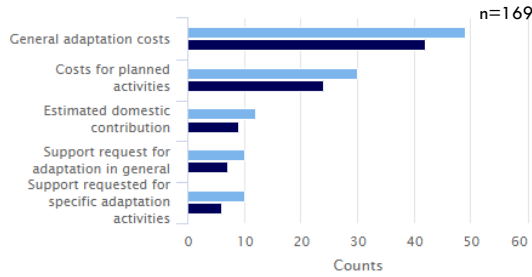


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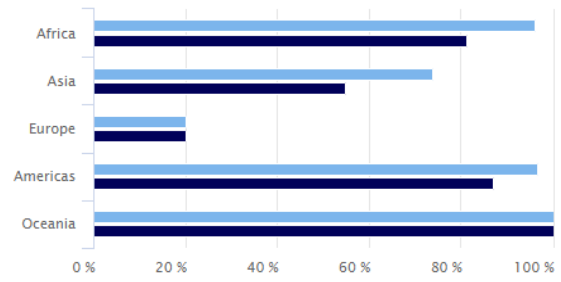
WRI 2015

ADAPTATION FINANCE AND (I)NDCS

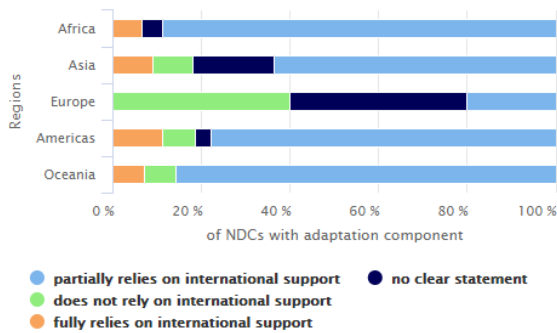
Number of (I)NDCs with adaptation components specifying adaptation costs, domestic contribution and support requirements



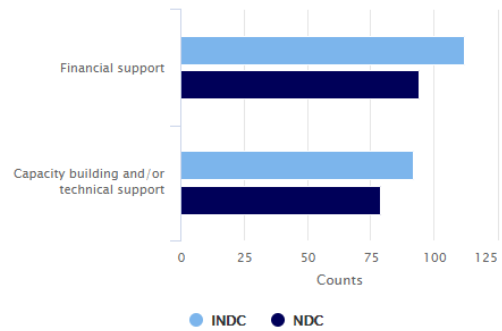
Share of (I)NDCs with adaptation component that intend to use international support for adaptation



Share of NDCs specifying that adaptation action relies on international support



Kind of support needed for adaptation



GIZ, 2018

ADAPTATION GOVERNANCE & DECISION MAKING

WHY BETTER ADAPTATION GOVERNANCE?

1. PAST EXPERIENCE: GLOBAL DEVELOPMENTAL INITIATIVES

- Johannesburg Plan of Action (SD)
 - Non-binding (voluntary)
 - No financial incentives for countries
 - Limited understanding on sustainable development at the early stages
- MDGs
 - Overly ambitious for some and inadequate for others
 - Insufficient funding
 - Doesn't cover the entire gamut of SD

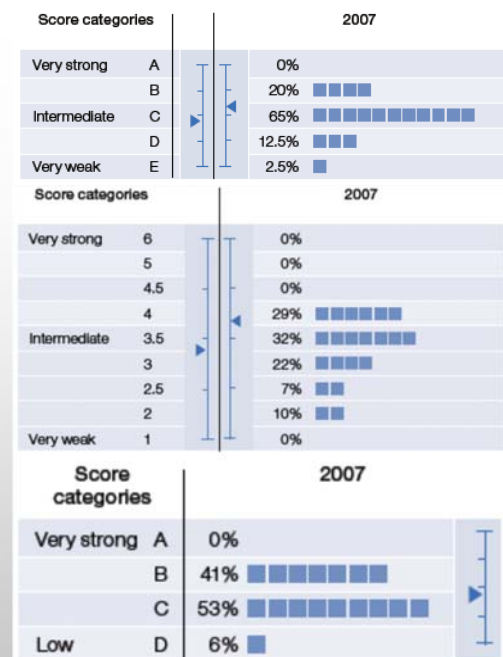
WHY BETTER ADAPTATION GOVERNANCE?

2. PAST EXPERIENCE: ODA

Existence of operational development strategy:

Quality of country's public financial management systems:

Quality of country's public procurement systems:



ADAPTATION GOVERNANCE IS CRUCIAL

| Mitigation | Adaptation |
|--|---|
| Has a protocol (KP) that governs | No 'protocol' to govern adaptation |
| There are GHG reduction targets to meet with coordinated efforts | There are no 'adaptation targets' to meet (only now we are talking about global goals) |
| Ways and means to <u>measure</u> the impact of collective actions | No streamlined measurement system for adaptation |
| Global actions and global benefits (more organized at global level) | Mostly local actions and local benefits (with some undeniable global spillover benefits) |
| Physical principles that govern mitigation | At nascent stages: Complex interaction of biophysical and socioeconomic elements |

- Adaptation deals with systems
 - that are at different levels of adaptive capacity
 - Several adaptation options deferring in their effectiveness and outcomes

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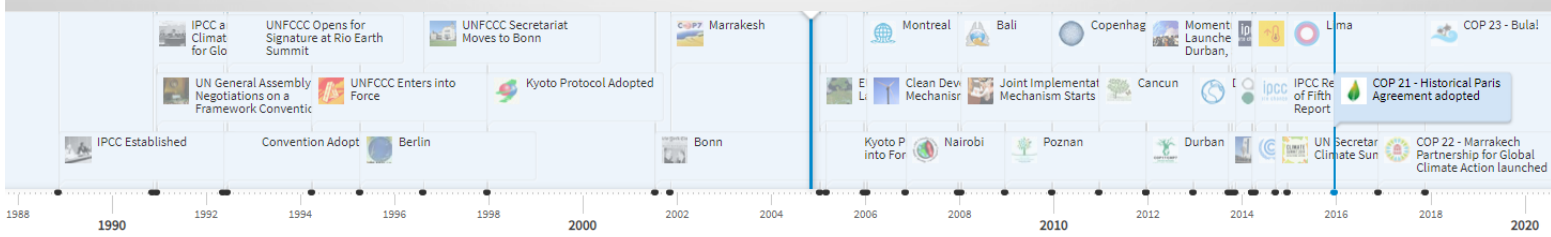
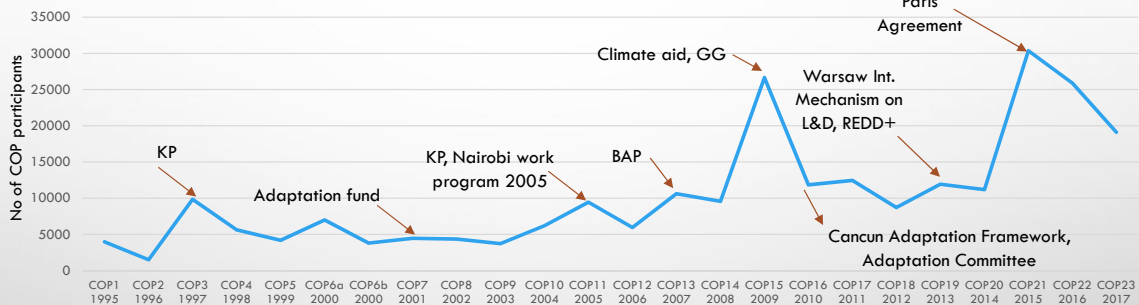
ADAPTATION GOVERNANCE IS CRUCIAL

- Higher stakes now since even more funds are to be spent on adaptation
- There would be greater role played by global institutions who may not fully understand the local priorities
- Inadequate experience of implementing adaptation in a large scale (if we think that the current course of development is not contributing to adaptation)
 - NAPAs are mostly project focused and not programmatic
 - Additional capacity is also needed to accept funds
- Successful adaptation regime may demand extensive monitoring leading to high transaction costs

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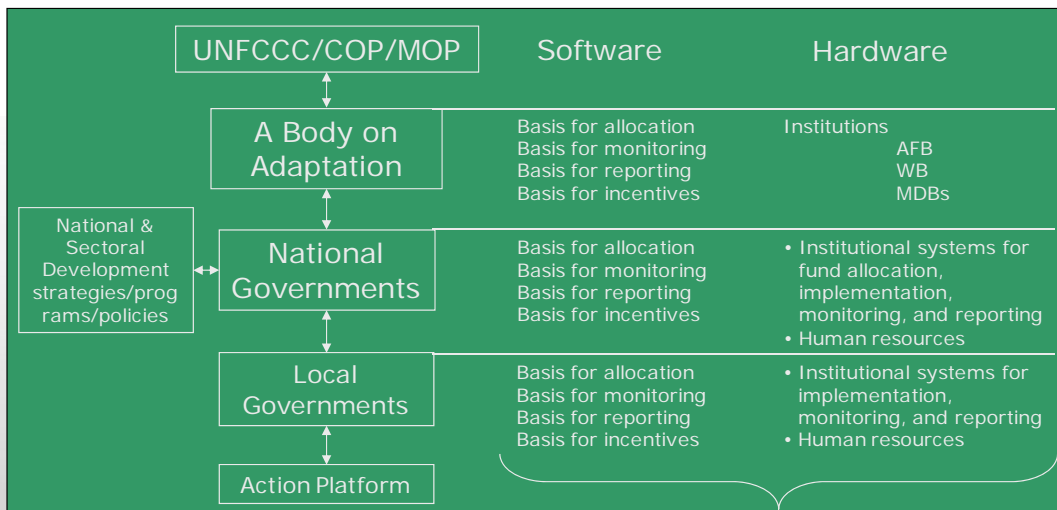
EVOLUTION OF ADAPTATION GOVERNANCE

Key adaptation-relevant events under UNFCCC-COP



UNFCCC, 2018

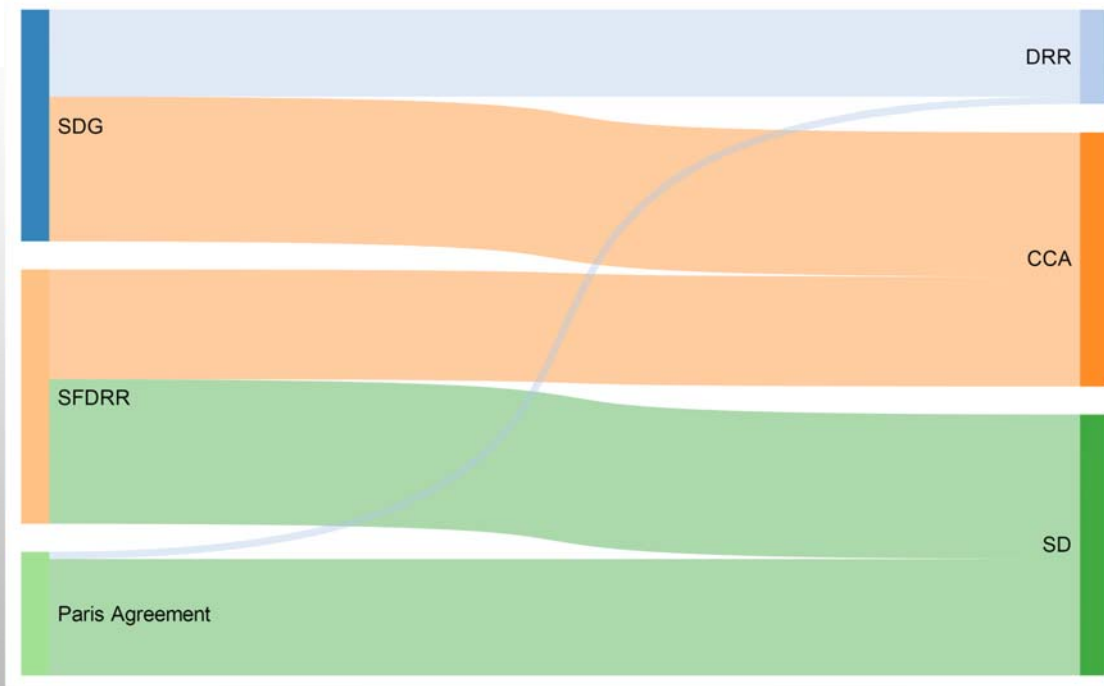
A SNAPSHOT OF ADAPTATION GOVERNANCE



Improved adaptation governance over the years

- Streamlined institutional mechanisms
- More emphasis on mainstreaming, moving away from project based initiatives and programs, often replicated across ministries and agencies
- Improved M&E by including human/social aspects in addition to financial and infrastructure aspects
- Accountability for effective implementation has been improved

