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ADB TA-8144 BAN: Project Summary
Capacity Building for Disaster Risk Finance

Dhaka
December 7, 2014
Project Team and Timeline

- **AIR Worldwide (AIR)**
  - Dr. Akshay Gupta, Team Lead & Disaster Risk Financing Specialist
  - Dr. Marc Ramirez and Dr. Ivan Gomez; Disaster Risk Modeling and Profiling Specialists

- **Asian Disaster Preparedness Center (ADPC)**
  - Dr. Peeranan Towashiraporn, Risk Profiling Specialist
  - Mr. Anisur Rahman, National Disaster Risk Management Specialist
  - Mr. Khondoker Golam Tawhid, National Capacity Development and Knowledge Management Specialist

- **Dr. Mehmet Ulubasoglu**, Deakin University, International Public Disaster Risk Finance Specialist

- **Mr. Moslehuddin Ahmed**, National Financial Sector and Capital Market Specialist

- **Dr. Simon Young**, International Disaster Risk Finance Specialist

- Project initiated in Feb. 2014 with expected completion in Mar. 2015
TA – 8144: Project Objectives

- Seeks to improve government preparedness for disaster relief and rehabilitation, with the outcome that the government is better positioned and equipped to plan disaster relief and rehabilitation

- Primary outputs:
  1. Catastrophe risk profiling of Bangladesh
  2. Estimates of funding gaps for disaster response
  3. Recommendations on potential disaster risk finance solutions
  4. Knowledge-sharing workshops on disaster risk finance
Primary Steps to Developing DRF Solutions

1) Risk Profiling
2) Funding Gap Analysis

3) DRF Solutions (Sovereign & Non-sovereign)

- International Donor Assistance
- Insurance Linked Securities
- Insurance/Reinsurance
- Contingent credit
- Reserves

Image Source: Adapted from the World Bank, (2012)

PRIMARY GOAL OF TA – 8144: Evaluate feasibility of available DRF mechanisms and support capacity development for future implementation of the same
Risk Modeling and Profiling
# Major Hazards Impacting Bangladesh

<table>
<thead>
<tr>
<th>Peril</th>
<th>Most Impacted Locations</th>
<th>Type</th>
<th>Potential Economic Severity</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>Southern Coast, Along Major Rivers</td>
<td>Catastrophic</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Tropical Cyclone</td>
<td>Southern Coast</td>
<td>Catastrophic</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Earthquake</td>
<td>North, East</td>
<td>Catastrophic</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Severe Storm</td>
<td>Central</td>
<td>Catastrophic</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Drought</td>
<td>Northwest, Southeast</td>
<td>Catastrophic</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Extreme Temperature</td>
<td>West, Northwest</td>
<td>Catastrophic</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Landslide</td>
<td>Southeast</td>
<td>Catastrophic</td>
<td>Local</td>
<td>Low</td>
</tr>
<tr>
<td>Fire</td>
<td>Major Cities</td>
<td>Catastrophic</td>
<td>Local</td>
<td>Moderate</td>
</tr>
<tr>
<td>Building Collapse</td>
<td>Major Cities</td>
<td>Catastrophic</td>
<td>Local</td>
<td>Low</td>
</tr>
<tr>
<td>River Bank Erosion</td>
<td>Along Major Rivers</td>
<td>Slowly On-Setting</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Arsenic Contamination</td>
<td>Southwest, Southeast</td>
<td>Slowly On-Setting</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Saltwater Intrusion</td>
<td>Southern Coast</td>
<td>Slowly On-Setting</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Climate Change</td>
<td>Southern Coast</td>
<td>Slowly On-Setting</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

![Tropical Cyclone](image1.png)

![Flood](image2.png)

![Earthquake](image3.png)

![Severe Storm](image4.png)
Bangladesh is one of the most at-risk countries in the world to natural hazards

- Overall, flood and tropical cyclones have been shown to most adversely affect Bangladesh
  - high population density
  - low-lying deltaic geography
  - location within an active monsoon and tropical cyclone basin

Disaster Profile from EMDAT:

<table>
<thead>
<tr>
<th>Peril</th>
<th>People Killed (Percent Total)</th>
<th>People Affected (Percent Total)</th>
<th>Estimated Damage (Percent Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>7%</td>
<td>75%</td>
<td>68%</td>
</tr>
<tr>
<td>Tropical Cyclone</td>
<td>89%</td>
<td>18%</td>
<td>27%</td>
</tr>
<tr>
<td>Severe Storm</td>
<td>1%</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Earthquake</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>-1</td>
</tr>
<tr>
<td>Other(^2)</td>
<td>2%</td>
<td>6%</td>
<td>-</td>
</tr>
</tbody>
</table>

