Climate Risk Management in a Changing Environment

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Drought

Cyclone

Storm surge, salinity

Hazards of Bangladesh

(Geophysical,climatological, hydrological, meteorological)

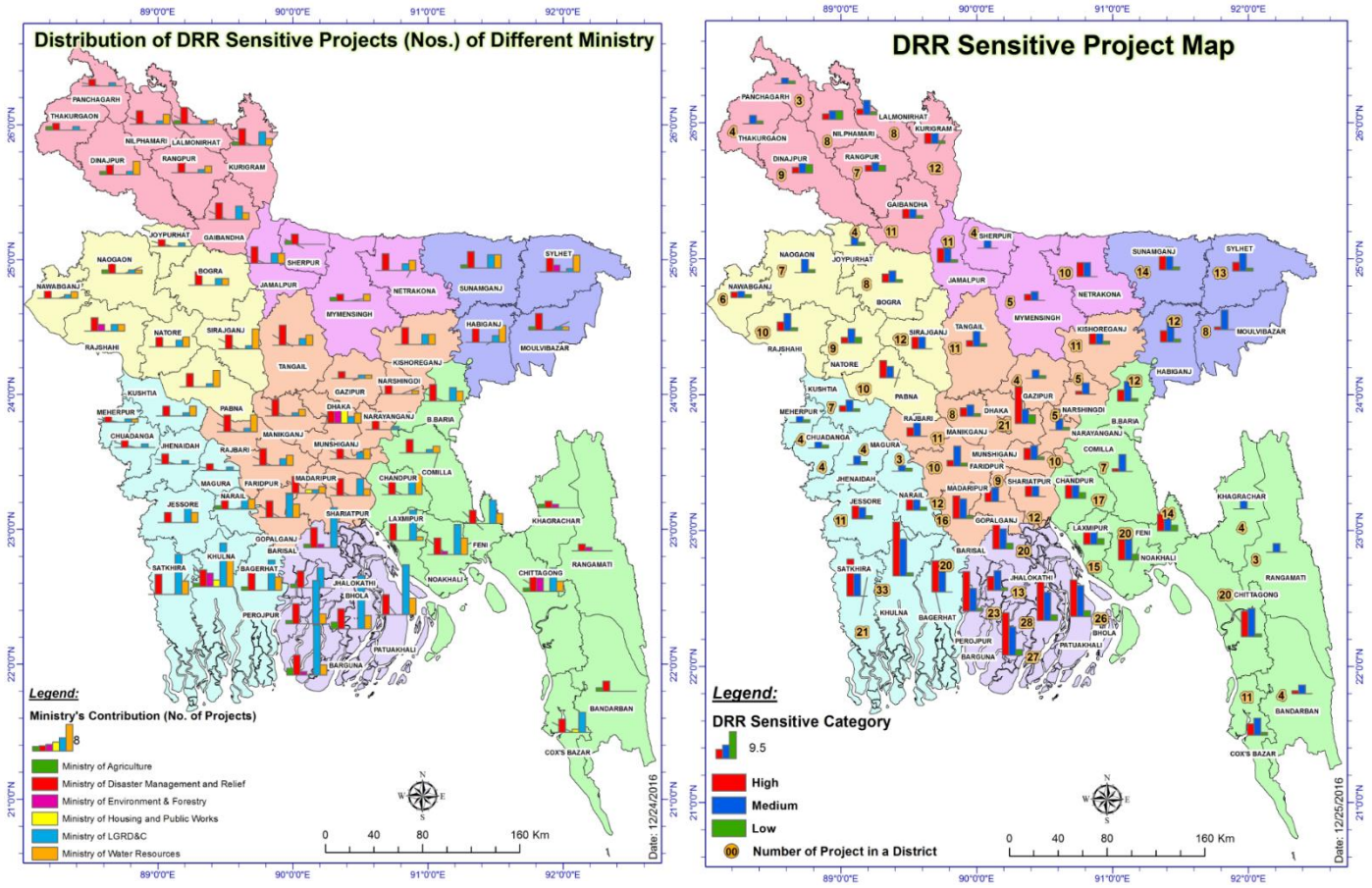
Flood

Water logging

Bank Erosion

Situation of Bangladesh

- **Bangladesh is one of the most at-risk countries** in the world to natural hazards
- **The last 20 years showed accelerated economic growth,** putting the country on track to graduate from the status of LDC to Developing Country
- **Despite the successes, about 20.5 % live below the poverty line (8th FYP).**
- **Climate change will severely challenge the country's ability to achieve its SDG targets**
- **Bangladesh is expected to incur losses equivalent to 1.5% of GDP— $2.2 billion in 2014 dollars (ADB 2016)**