SDGS, PARIS AGREEMENT AND SFDRR



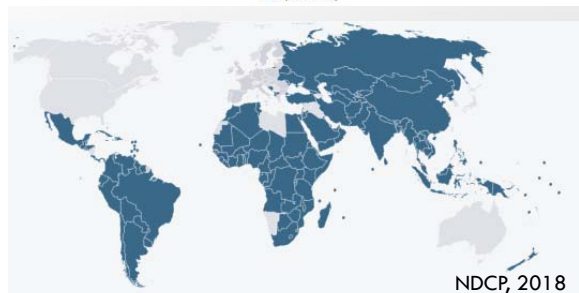
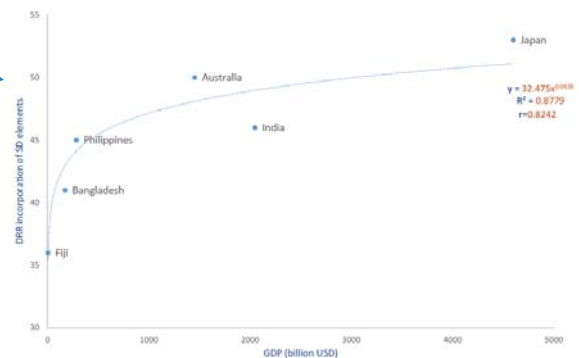
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Prabhakar, 2016

SDGS & DRR, SDGS & (I)NDCs

| SDGs | Level of SDG incorporation in disaster risk reduction frameworks, plans and strategies | | | | | |
|---------|--|------------|------|-------|-------|-------------|
| | Australia | Bangladesh | Fiji | India | Japan | Philippines |
| Goal 1 | △ | ⊙ | × | ○ | × | ⊙ |
| Goal 2 | ○ | ⊙ | ○ | △ | ○ | △ |
| Goal 3 | △ | ○ | ○ | ⊙ | ⊙ | ○ |
| Goal 4 | ⊙ | ○ | ○ | ⊙ | ⊙ | ○ |
| Goal 5 | ○ | ○ | △ | ○ | ⊙ | ○ |
| Goal 6 | △ | ○ | ⊙ | ○ | ⊙ | ⊙ |
| Goal 7 | × | × | × | △ | ⊙ | × |
| Goal 8 | ○ | ○ | △ | △ | ⊙ | ○ |
| Goal 9 | ○ | △ | ○ | ○ | ⊙ | ○ |
| Goal 10 | ○ | △ | △ | △ | △ | × |
| Goal 11 | ○ | ⊙ | ○ | ○ | ⊙ | ⊙ |
| Goal 12 | △ | × | × | × | ○ | × |
| Goal 13 | ⊙ | ⊙ | × | ○ | △ | ⊙ |
| Goal 14 | ⊙ | × | △ | ○ | △ | ○ |
| Goal 15 | ○ | × | △ | × | △ | ○ |
| Goal 16 | ⊙ | × | × | ○ | ○ | × |
| Goal 17 | ⊙ | × | △ | ⊙ | ○ | △ |

Key: ⊙: strongly incorporated; ○: incorporated; △: weakly incorporated; ×: not incorporated.
Refer to figure 1 for the SDGs listed in the first column.

Prabhakar, 2016

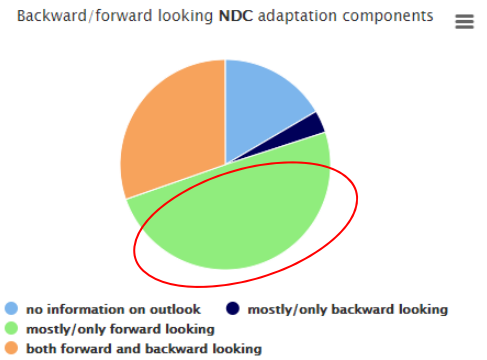
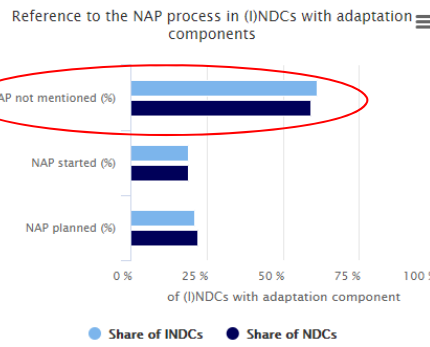
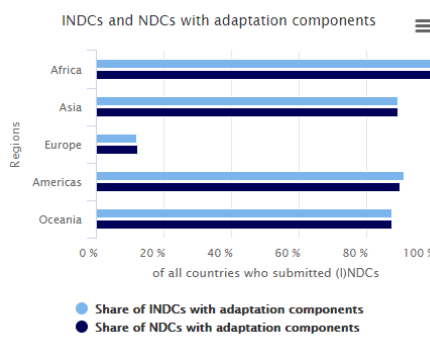


NDPC, 2018

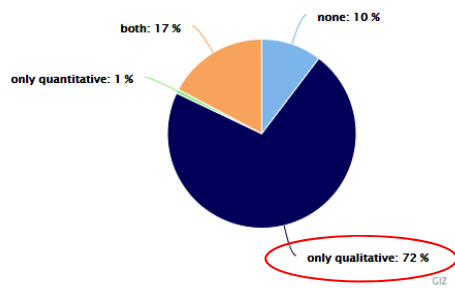
- SDGs are clearly less integrated in the DRR of developing countries compared to the developed countries.
- On contrary, 146 out of 197 parties to UNFCCC showed strong linkages with SDGs in their (I)NDCs

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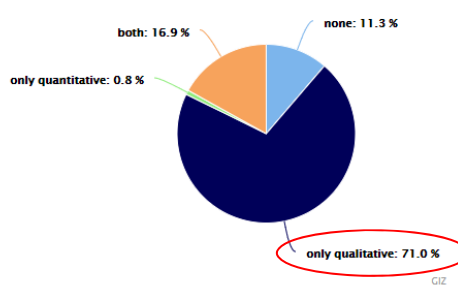
(I)NDCS AND ADAPTATION



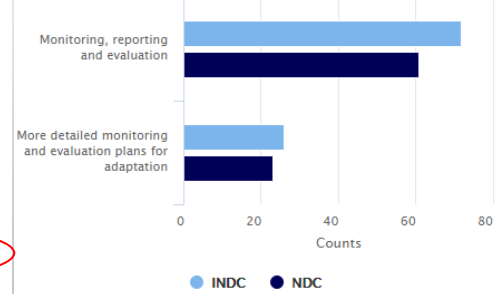
Quantitative vs. qualitative adaptation goals in INDCs with adaptation components



Quantitative vs. qualitative adaptation goals in NDCs with adaptation components



Number of (I)NDCs that embed monitoring, evaluation and reporting



GLOBAL GOAL ON ADAPTATION



- Global Goal on Adaptation was introduced in the Paris Agreement as a means to track progress made by countries in enhancing adaptive capacity, strengthening resilience and reducing vulnerabilities in the context of limiting global temperatures within 2°C.
- There are no specified global goals yet. However, one of the proposals is to leave for countries to decide the national goal and the global goal is simply a summation of all such national goals. Though puts less burden on countries, it may not add up to the required goal for sustaining and safeguarding the planet against impacts.
- Especially, aggregating national goals will be a challenge as they use different metric. Hence, there is a need for globally harmonized metric.



ADAPTATION DECISION MAKING & METRICS

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PAST VS FUTURE-BASED DECISION MAKING

- ▶ Decision making based on the past climate
 - Assumes general development programs would suffice to take care of climate change
 - Most followed ideology
 - Many national communications generally list developmental programs in the place of adaptation initiations
 - Will not be able to address the future climate change impacts

PAST VS FUTURE BASED DECISION MAKING...

- Decisions those are valid for the future, based on future climate forecasts
 - Less information
 - No dependable climate forecasts
 - Time scales (near and far)
 - Spatial scale (AR4:~110 sqkm, AR3: 180 sqkm; FAR: 500sqkm)
 - Less understanding on the climate system
 - Complex ocean and atmospheric interaction
 - Solar and lunar influences etc.

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THREE MODES OF RISK MANAGEMENT

| | Based on risk prediction | Contingency | Precautionary |
|------------------------------------|--|--|---|
| Rationality | Reduce risks based on what science defines (we can predict risks) | Adapt to contingency as you face them | Prevent at all cost (even when science do not exist) |
| Who needs this approach? | Societies with risks higher than average | Governments tacking those unfit to adapt | When everything is at stake |
| Technologies | Risk quantification Risk insurance/spreading etc. | Surveillance, data mining, capacity building | No boundaries |
| Risk representation | Risk is knowable | A risk to live with | A risk to be avoided at any cost |
| Where science-policy-people stand? | Science is conclusive, and political decisions are grounded in the science | Scientific knowledge is inconclusive, policies to take decisions under uncertainty | Limited science, decisions are authoritative, and arbitrary |