\(^1\) Does not include damage reported for the 2004 Indian Ocean Earthquake and Tsunami.
\(^2\) Includes collapse, drought, extreme temperature, significant fire disasters, landslides, complex disasters, and significant transport/industrial/miscellaneous accidents. Does not include the 1943 Bengal Famine or epidemics.
For this project, the peril of tropical cyclones (wind and precipitation) has been selected as the natural hazard for detailed probabilistic assessment.

- Single peril allows for quantitative assessment, which is then also used for the funding gap analysis, and development of conceptual disaster risk financing solutions.
- Learnings from this study can be expanded to any pertinent peril in future studies – thus, study provides a clear framework for disaster risk finance applications as well as a comprehensive example.

Impact of flood hazard has been considered based on historical data and information available in the public literature.
Preliminary Loss Results

Inferred EP Curve

- Tropical Cyclone
- Flood

Mean Return Period (Years)

Loss (Million USD)

<table>
<thead>
<tr>
<th>Mean Return Period (Years)</th>
<th>AAL</th>
<th>2</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>50</th>
<th>100</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 AILA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 SIDR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998 FLOOD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Annual Average Loss

<table>
<thead>
<tr>
<th></th>
<th>Cyclone</th>
<th>Flood</th>
</tr>
</thead>
<tbody>
<tr>
<td>M USD</td>
<td>994</td>
<td>2,505</td>
</tr>
<tr>
<td>M BDT</td>
<td>76,480</td>
<td>192,687</td>
</tr>
<tr>
<td>% GDP</td>
<td>0.7%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

2014 GDP = 147,349 million USD
11,335 billion BDT

Note: TC EP curve derived from modeled loss EP curve, with a factor of 1.5 to account for storm surge and a 2.0 factor to account for losses to other non-modeled sectors

Flood EP curve derived from historical record

Estimated Economic Loss (% GDP)

<table>
<thead>
<tr>
<th></th>
<th>Bangladesh</th>
<th>Philippines</th>
<th>Tonga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclone</td>
<td></td>
<td></td>
<td>Cyclone</td>
</tr>
<tr>
<td>Flood</td>
<td>1.7%</td>
<td></td>
<td>Cyclone</td>
</tr>
<tr>
<td>Annual Average</td>
<td>0.7%</td>
<td>1.0%</td>
<td>2.7%</td>
</tr>
</tbody>
</table>
Total Damage due to Flood, Tropical Cyclone, Earthquake & Severe Storm

Figure 1. Natural Disasters in Bangladesh 2000-2014

Total Damage (Millions of USD)

2004 Floods: USD 2,300 M
2007 Cyclone Sidr: USD 2,700 M
2009 Cyclone Aila: USD 1,200 M

Source: Various Data Sources Collated by Air-WorldWide and ADPC
Disaster Funding Data Sources and Primary Components of Funding

- Expenditures made on the recovery, rehabilitation and prevention projects
  - Derived from the approved procurement costs of a total of 204 unique tenders implemented over the period 2000 to 2014
  - Source: Annual Development Program of the Planning Commission, Ministry of Planning

- Humanitarian aid

- Disaster and climate change-related development assistance
  - Source: Economic Relations Division, Ministry of Finance
Figure 6. Financing Natural Disasters in Bangladesh 2000-2014

Figure 7. Natural Disasters and Funding Gap in Bangladesh 2000-2014

Preliminary Funding Gap Results

Figure 7. Natural Disasters and Funding Gap in Bangladesh 2000-2014

Funding Gap ( Millions of USD)

- 5 to 10+yr RP (Risk Transfer (public + private))
- 2 to 5yr RP (Contingent Credit, micro-insurance)
- Annual (Reserve Fund)

Disaster Risk Financing Solutions
Options for Reducing the Funding Gap

High severity

Low severity

Low frequency

High frequency

Unfunded

Reserves

Funding Gap
Disaster Risk Financing, a short overview

- Four ‘pillars’ of DRF identified, all underpinned by risk modelling/assessment
  - Sovereign governments have a primary role in one, a leading role in another, agricultural insurance, and a facilitative role in the remainder
- The development of appropriate DRF solutions involves research on local financial and insurance institutions and the regulatory framework to understand feasibility of each DRF option under consideration.