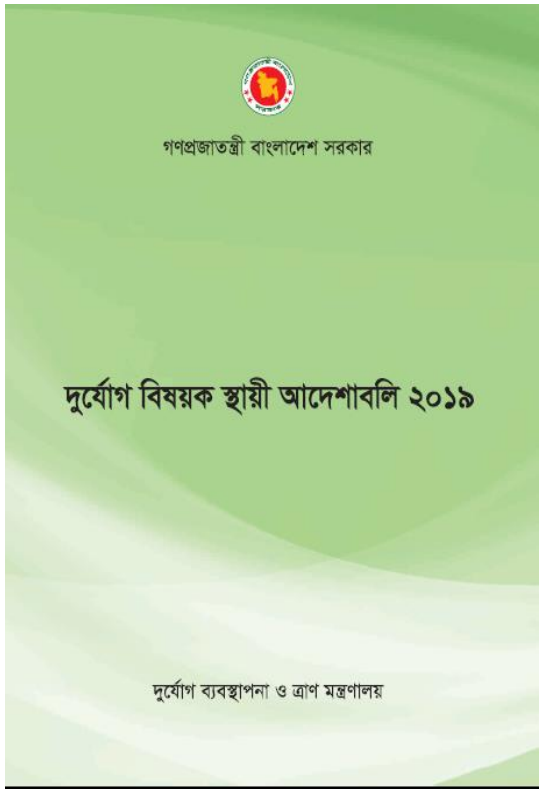


Source : Trends of Disaster Related Public Fund Allocation in Bangladesh
An analysis of ADPs during 6th Five Year Plan period (FY 2011- FY 2015), 2017, Programming Division

Importance of National Policies

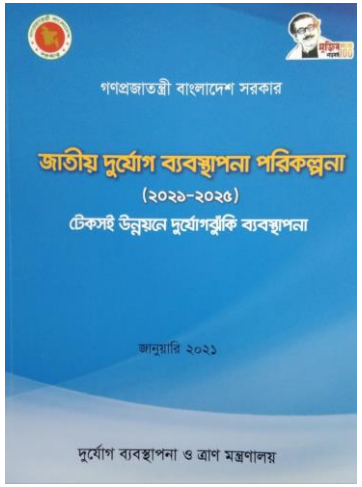
- Following the NDMC decision [***of 06.05.2015 & follow up on 06.09.2017].***

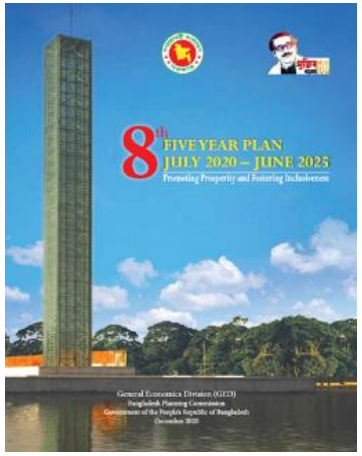
- The revised SOD of 2019 incorporated DIA as an essential tool for achieving gender responsive, disability inclusive and risk informed development in the country.
  - SOD 2019, Sections 5.2.25 and 5.2.26.



Disaster Impact Assessment (DIA) tool and Guideline

DIA in National Policy Framework	
National Plan for Disaster Management (NPDM)	I. Institutionalizing DIA in preparing TAPP/DPP in development projects/programmes (NPDM 2021-2025, Annexures 3 & 4)
8th Five Year Plan (Page: 481 – 482)	**Following issues have been included in 8th Five Year Plan:** **I. Developing DIA Guidelines** II. Promote Supply Chain Resilience III. Promote Business Continuity Plan (BCP) IV. Develop Industry Sector Risk Profile





Purpose & Objective of DIA…

- **Firstly,** to screen projects (DPPs) through checking 3-key points:

WHETHER A PROPOSED PROJECT OR INTERVENTION:

is threatened or to be impacted by existing hazards in development areas;

itself can increase intensity, frequency and extent of existing disaster risk; and,

may generate new threat (or risk) in development sites, where there was no such disaster in the past.

Outline of the Guideline – six steps

1. Locating the project on hazard map
2. Identifying impact of hazards
3. Listing proposed countermeasures
4. Assessment of resilience
5. Estimating the cost of DRR
6. Reporting residual risk

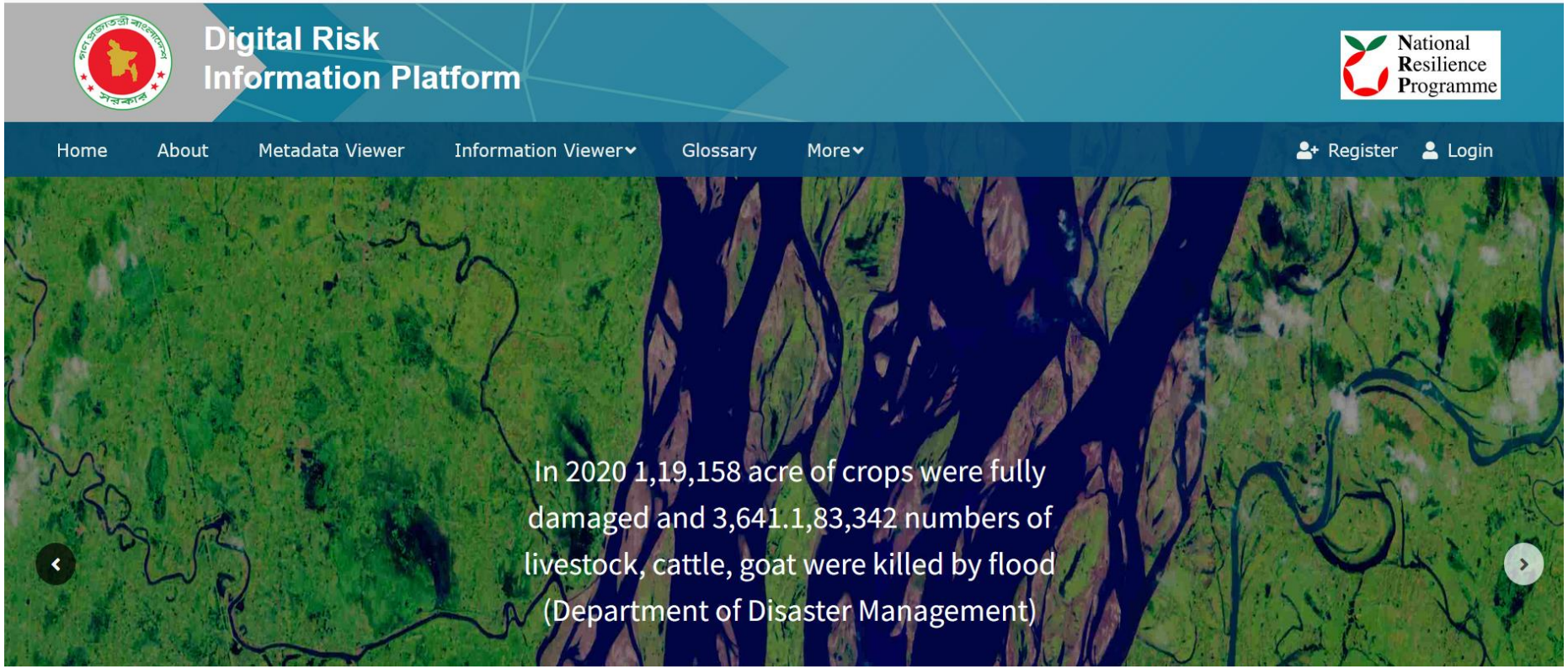
DIA Checklist (1)