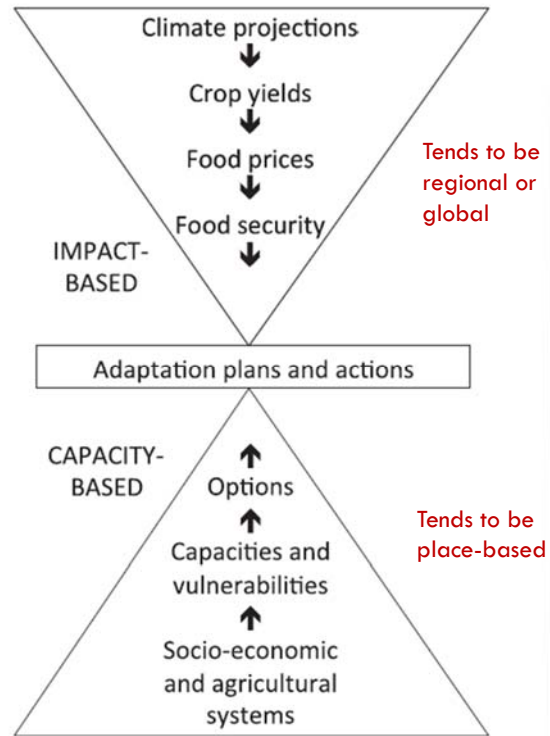
Based on Oels, 2013

42

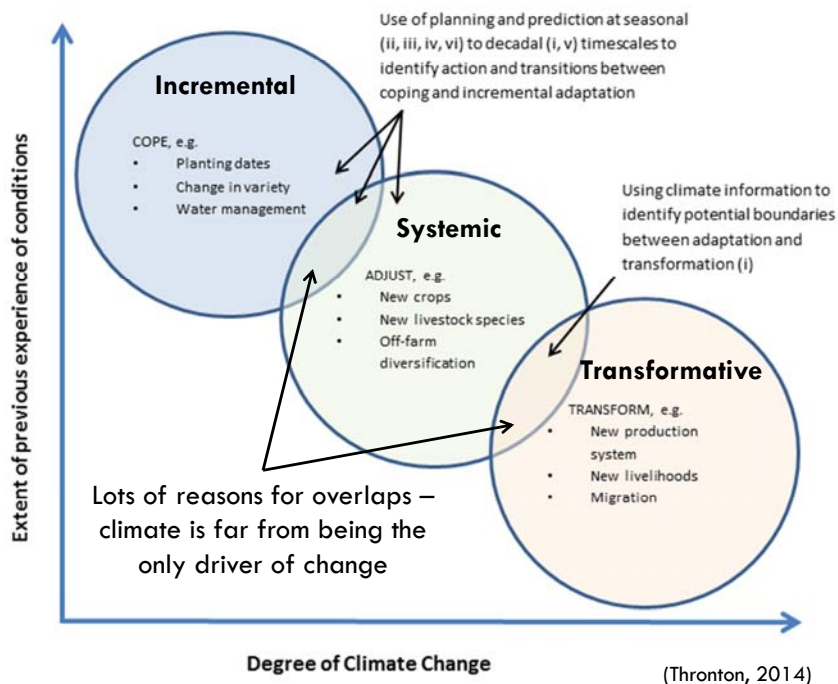
IMPACT VS CAPACITY BASED DECISION MAKING

OR

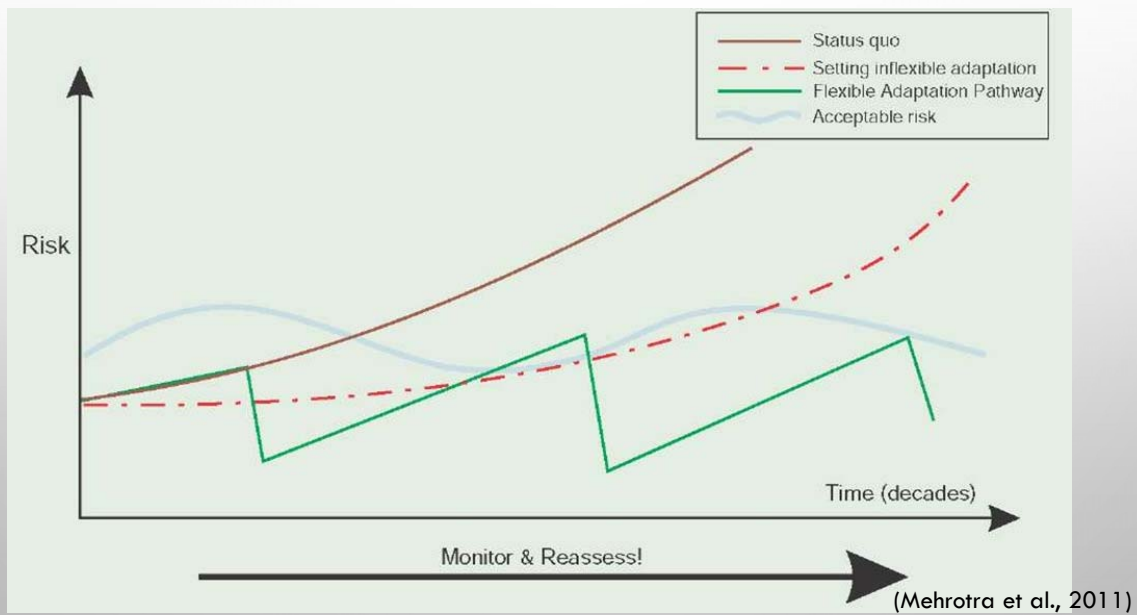
TOP DOWN VS BOTTOM UP



TRANSFORMATIVE ADAPTATION

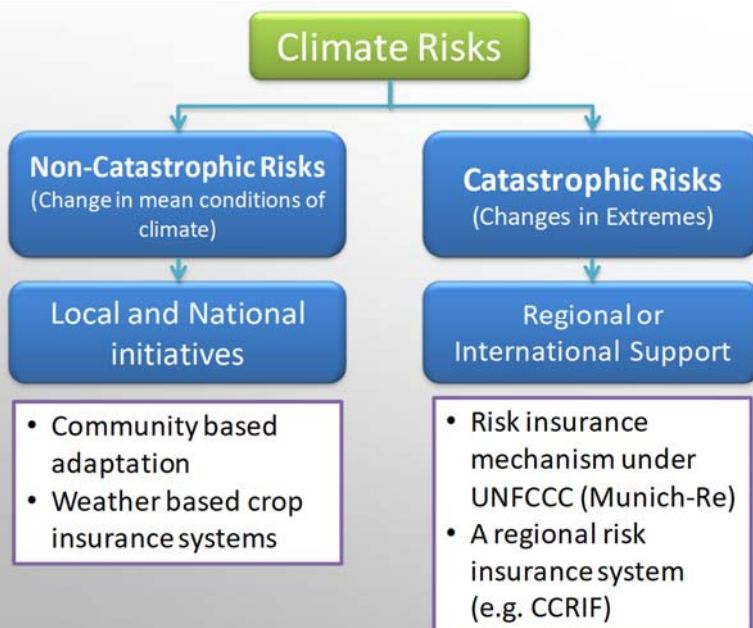


FLEXIBLE ADAPTATION VS INFLEXIBLE ADAPTATION



45

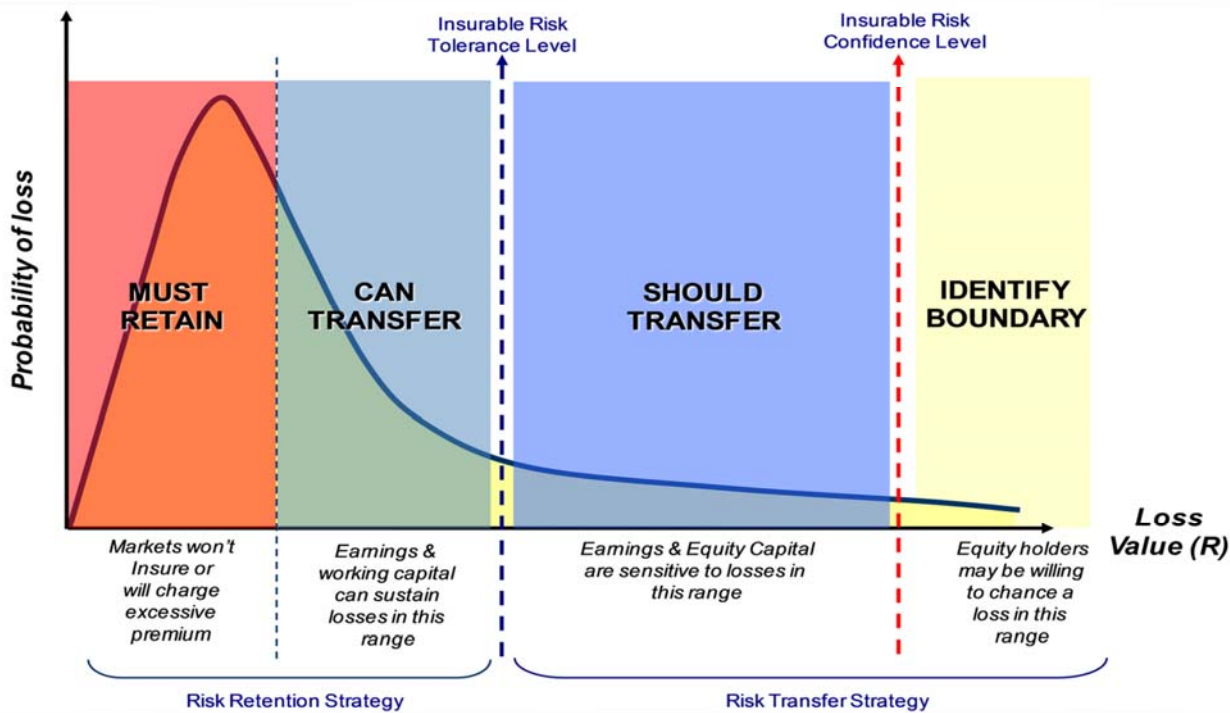
TWO-PRONGED APPROACH FOR CLIMATE RISK REDUCTION



- a. Non-catastrophic risks: Risks from change of mean state of climate
 - a. Within the capacity of national systems
 - b. Local knowledge is useful
 - c. E.g. Community based adaptation, weather based crop insurance schemes etc.
- b. Catastrophic risks: Risks from changes in extremes
 - a. Need external assistance in terms of finances and experiences
 - b. Local knowledge often fall short
 - c. E.g. Global and regional catastrophic risk insurance schemes, adaptation networks

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RISK MANAGEMENT STRATEGIES



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BAP ON ADAPTATION (SECTION C, I-V)

- “ENHANCED ACTION ON ADAPTATION WITH CONSIDERATION OF ...**PRIORITIZATION OF ACTIONS**...AND SUPPORT ADAPTATION IN A **COHERENT AND INTEGRATED MANNER**”
- “**POSITIVE INCENTIVES** FOR DEVELOPING COUNTRIES FOR **ENHANCED MITIGATION AND ADAPTATION ACTIONS**”

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HOW TO PRIORITIZE AND INCENTIVIZE ADAPTATION ACTIONS?