- Conceptual DRF options will be considered in the areas of:
  - public finance (i.e., contingency budgeting)
  - micro-insurance/finance
  - capital and insurance market-linked risk transfer solutions
Characteristics of DRF
Pros & cons of *ex post* options for Bangladesh

- **Donor Funds** (relief and reconstruction)
  - Traditionally have been dominant portion of response costs
  - Cost and availability becoming increasingly uncertain as donors concentrate more on assisting Sovereigns in improving their own response and risk financing mechanisms
  - Other than immediate response resources, other funding often takes many months

- **Internal budget** (contingency fund and re-allocations)
  - For Bangladesh, budget resources for any response are highly limited
    - contingency funds are hard to defend
    - re-allocations to an emergency response negatively impact other programmes

- **Raising new debt** (Domestic and External)
  - As we have heard, this is highly challenging at present, even when the Govt has control over the timing; immediately after a natural disaster, borrowing could be very difficult and/or very expensive
Characteristics of DRF
Pros & cons of *ex ante* options for Bangladesh

- **Sovereign Reserve Fund**
  - As with contingent budgetary allocation, finding resources for launching and maintaining a Reserve Fund does not appear feasible for Bangladesh at present.
  - Very high opportunity cost of Reserve Funds mean that they are generally only able to cover a small proportion of losses for major disasters.

- The other three *ex ante* options discussed all have the advantage of low up-front cost, so leveraging sparse budgetary resources to provide substantial capital influx should a disaster occur. Those options are:
  - Contingent debt
  - Traditional risk transfer
  - Accessing capital markets for cat risk transfer

- These options are relevant to both public and private sectors – the microfinance sector bears significant burden and must be part of the solution.
  - Outstanding Loans US$3.3 Bn; Savings US$1.2 Bn
Ex ante DRF instruments I
Contingent Debt

- **Contingent debt** provides the ability to raise debt financing quickly, on pre-agreed terms (e.g. rate, tenor, capacity), after a disaster shock
  - It may or may not be linked to active debt financing (e.g. restructuring of committed resources)
  - It generally requires an ongoing fee to maintain the ‘window’
  - Available from IFIs, bi-lateral donors and commercial banks
  - Only generally applies to Sovereign DRF, though large corporates and public entities may utilise contingent debt also

- Bangladesh’s current credit status will limit options for sovereign contingent debt, although different products may be available from various MDBs
Ex ante DRF instruments II
Traditional Risk Transfer

- **Traditional risk transfer** utilises the global re / insurance markets, usually via a broker
  - Flexible with regard to form of risk transfer (indemnity / parametric), and duration (though usually annual)
  - Relatively standardised contracting and highly experienced and efficient claims settlement
  - Has covered most of *ex ante* DRF in development context
  - Severe pricing volatility has all but disappeared

**Guy Carpenter Global Property Catastrophe Rate on Line Index**

Source: Guy Carpenter & Company, LLC.
Alternative risk transfer includes a rapidly expanding universe of instruments (generally termed insurance-linked securities, or ILS) and capital market investors

- Vast majority of ILS volume remains in peak risk zones (US wind, Europe wind, Japan quake, US quake)
- Rapidly expanding capacity for diversifying investments (e.g. developing world risk)
- Growing sophistication of investors and market-makers means that ILS is converging more and more with traditional reinsurance

Source: Guy Carpenter estimates.
- **Analysing and packaging risk**
  - Initial risk assessment results were presented earlier; these start to provide the basis for formulating ideas about quantum of risk and potential risk financing structures
  - National annual expected loss around 2.5% of GDP
  - 100-year loss for flood and tropical cyclone around 10% of GDP
  - Government burden likely to be at least 25%

- **Identify specific need**
  - Funding gap analysis is important
    - Is managing disaster response budget volatility a key concern for Government?
  - What mechanisms are in place and can they be scaled up through accessing international risk markets?
    - Waiting for donor response is not a sustainable nor efficient mechanism
Options for Bangladesh
What might be possible?

- **Portfolio insurance for microfinance sector**
  - Substantial risk resides in the loan portfolios of the MFI sector
  - This can reduce the direct burden on Government and catalyse economic activity

- **Sovereign options**
  - Contingent credit
  - Transfer of cyclone and/or flood risk to international markets – to provide early liquidity for 1 in 10+ year events

- **Micro-insurance**
  - Expanding scope of micro options in agriculture and weather index insurance