Project name: Rehabilitation of Ocastal Polder No. 62 (Patenga), Polder No. 63/1A (Anowara), Polder No. 63/1B (Anowara & Patiya) in Chittagong District.

Implementing Agency: Bangladesh Water Development Board (BWDB)

Project locations	**Hazards (Level of risk)** (List relevant hazards, whose risk level is very high to average)	**Impact assessment**		**Listing proposed countermeasures**	**Cost of proposed countermeasures**
		Impact of hazards on proposed project	**Impact of Proposed Project on hazards**		
Chittagong District *[Polder No. 62 (Patenga), Polder No. 63/1A (Anowara), Polder No. 63/1B (Anowara & Patiya)]*	Cyclone (very high) Landslide (very high) Storm Surge (very high) Earthquake (high) Salinity (high) Sea level risk (Average)	1. Embankment breach and overtopping by storm surges. 2. Embankment will be subjected to wave action & tidal bore. 3. Damage to Hydraulic Control Structures.	**Hydraulic** ▪ **Rise of flood levels** and downstream areas are exposed to higher level of floods. **Morphological:** ▪ Increased **silt and sediment deposition** leading to waterlogging. ▪ Bank erosion due to increased **flood velocity** + **higher flood** e levels → Scoring. ▪ Rise of riverbeds leading to **water logging**. **Others:** ▪ **Drainage failure** in absence of a working canal system to manage the outflow of rainfall runoff. ▪ Water stagnation leading to increased **salinity level and crop damage.** ▪ Increased flood height can cause damage to	**Addressing Hazards:** 1. **Surge:** Plinth level above historically highest surge level+ forestations. 2. **Salinity:** Thicker covering + Modular construction to reduce salinity 3. **Cyclone:** Construction of multipurpose cyclone shelters, with health options + BNBC code compliance. 4. **Erosion:** NbS (afforestation) to reduce erosion due to wave action + Higher velocity water flow. 5. **Emergency:** Sand bagging as an emergency adaptive measure in case of embankment breach **Addressing vulnerabilities:** 1. **Local administrative strategy** to address normal service operation after a cyclone + storm surge.	

Disaster & Climate Risk Information Platform (DRIP)

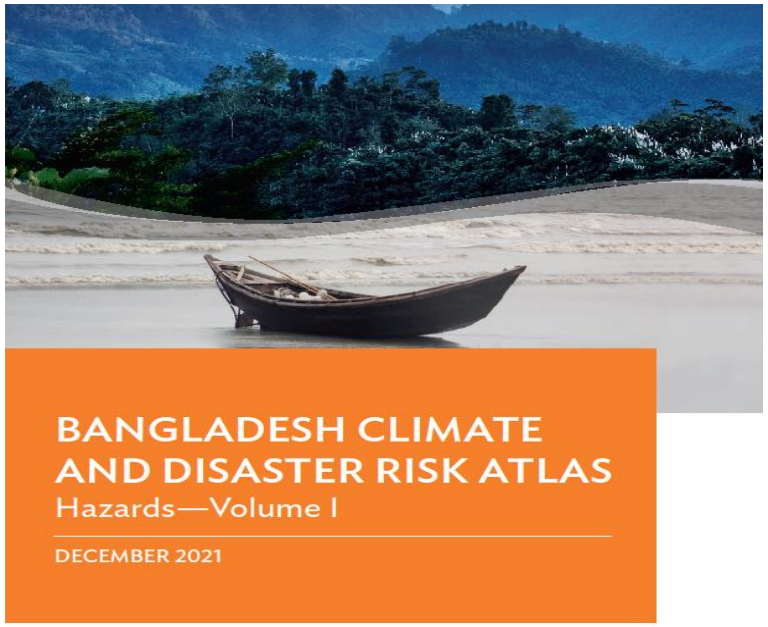


http://drip.plancomm.gov.bd/

Disaster & Climate Risk Information Platform (DRIP)