- By
 - Knowing where we want to go (adaptation targets, goals?)
 - Setting a time frame
 - Knowing how much 'adaptation' we want to achieve at each stage to meet the target
- This is facilitated by
 - Setting a base line of adaptation (to compare the progress and effectiveness)
 - And agreeing on a measurement system (adaptation metrics)

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ADAPTATION METRICS

- Metric:
 - A system of measurement
 - The unit of measurement
 - Value of the unit

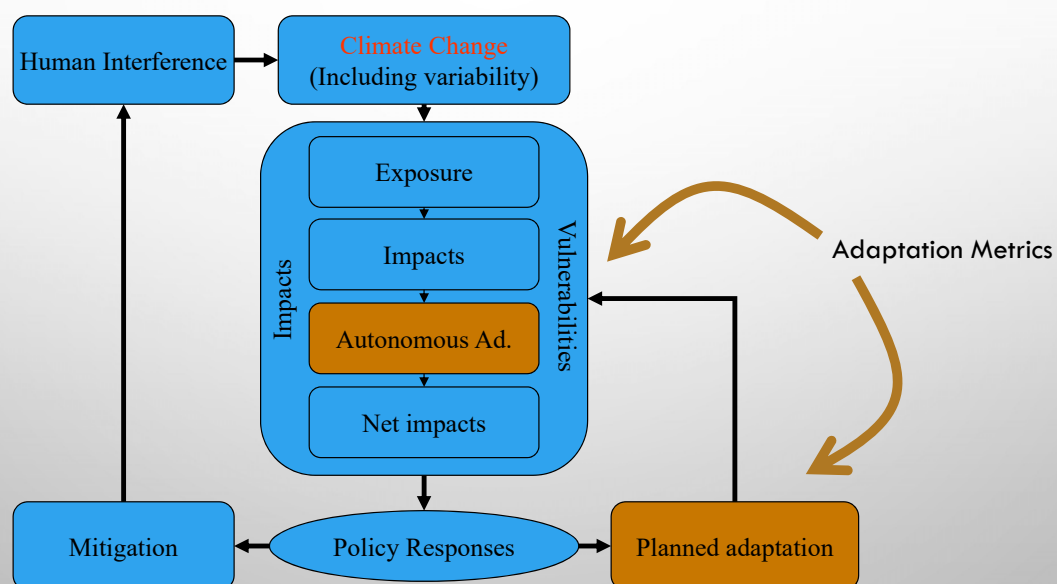
50

ADVANTAGES OF ADAPTATION METRICS

- Ability to **measure adaptation** at any given point of time
- Provide a **means to compare** the level of adaptation reached across locations, regions, societies and nations
- Help in decision making related to **identification and prioritization** of appropriate adaptation actions and for funding
- **Help track the progress** over the time scales
- Help in **minimizing the risk of mal-adaptation**

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ADAPTATION METRICS FOR PLANNED & AUTONOMOUS ADAPTATION



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CRITICAL THRESHOLDS: A FRAMEWORK FOR INSTITUTIONALIZING ADAPTATION METRICS

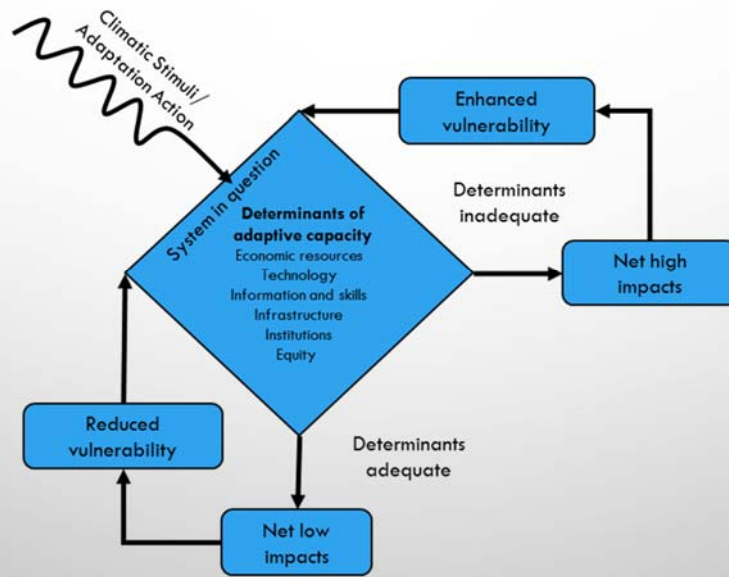
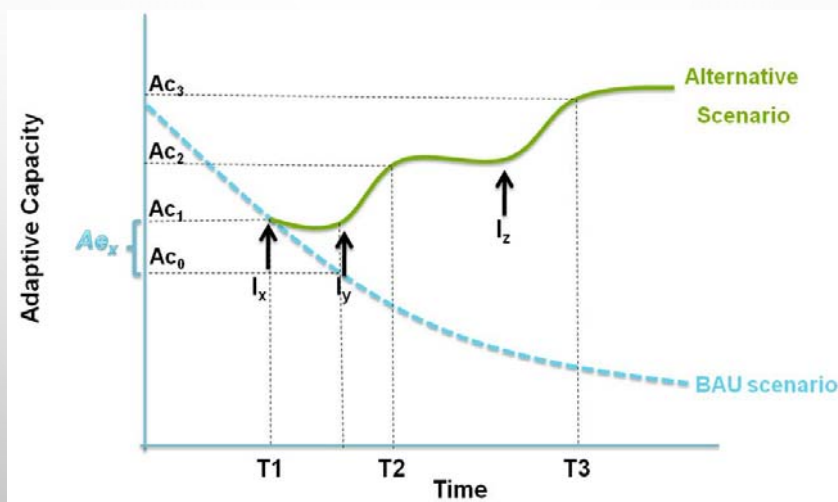


Figure: Determinants of adaptive capacity and their link with climatic vulnerability (Prabhakar and Srinivasan, 2009)

FRAMEWORK FOR ASSESSING THE ADAPTATION EFFECTIVENESS (AE)



$$Ae_x = Ac_1 - Ac_0$$

Where Ae_x is effectiveness of adaptation action x ; Ac_0 and Ac_1 are Adaptive Capacity at points

CRITERIA FOR ADAPTATION METRICS

- MEASURABLE
 - COST EFFECTIVE
- SCALABLE
- COMPARABLE
 - ACROSS TIME AND GEOGRAPHICAL SCALES
- CONTEXT SPECIFIC
 - SPECIFIC TO SYSTEM BEING MEASURED
- SENSITIVE TO DEGREE OF ADAPTATION
- LEARNING AND EVOLVING

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DIFFERENT METRICS

- QUALITATIVE AND QUANTITATIVE
 - COST AND TIME RESOURCES, EFFECTIVENESS
- DIRECT AND PROXY
 - TO ACCOMMODATE THOSE CANNOT BE DIRECTLY MEASURED
- EX-ANTE VS. EX-POST
 - TO CHOSE OPTIONS AND TO MEASURE OUTCOMES
- LOCAL VS NATIONAL
 - TO ACCOMMODATE DIFFERENTIAL IMPACTS OF CLIMATE CHANGE AT DIFFERENT SCALES

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ADAPTATION METRICS IN AGRICULTURE SECTOR

| Metric/s | Reference | Description on availability and limitations (includes authors judgement) |
|---|-------------------------------|--|
| Mean and variability of yield and production, income, aggregate of value added | Tubiello and Rosenzweig, 2008 | Measured and computed metrics. Available at local, national, regional and international levels in many countries. The aggregate of value added may need to be computed at the local level as such statistics will not be readily available. |
| Nutrition index | Tubiello and Rosenzweig, 2008 | Computed metric (sum of local production and net imports divided by total food demand). Can be computed at national and regional level. |
| Yield estimates (remotely sensed), yield variability, highest relative yield/yield percentile | Luers et al., 2003 | Estimates could help in filling the gaps in the existing yield data, validating the measured yield data etc. Accuracy could be an issue when resolution of remote sensing is low. |
| Agricultural export, farm income, out-migration from farming, emergency payments | Venema, 2006 | Agricultural exports and out-migration of farming are mostly applicable at the macro-economic level, while data on rest of the metrics (emergency payments) could be sparingly available. |
| Sources of income, livestock number, source of fertilizer | Brooks and Adger, 2005 | It was not clear on how many sources of income is considered as optimal, and also the number of cattle. However, it is suggested that the higher the sources of income, with more diversification into non-farm sources, the higher the adaptive capacity. |

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IGES, 2008

PROBLEMS WITH EARLIER SUGGESTIONS

- Several single metrics doesn't often provide an intuitive overall picture of adaptation in a sector
- Policy makers may often prefer single composite index representing the entire sector with a single number (not withstanding their intrinsic limitation)

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SOME COMPOSITE INDICES

- GDP, HDI...
 - Grossly averages out, and even nullifies, the impacts at the sectoral and sub-national level
 - Criticized as either too primitive or too unattainable (e.g. HDI)
 - Lack of consensus among various stakeholders

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SOME COMPOSITE INDICES

- Index of Usefulness of Practices for Adaptation to climate change (IUPA) Index (Claudio Szlafsztein, Federal University of Para, Brazil)
 - Integrates both qualitative and quantitative parameters into a single index
 - Choosing the weightings for individual parameters is a question

60

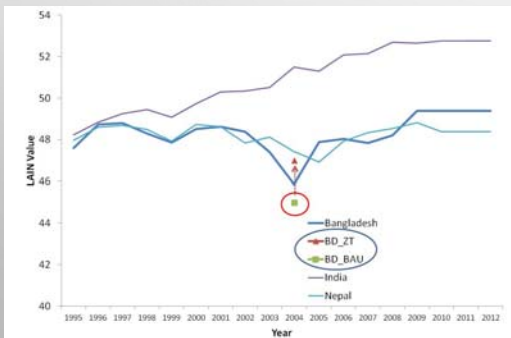
ASSESSING THE EFFECTIVENESS OF ADAPTATION PRACTICES AT THE LOCAL LEVEL THROUGH LOCAL ADAPTATION INDEX

Prioritized

| Indicators (Bangladesh) | |
|-------------------------|---|
| Vulnerability | <ul style="list-style-type: none"> % farms with soil degradation (exposure) % soil cover (exposure) Period of fresh water availability (exposure) Area under high water use crops (sensitivity) Area under arable farming (sensitivity) Soil organic matter content (capacity) Area under reduced tillage (capacity) |
| Readiness | <ul style="list-style-type: none"> % of households having access to credit (economic) % of households having access to markets (economic) |

Quantified

| | Indicators (Bangladesh) | Value | Range (Min Max) | Score | Weight |
|-------|-------------------------------------|-------|-----------------|-------|--------|
| Vuln. | % Soil degradation | 5 | 5-30 | 0.17 | 0.11 |
| | % soil cover | 70 | 10-70 | 1.00 | 0.11 |
| | Period of water availability (days) | 180 | 50-200 | 0.90 | 0.11 |
| | Water int. crops (ha) | 30 | 40-60 | 0.50 | 0.11 |
| | Arable farming (ha) | 80 | 40-90 | 0.89 | 0.11 |
| | Soil OM content (%) | 0.75 | 0.25-1 | 0.75 | 0.11 |
| Read. | Households credit access (%) | 50 | 10-80 | 0.63 | 0.33 |
| | Farmers access to markets (%) | 60 | 20-80 | 0.75 | 0.33 |