- DRIP - a specialized software application for strengthening the country's **institutional capacity for mainstreaming disaster and climate risk information** into development planning & budgeting, policies and programs.
- **DRIP's Objective:**
  - **Integration of information;**
  - **Common platform, and**
  - **Assisting government officials with access and analysis.**
  - **Report generation**

Contents of the Risk Atlas Vol I: Hazards



Hazards

- **Hazard Assessment**
- **Hazard classification**

❑ **Hydro meteorological Hazards**

❑ **Climate Hazards (RCP 4.5, RCP 8.5)**

✓**Sea level Rise**

✓**Climate Projections**

✓**Projected Rainfall Changes**

✓**Projected Seasonal Changes**

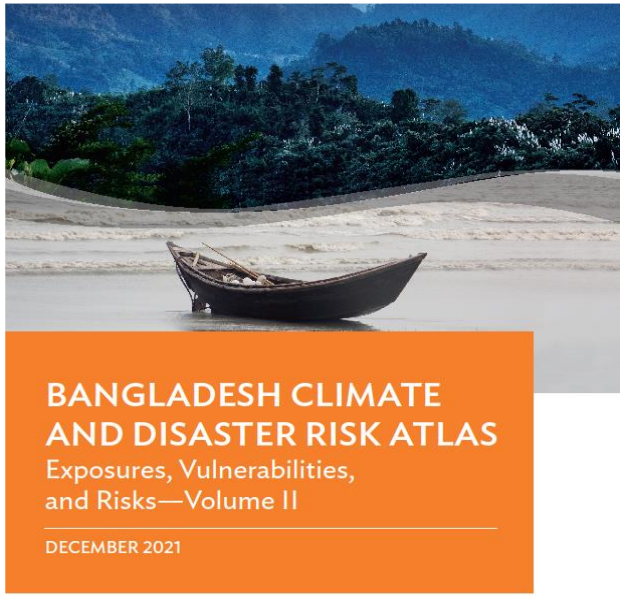
✓**Projected Temperature Changes**

✓**Projected Seasonal Temperature**

❑**Other Geophysical Hazards**

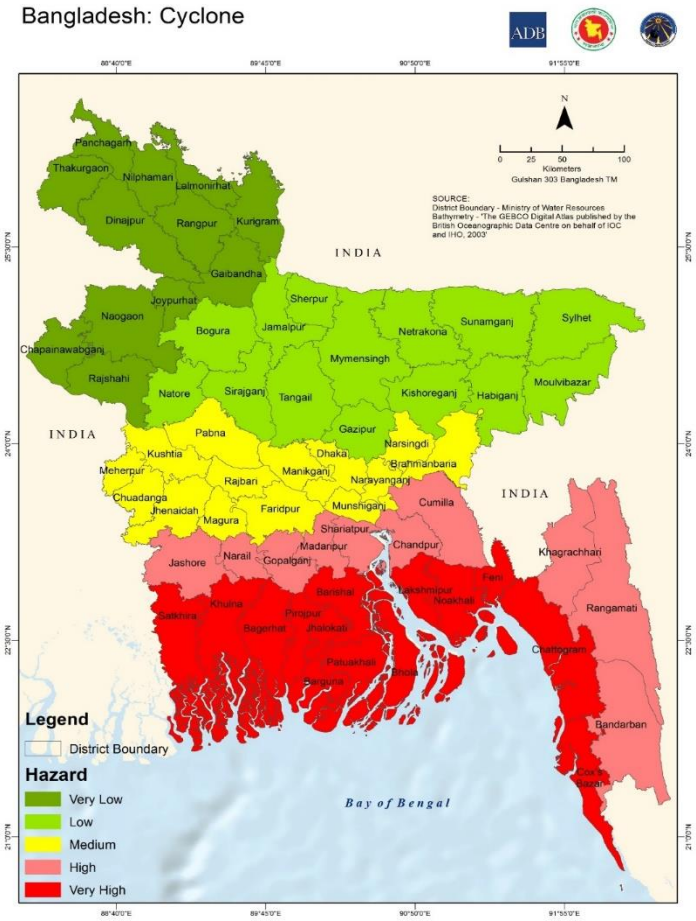
For details of the data and methods, please visit Asian Development Bank website:
https://www.adb.org/publications/bangladesh-climate-disaster-risk-atlas-volume-1
https://www.adb.org/publications/bangladesh-climate-disaster-risk-atlas-volume-2

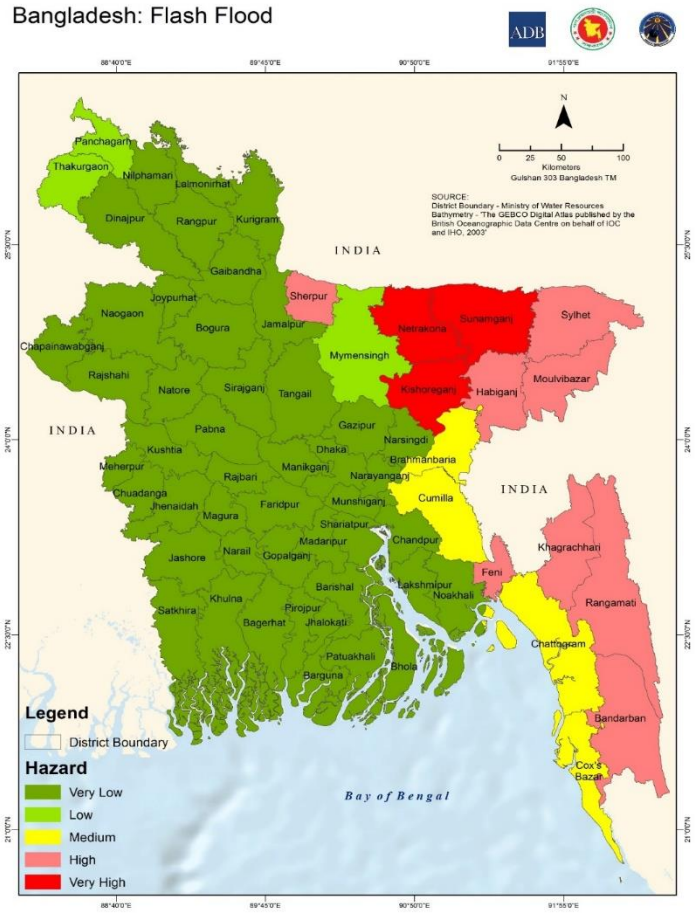
Contents of Vol II: Exposures, Vulnerabilities and Risks



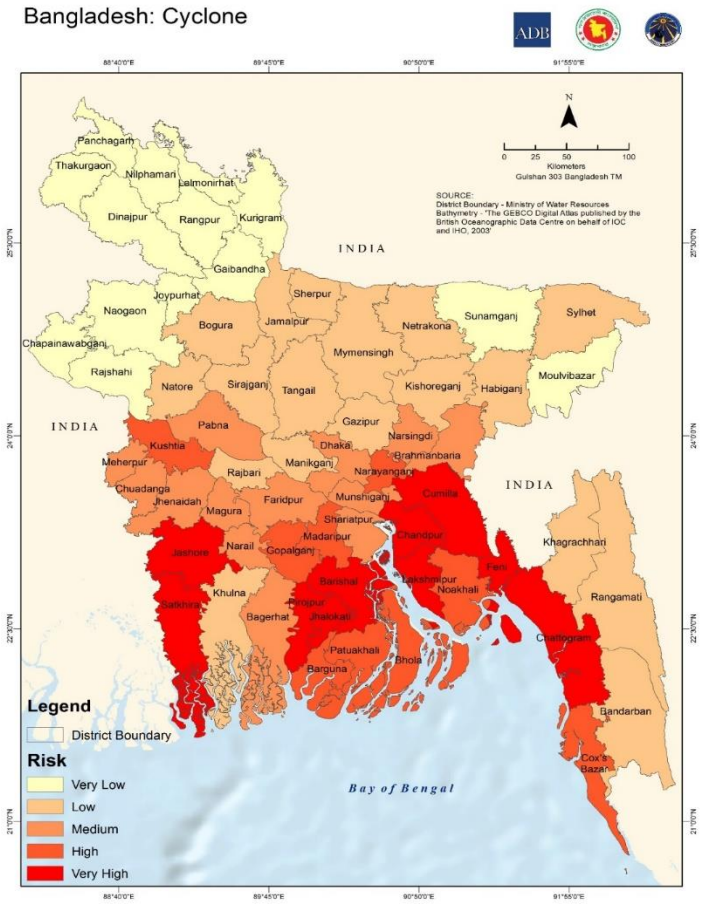
- ❑ **Exposures**
- • **Exposure Assessment**
  - ✓**People**
  - ✓**Crops**
  - ✓**Forests**
  - ✓**Transportation**
- • **Exposure to Hazards**
- ❑ **Vulnerabilities**
  - ✓ **Vulnerability Assessment**
  - ✓ **Socioeconomic Vulnerability**
  - ✓ **Adaptive Capacity**
  - ✓ **Vulnerability to Hazards**
- ❑ **Risks**
  - ✓**Risk Assessment**
  - ✓**Conceptual Relationship of Components of Disaster Risk**

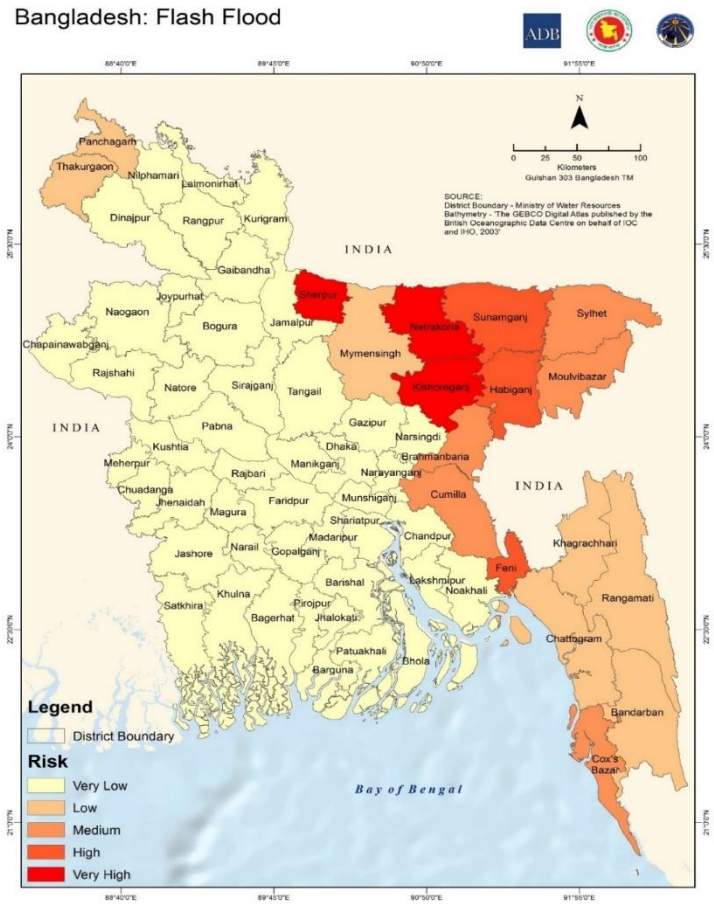
Vol I Hazard Maps (Cyclone and Flash Flood)