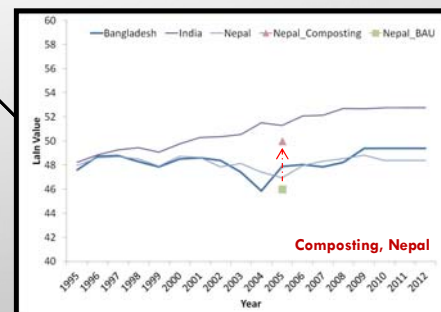
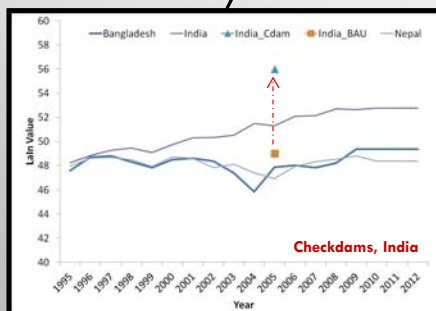
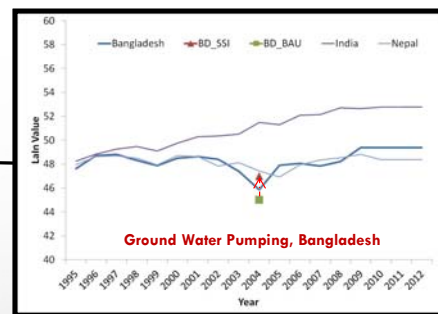
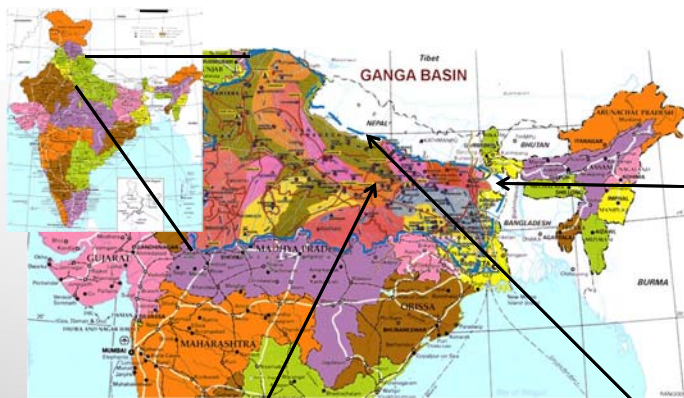


$$Lain = \left[\left(\frac{\sum_i^{Read} Index_i - Mean_{all}(Index_i)}{Stdev_{all}(Index_i)} * Weight_{Index} \right) / Max(Score)_{all} \right]_{Read.} * 60 - \left[\left(\frac{\sum_i^{Vuln} Index_i - Mean_{all}(Index_i)}{Stdev_{all}(Index_i)} * Weight_{Index} \right) / Max(Score)_{all} \right]_{Vuln.} * 40$$

Integrated as Lain

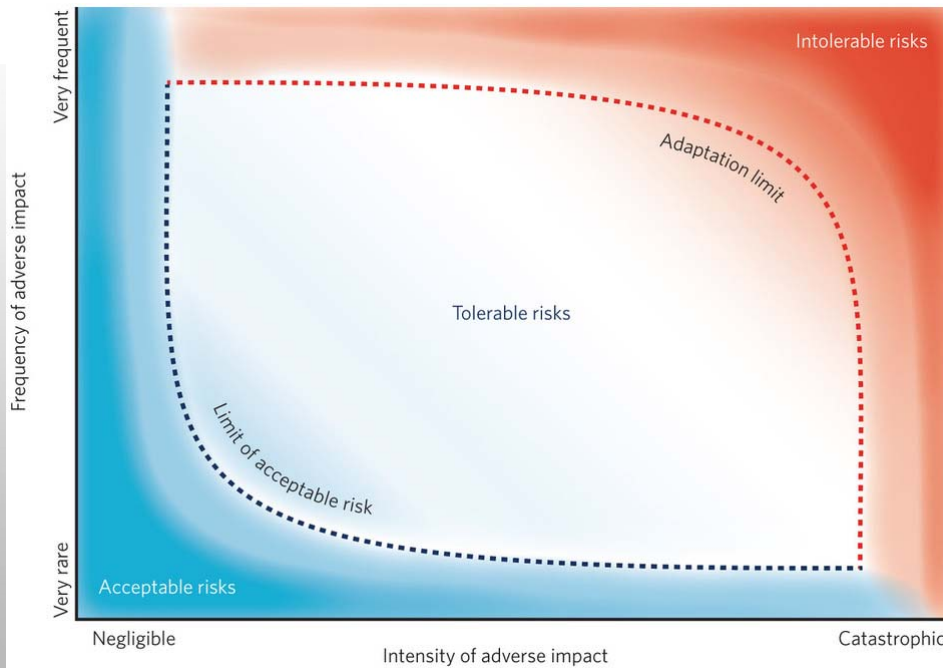
61

USE OF LAIN IN THE GANGETIC BASIN



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LIMITS TO ADAPTATION

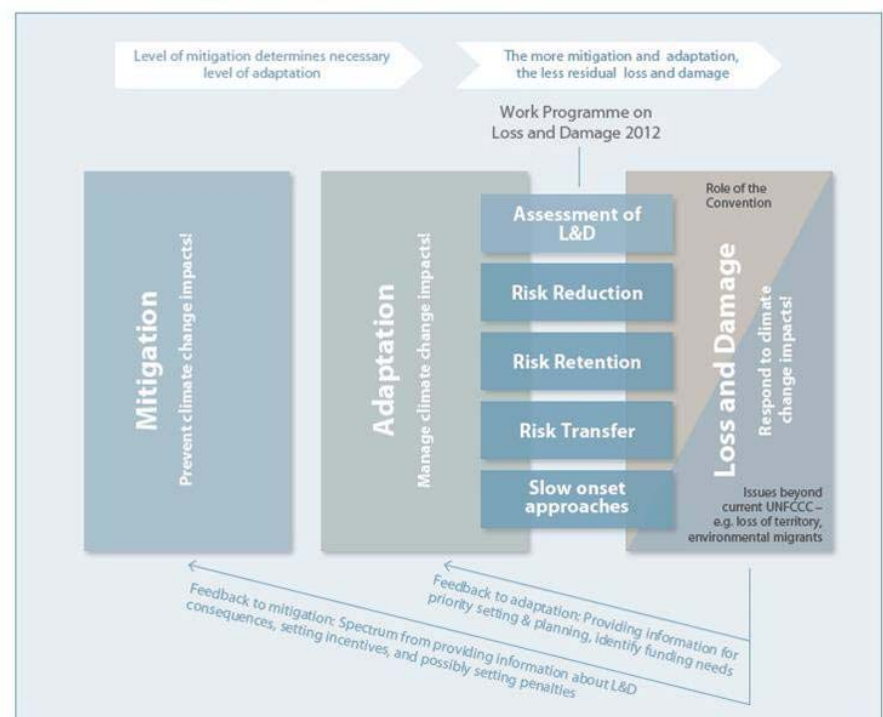


Based on the risk-based analysis, the scholars have warned that there will be circumstances where adaptation cannot happen in a given technological, social and economic setup.

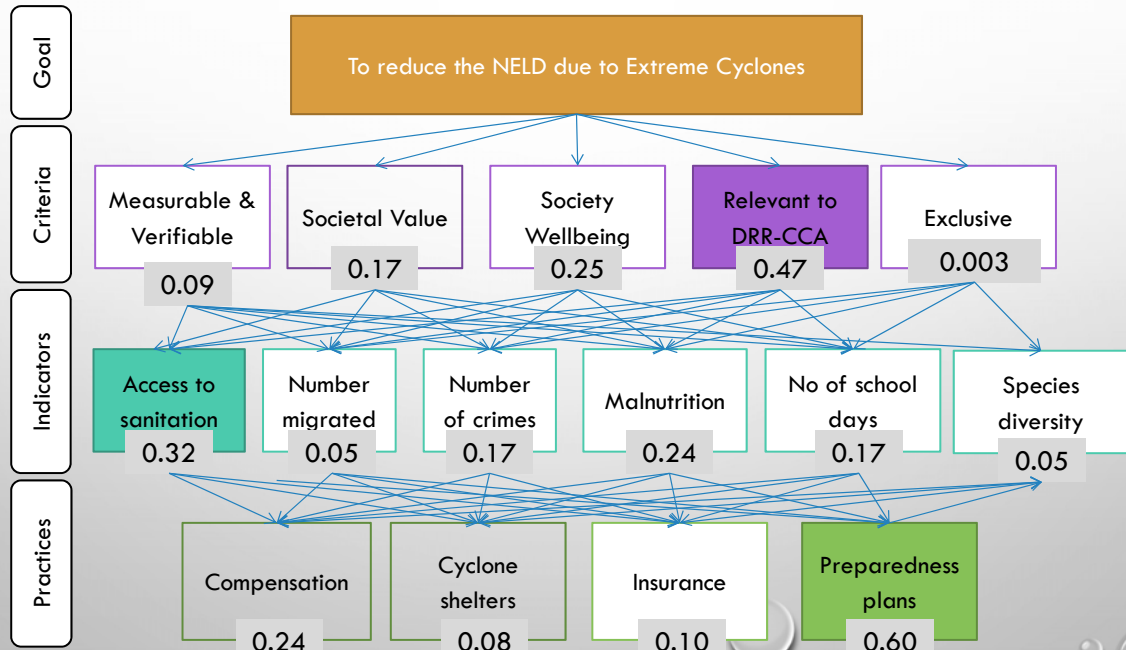
Dow et al., 2013

LOSS AND DAMAGE

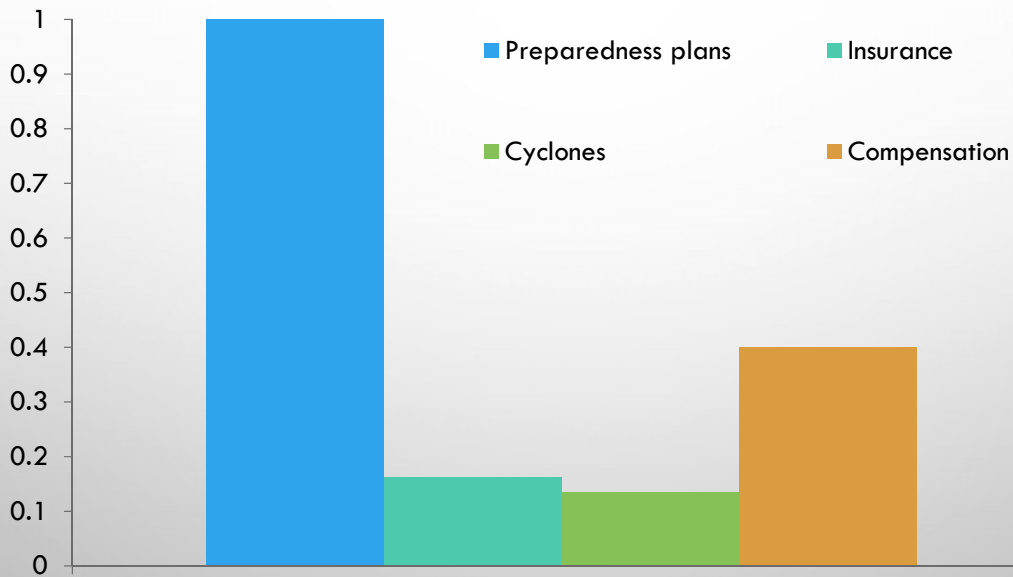
Potential conceptual frame of loss and damage