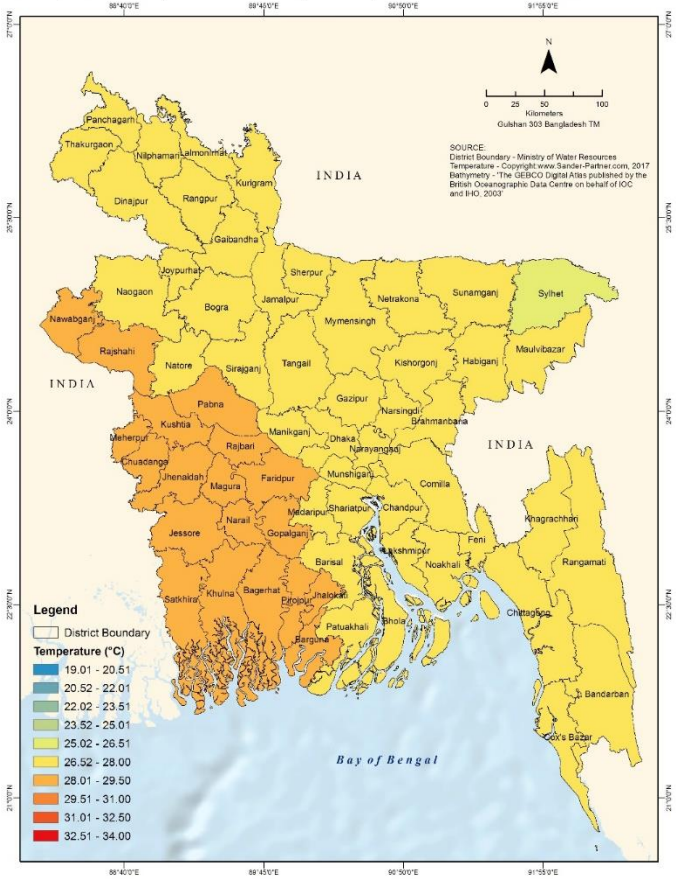


Vol II: Exposure, Vulnerability and Risks

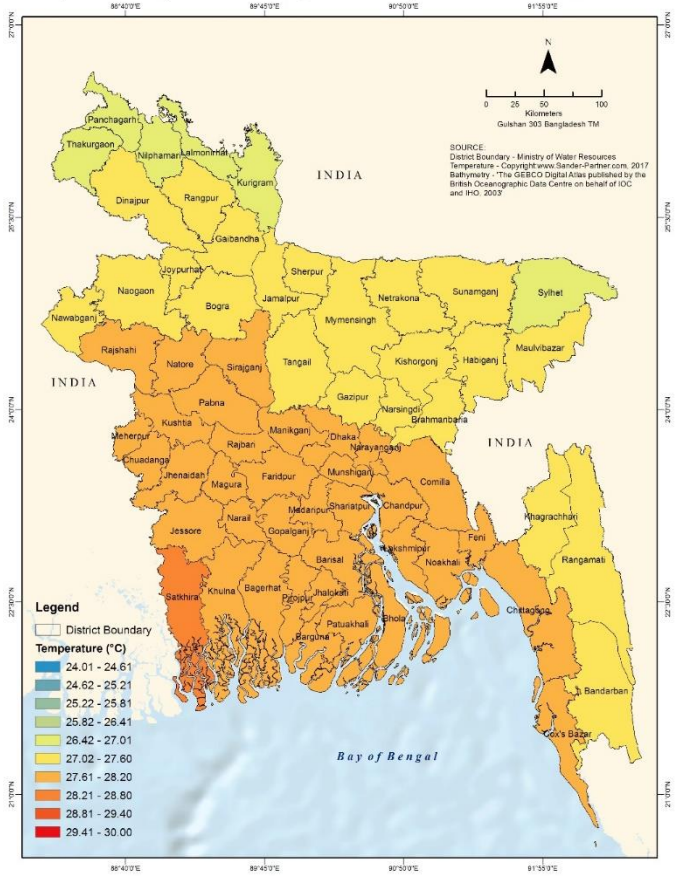




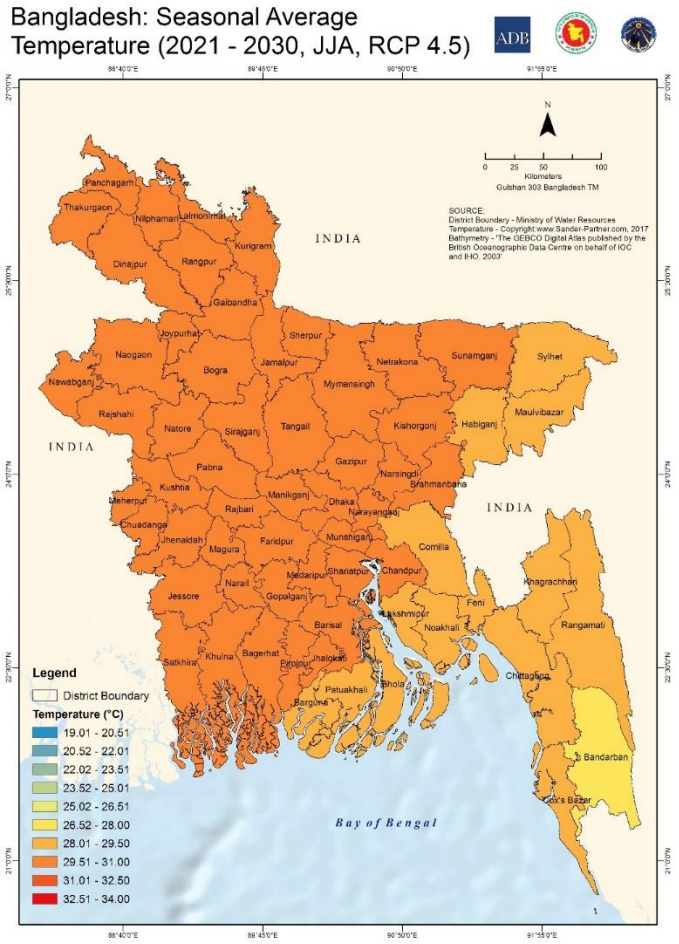