AHP FOR ADDRESSING NELDS: BANGLADESH

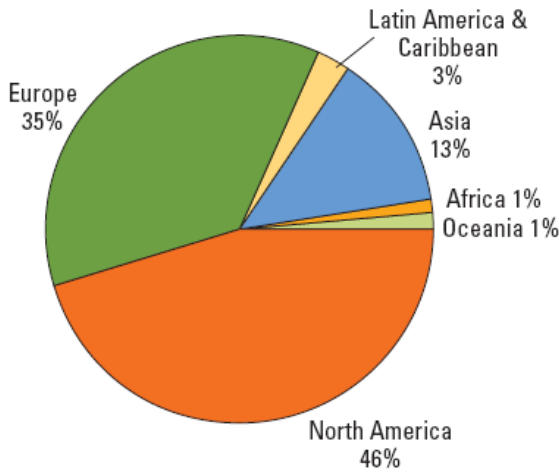


EFFICACY OF PRACTICES COMPARED

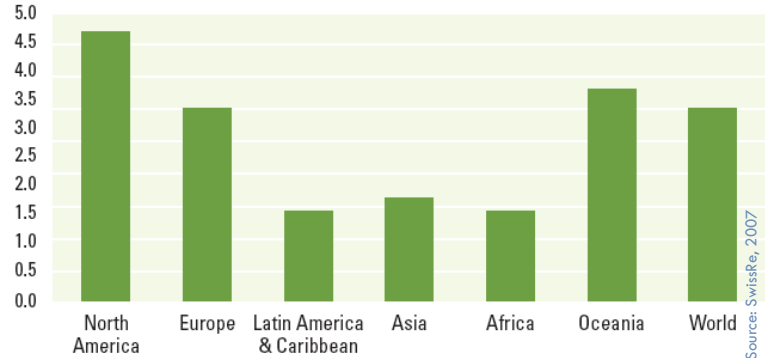


INSURANCE PENETRATION IN DEVELOPING WORLD

Non-life insurance premium volume in 2006
(total volume = \$1.5 trillion)



Premium/GDP (%)



- Insurance has largely been developed in developed countries
- Risk insurance costs in developing countries are huge due to poor infrastructure and high vulnerabilities

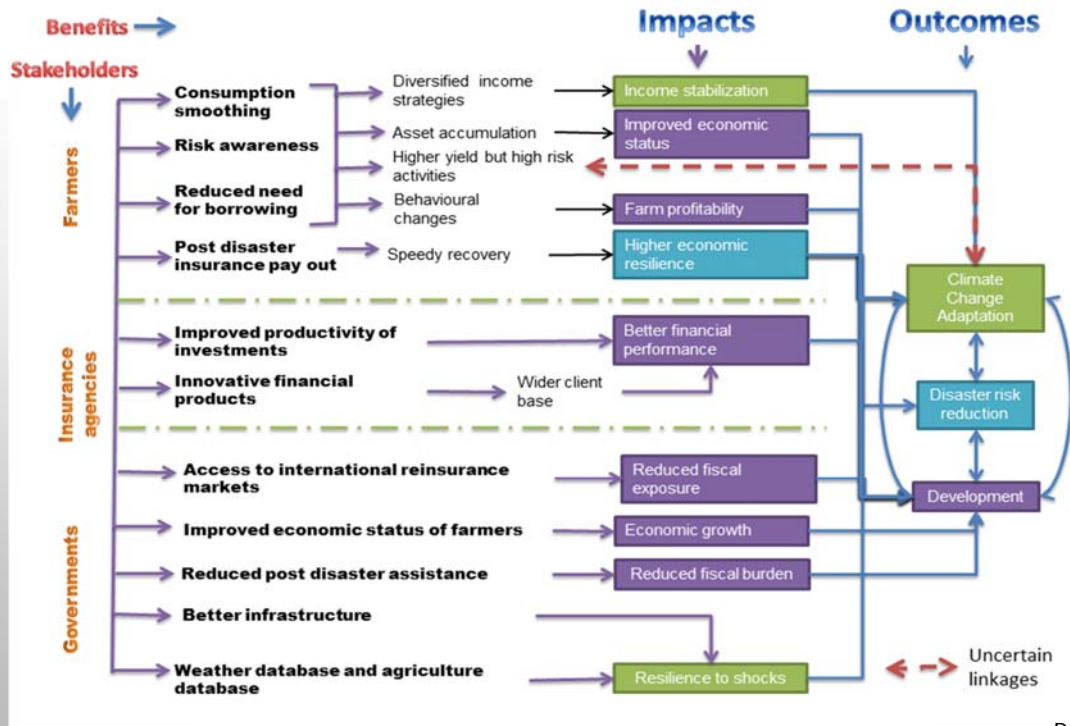
67

REASONS FOR POOR PENETRATION OF INSURANCE

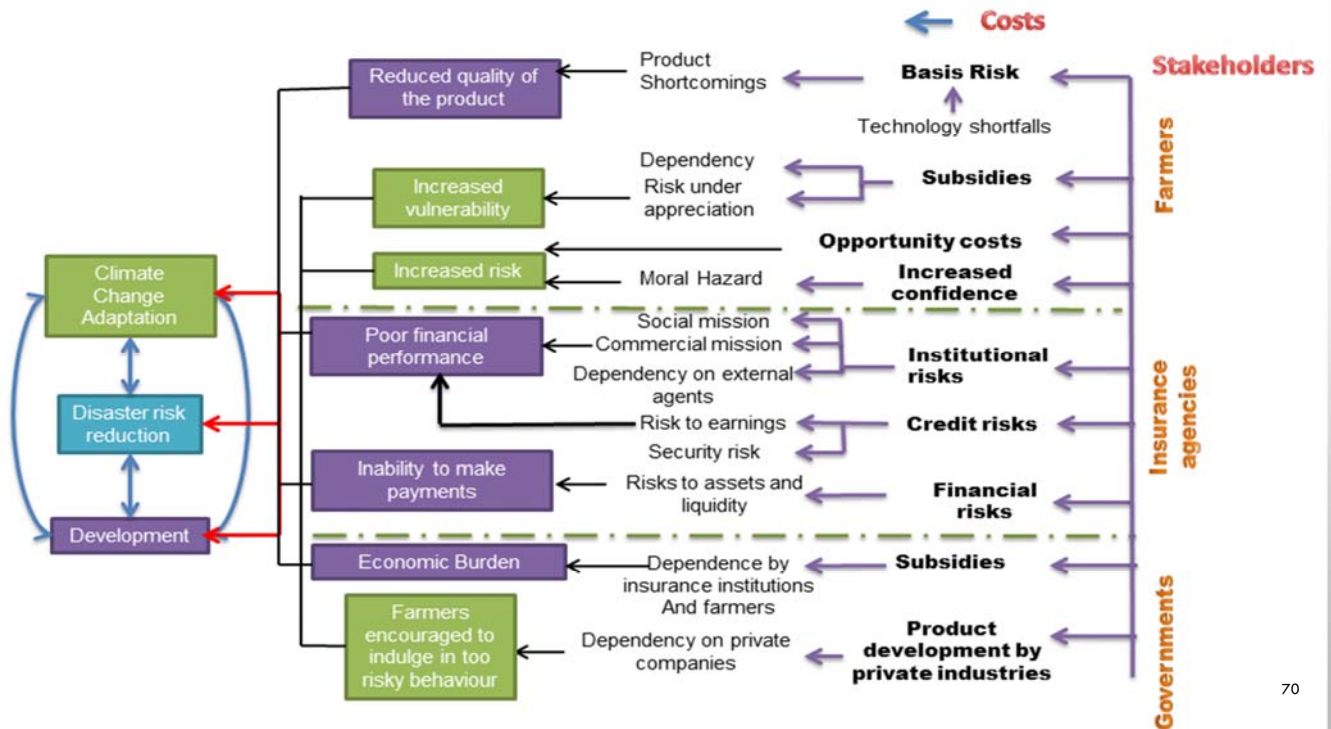
- HIGH BASE RISKS
- POOR ENABLING ENVIRONMENT (GOVERNMENT POLICIES, REACTIVE CULTURE OF GOVERNMENTS)
- POOR PRIVATE SECTOR PRESENCE
- POOR PRESENCE OF RE-INSURERS
- SOCIAL AND CULTURAL FACTORS RELATED TO RISK MANAGEMENT (LETHAL ATTITUDE)
- LACK OF HISTORICAL DATA ON VARIOUS RISK FACTORS THAT HELP IN DESIGNING RISK INSURANCE SYSTEMS (E.G. RAINFALL AMOUNT AND CORRESPONDING CROP LOSS)

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COSTS AND BENEFITS OF INSURANCE



COSTS AND BENEFITS OF INSURANCE



HOW INSURANCE CAN LEAD TO LONG-TERM CCA-DRR BENEFITS?

- When it was combined with post-disaster reconstruction
 - Combining fire and earthquake insurance with reconstruction of houses
- Mandatory requirement
 - Japan, mandatory fire and earthquake insurance with right insurance price signal has led to higher emphasis on risk mitigation leading to long-term reduction in risks
- Right price signal
 - Avoiding subsidies (e.g. agriculture) and instead spending on risk mitigation options

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HOW INSURANCE CAN LEAD TO ...

- Appropriate insurance and contract design
 - Multi-peril and location specific insurance approaches including weather index insurance
 - By reducing basis risks
 - Mandatory combination of risk mitigation and risk spreading instruments
 - Reducing basis risks, lessening disaster losses
 - Making female members of household the beneficiary of insurance payoff
 - Economic empowerment and share in risk management decisions
 - Innovative solutions such as linking savings with insurance
 - Effectively high liquidity situation of households that can be used for nutrition, health and education

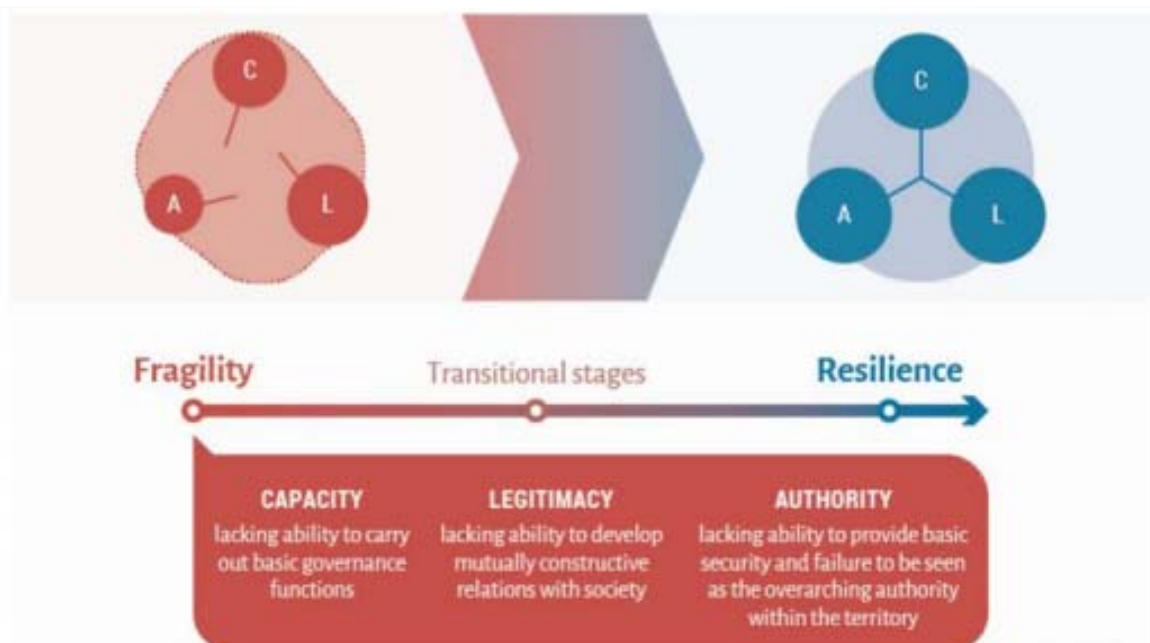
72

COMPOUNDING OF RISKS AND ITS IMPLICATIONS FOR ADAPTATION

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CLIMATE FRAGILITY RISKS. WHAT IS FRAGILITY?

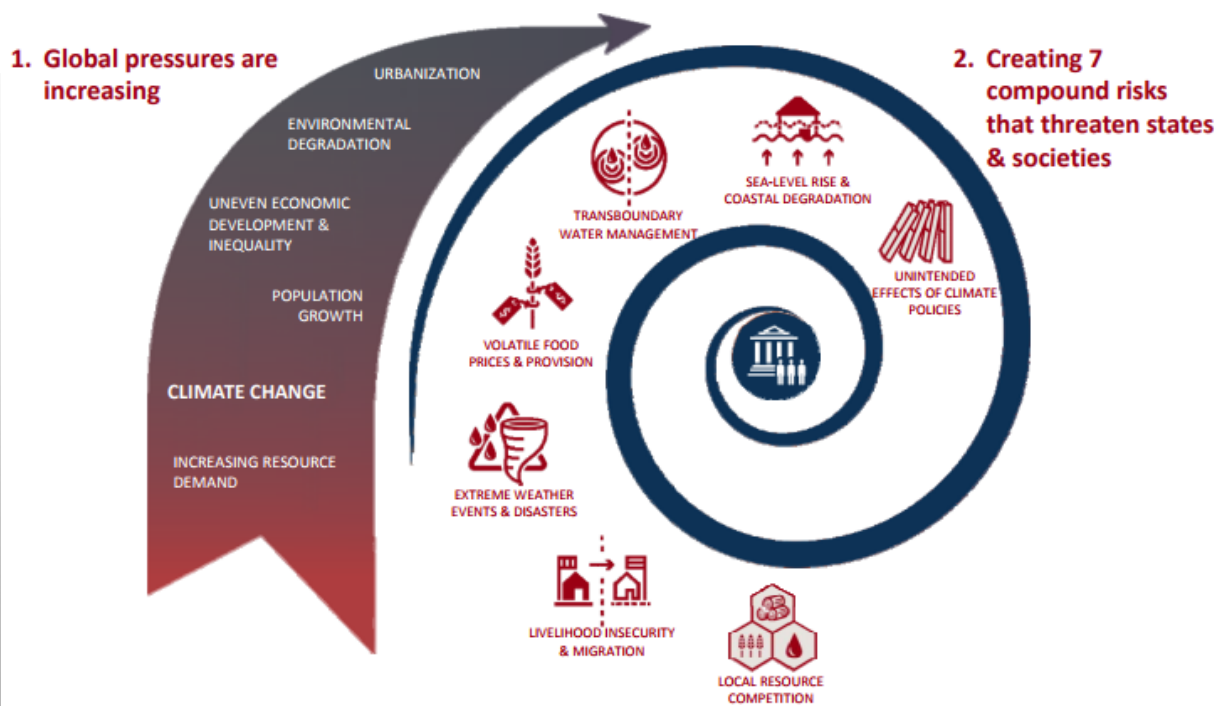
Fragility refers to “the quality of being easily broken or damaged”



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Adelphi, 2015

CLIMATE CHANGE AS A THREAT MULTIPLIER



CLIMATE FRAGILITY RISKS

- EMERGE THROUGH THE INTERACTION OF CLIMATE CHANGE WITH OTHER PRESSURES AND STRESSORS
- THEY CAN CONTRIBUTE TO DIFFERENT SITUATIONS OF FRAGILITY:
 - POLITICAL UNREST AND INSTABILITY
 - LOCAL CONFLICTS AND VIOLENCE
 - CIVIL WAR AND LARGE-SCALE CONFLICT
 - TRANSBOUNDARY DISPUTES
- THEY CAN HAVE REGIONAL AND INTERNATIONAL IMPACTS, FOR EXAMPLE THROUGH CONFLICT SPILL-OVER OR MIGRATION

IMPORTANCE TO FRAGILITY RISKS: G7 FOREIGN MINISTERS' MEETING, HIROSHIMA, JAPAN

- “WE REITERATE THAT CLIMATE CHANGE POSES A SERIOUS THREAT TO **GLOBAL SECURITY** AND ECONOMIC PROSPERITY AND SHARED THE VIEW THAT FOREIGN POLICY MUST CONTRIBUTE TO ADDRESSING THIS CHALLENGE EFFECTIVELY.”
- “WE WILL WORK TO PRIORITIZE PREVENTION OF **CLIMATE FRAGILITY RISKS** BY ALIGNING OUR EFFORTS TOWARD THE COMMON GOAL OF **INCREASING RESILIENCE AND REDUCING FRAGILITY** IN THE FACE OF GLOBAL CLIMATE CHANGE, INCLUDING TAKING STEPS TO INTEGRATE CLIMATE-FRAGILITY CONSIDERATIONS ACROSS OUR NATIONAL GOVERNMENTS.”

Source: Joint Communique of G7 Foreign Ministers' Meeting, 2016

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THE CURRENT SITUATION OF MAJOR FRAGILITY RISKS IN ASIA

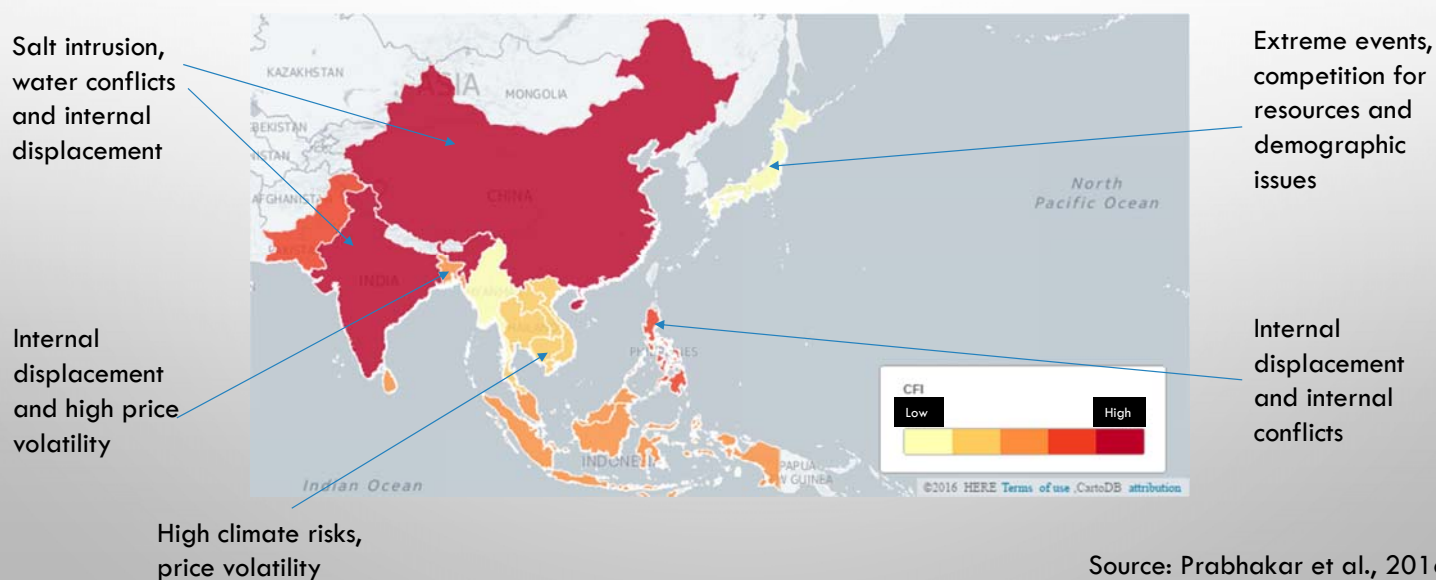
1. DEVELOPMENT-DISASTERS NEXUS
2. MIGRATION AND RELATED CONFLICTS
3. FOOD PRICE FLUCTUATIONS
4. TRANSBOUNDARY RESOURCE CONFLICTS: WATER
5. UNINTENDED EFFECTS OF CLIMATE POLICIES
6. SEA LEVEL RISE AND COASTAL DEGRADATION
7. COMPETITION FOR LOCAL RESOURCES

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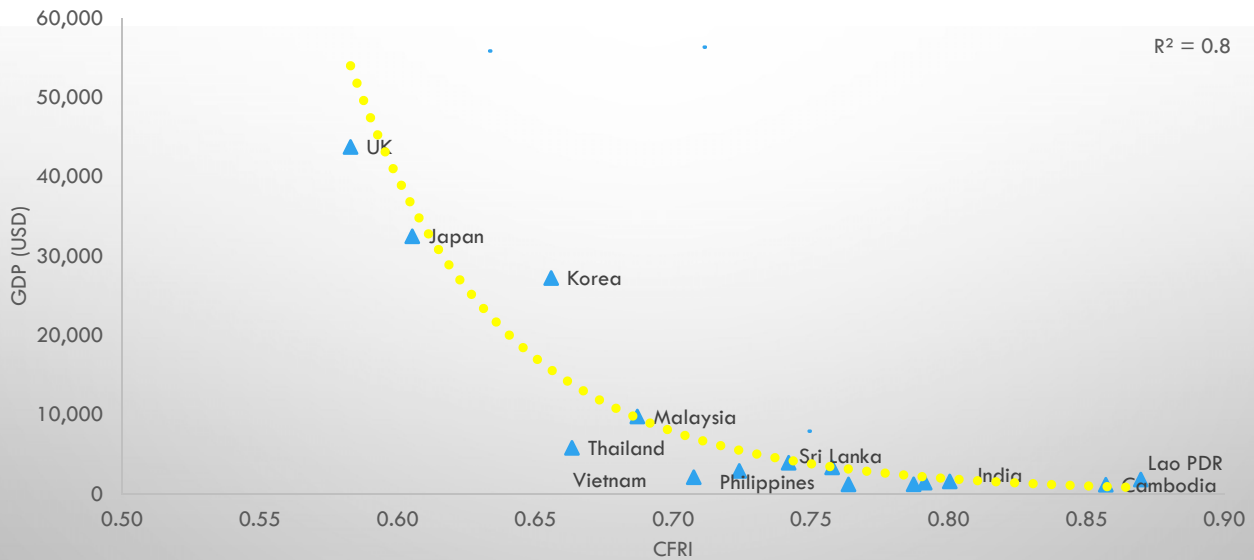
MAKING SENSE OF FRAGILITY RISKS: CLIMATE-FRAGILITY INDEX

| Indicator | Proxy indicator | Rationale and limitations | Source |
|-------------------------------------|---|---|-----------------------|
| Local competition for water | Baseline water stress | The higher the water stress the higher the competition around water. However, water stress may not always lead to tensions and conflict depending on the local governance and social systems which are represented by the governance indicator of the World Bank. | WRI, 2016 |
| Extreme weather events | Climate risk index | Climate risk index is the most comprehensive risk index covering climatic hazards and has been regularly produced for most countries. | Germanwatch, 2016 |
| Migration and internal displacement | % of population affected by migration and internal displacement | The data provided by the Internal Displacement Monitoring Centre gives a clear picture of the number of internally displaced and migrants. These numbers were converted into % of population. | IDMC, 2015 |
| Food price volatility | | Food price volatility was calculated as a standard deviation of principal food crop prices in the past decade in local currency. | FAOSTAT, 2016 |
| Sea level rise (SLR) | % of population affected by SLR | % of population affected by SLR reflects social and economic impacts better than the mere change in SLR. | Climate Central, 2015 |
| Unintended effects of policies | World Bank Regulatory Quality indicator | There are no verifiable measures for unintended effects of policies yet; however, the World Bank Regulatory Quality indicator provides a close assessment for policy effectiveness, assuming that least unintended effects of policies are expected with higher regulatory quality. | World Bank, 2016 |

COMPARISON OF COUNTRIES ON FRAGILITY RISKS: CLIMATE-FRAGILITY INDEX (CFI)



THE DEVELOPMENT NEXUS



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Prabhakar et al 2016

NEXUS IS TO BE CONSIDERED

- Climate change could worsen frequency and intensity of natural disasters.
- It could also impact economic conditions such as food price hike.
- Both could exacerbate current social and security problems faced by countries, which include internal conflicts and increase in internally displaced population.