Bangladesh: Seasonal Average Temperature (1970 - 2005, MAM)

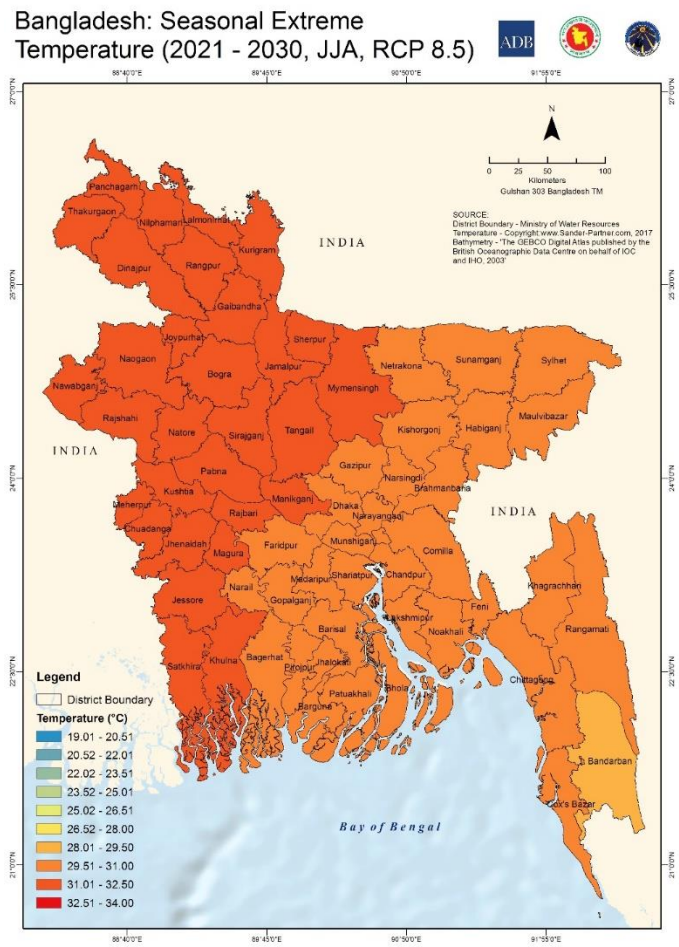


Bangladesh: Annual Extreme Temperature (2021 - 2030, RCP 8.5)