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FRAGILITY AND DEVELOPING COUNTRIES

- Developing countries are more vulnerable because of underlying socio-economic factors, weak institutions to deal with conflicts, and developmental deficit unable to meet basic needs of the people.
- This reconfirms the importance of ODA to help developing countries address security issues, development deficits and other economic issues so that poor and discriminated can at least meet basic needs for their daily life.

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DEVELOPED COUNTRIES AND FRAGILITY

- Demographic issues (e.g. aging population) dominate the CFRs of developed countries like Japan.
- This was obvious from recent disasters in Japan, which include the East Japan Triple disaster and recent earthquakes in Kumamoto.
- There is a need to put in place appropriate policies for addressing emerging demographic issues and Japan can take a lead in this area in the region.

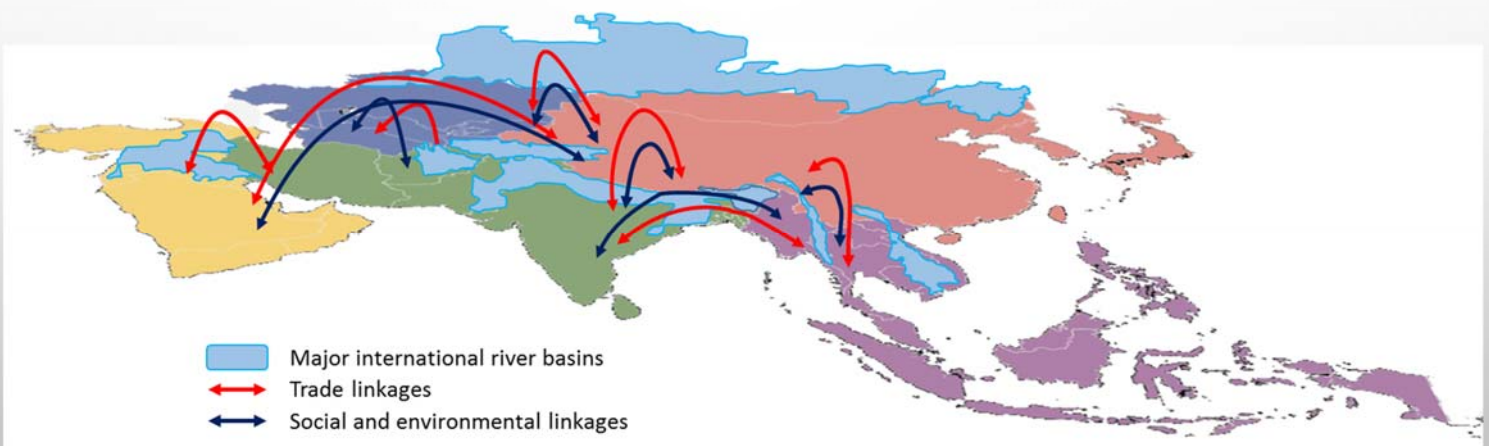
84

FRAGILITY IMPLICATIONS FOR COOPERATION

- Increasing internal conflict and its implications for its neighbors means the urgent need to strengthen mutual trust amongst neighboring prefectures and countries in particular.
- Information exchange through key channels of the governments and introduction of coherent policies, for example, become necessary.
- In this respect, a third party or multilateral mechanisms could play important roles, though existing ones are not working very well. Regional mechanisms such as SAARC, ASEAN etc should take a lead in providing enabling environment for strengthening the trust.
- There is a need for coordinated policy development between developed and developing countries due to increasing dependency on each other and the implications of CFRs in one country on the other country.
- Sharing integrated risk assessments among countries and designing immigration policies are some possible areas of cooperation among these countries.

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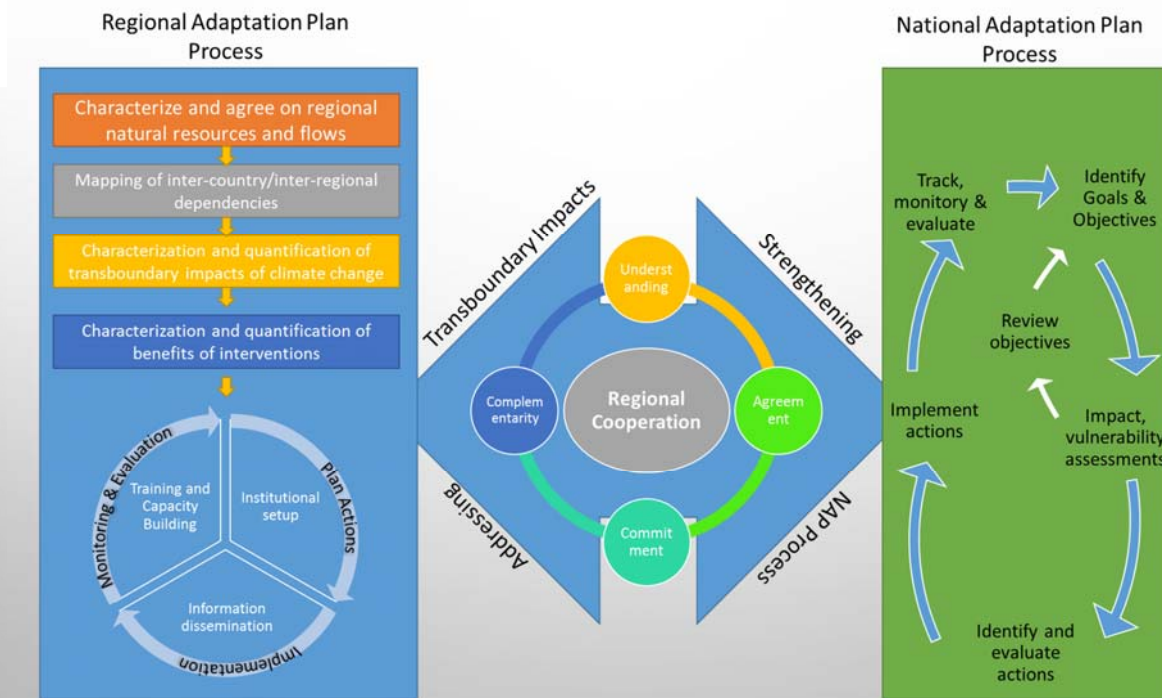
TRANSBOUNDARY ADAPTATION: FROM WHERE IMPACTS ORIGINATE AND WHERE THE SOLUTIONS RESIDE?



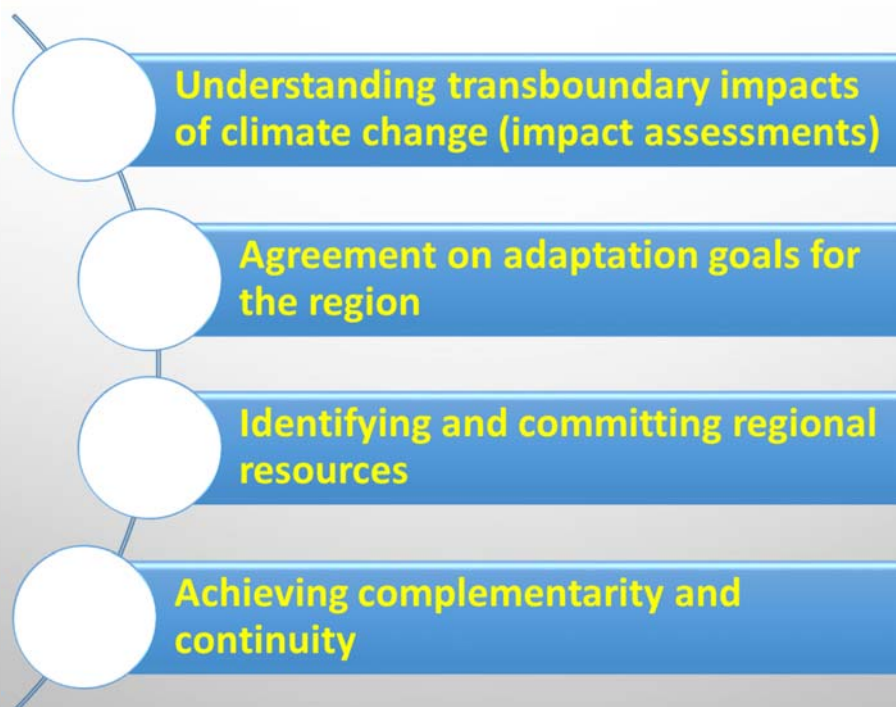
- Asia and Pacific is increasingly integrated in terms of economic/trade linkages and in terms of social mobility.
- As a result, climate incidents in one part of the region/world will increasingly have implications felt in other parts of the region/world.
- Hence, adaptation planning merely based on impact assessments within country boundaries will not be effective.

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WHAT A REGIONAL ADAPTATION PLAN LOOKS LIKE



THE 4 TENETS OF REGIONAL ADAPTATION PLANNING



WAY FORWARD

► Mainstreaming climate change adaptation concerns in developmental planning

- Strategic thinking: Short term goals vs longer term problem
- Validity of current actions in future
 - Identification of win-win strategies
 - Act where hints are clear and keep on watch where hints are not clear
- Reducing the uncertainty: Understanding climate system for dependable climate forecast
- Climate Vulnerability Impact Assessment of projects and programs on the lines of EIA


► Developing capacities for decision making under uncertainty: Climate integrated decision making, climate task groups (CTGs).

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CONCLUSION

- Climate change adaptation and development are closely intertwined.
- There is a need for enhancing the coordination between various institutions and governments at the local, national and regional levels.
- There is a clear capacity gap among various stakeholders, and sustained capacity building measures by mainstreaming climate change adaptation into existing human resource development strategies is needed.
- A shift from ad-hoc measures to planned interventions that aims at creating longer-term adaptation benefits is important for better vulnerability reduction.
- Global adaptation goal needs to be operationalized in such a way that the diverse circumstances of countries is reflected in global reporting leading to concerted actions and M&E.
- Adaptation metrics at the national and sub-national level should be considered that can measure both economic and non-economic effectiveness of adaptation actions.
- Regional cooperation is necessary for enhancing adaptation and its effectiveness.

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SIVAPURAM.PRABHAKAR@GMAIL.COM

THANK YOU!