Comparison of two scenarios



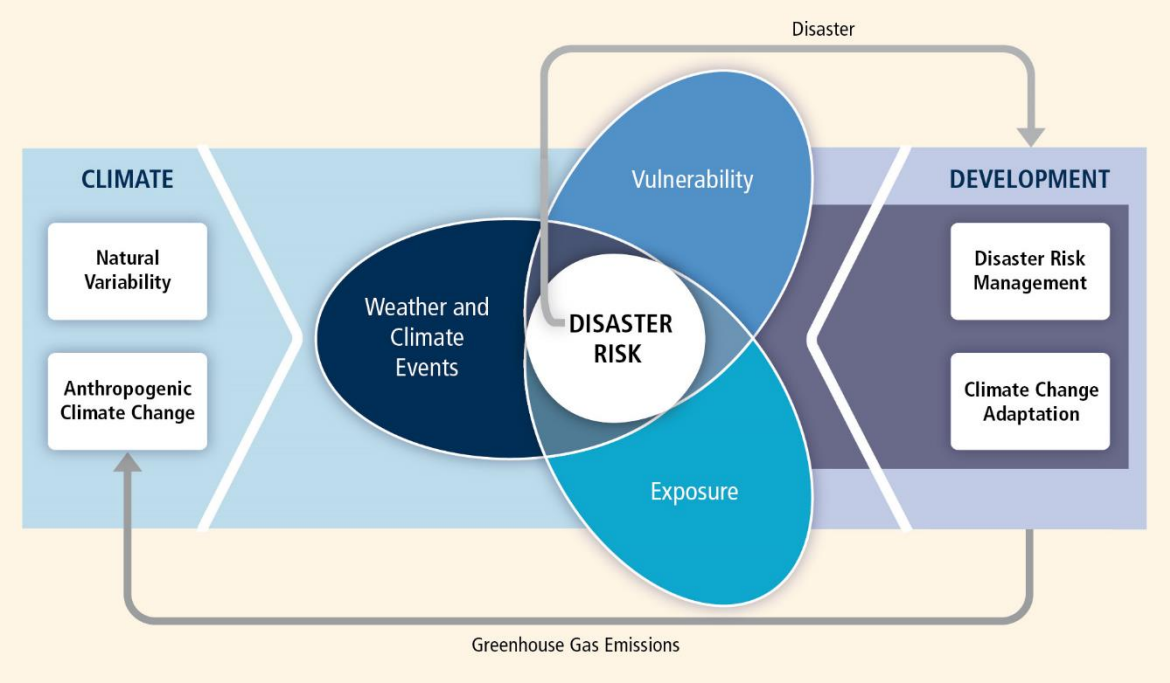


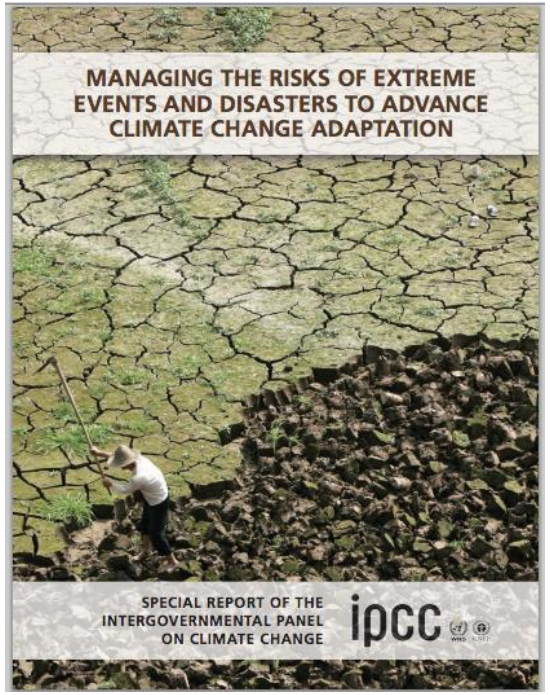
The Atlas shows Most Impacted Sectors and Regions

Physical Impacts	Critical Vulnerable Areas	Most Impacted Sectors
Temperature rise and drought	North-West, West and South-west	Agriculture (crop, livestock, fisheries), Water, Energy, Health
Sea Level Rise and Salinity Intrusion	Coastal Areas Islands	Agriculture (crop, fisheries, livestock), Water (water logging, drinking water), Human Settlement, Energy, Health
Floods	Central Region North East Region Chars and Islands	Agriculture (crop, fisheries, livestock) Water (urban and rural and industry), Infrastructure, Human settlement, Health, DRR, Energy
Cyclone and Storm Surge	Coastal and Marine Zone	Marine Fishing, Agriculture, Water resources, Infrastructure, Human settlement, Life and property

Climate and Disaster Risk Model: SREX, IPCC 2012

R=f(H,E,V)





[BOOK] Managing the **risks** of extreme events and **disasters** to advance **climate** change adaptation: special report of IPCC

GIS based Risk Assessment

Hazard
(i.e. earthquake)

Exposure
(people, houses)

Vulnerability
(Socio-economy/adaptive capacity)

Risk
(Combined effect)

RISK=*f*(HAZARD , EXPOSURE, VULNERABILITY)

Hazard Assessment

RISK=*f*(HAZARD, EXPOSURE, VULNERABILITY)

Hazard = Spatial distribution of Frequency and magnitude

Climate and Disaster Risk Model: SREX, IPCC

Direct impact of climate change

- **Temperature**
- **Precipitation**

Downscaling of GCM

Hydro-climatic hazard

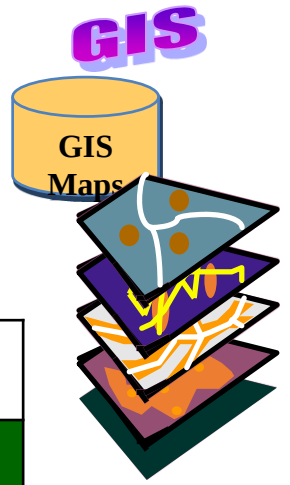
- **Flood**
- **Flash flood**
- **Drought**
- **Cyclone**
- **Storm surge**
- **Seal level rise**
- **Salinity**
- **Erosion**

Geophysical hazard

- **Earthquake**
- **Landslide**

GIS based map for all the hazards, exposure and vulnerability

Multi-Hazard and Disaster Risk Assessment



Projection System: Bangladesh Transverse Mercator (BTM)
Datum - Gulshan_303

Risk Assessment Approach: Risk scoring

Risk Category	Risk Score (RS)
Very Low	0-5
Low	6-10
Moderate	11-15
High	16-20
Very High	21-25

Thank you all!