Adapting social safety net programs to climate change shocks: issues and options for Bangladesh

Presented by

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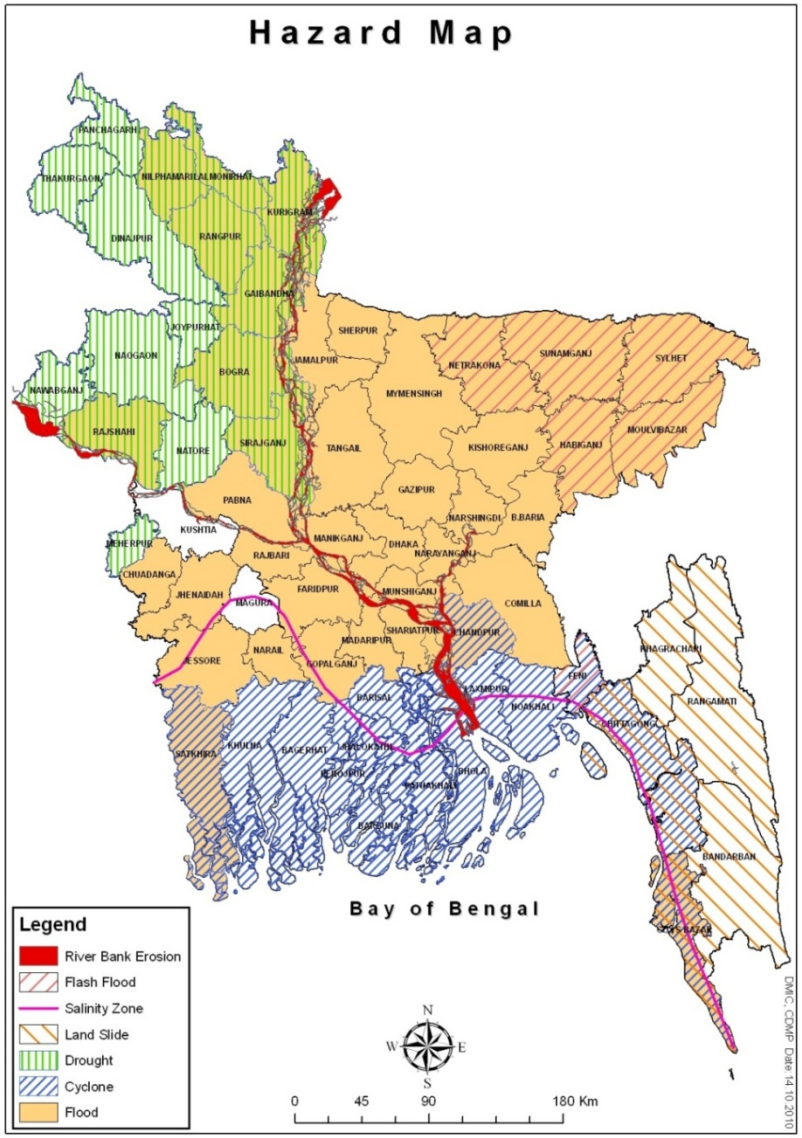
I. Rationale

Why is the climate change issue important to Bangladesh?

- Spatial geographic position, presence of Bay of Bengal, riverbed siltation;
- Monsoon climate, variability in rainfall leads to flood or drought;
- Physiographic factors, low elevation in coastal region: great risk to sea-level rising, water logging and salinity;
- Higher incidence of poverty: poor are more vulnerable to climate change shocks.

The study is concerned to	Flood
	Cyclone
	Water logging
	Salinity
	Drought



II. Objectives

- To quantify the number of rural poor whose livelihoods is threatened by climate change and describe the type of climate risks facing them;
- To identify successful examples of coordination/integration of disaster management, social safety nets and climate change adaptation/rural development in Bangladesh and abroad;
- To draw implications for the design and implementation of the safety nets in Bangladesh and for the coordination among ministries such as the MoFDM, MoA, MoEF, MoFL, MoWR, and MoLGRDC.

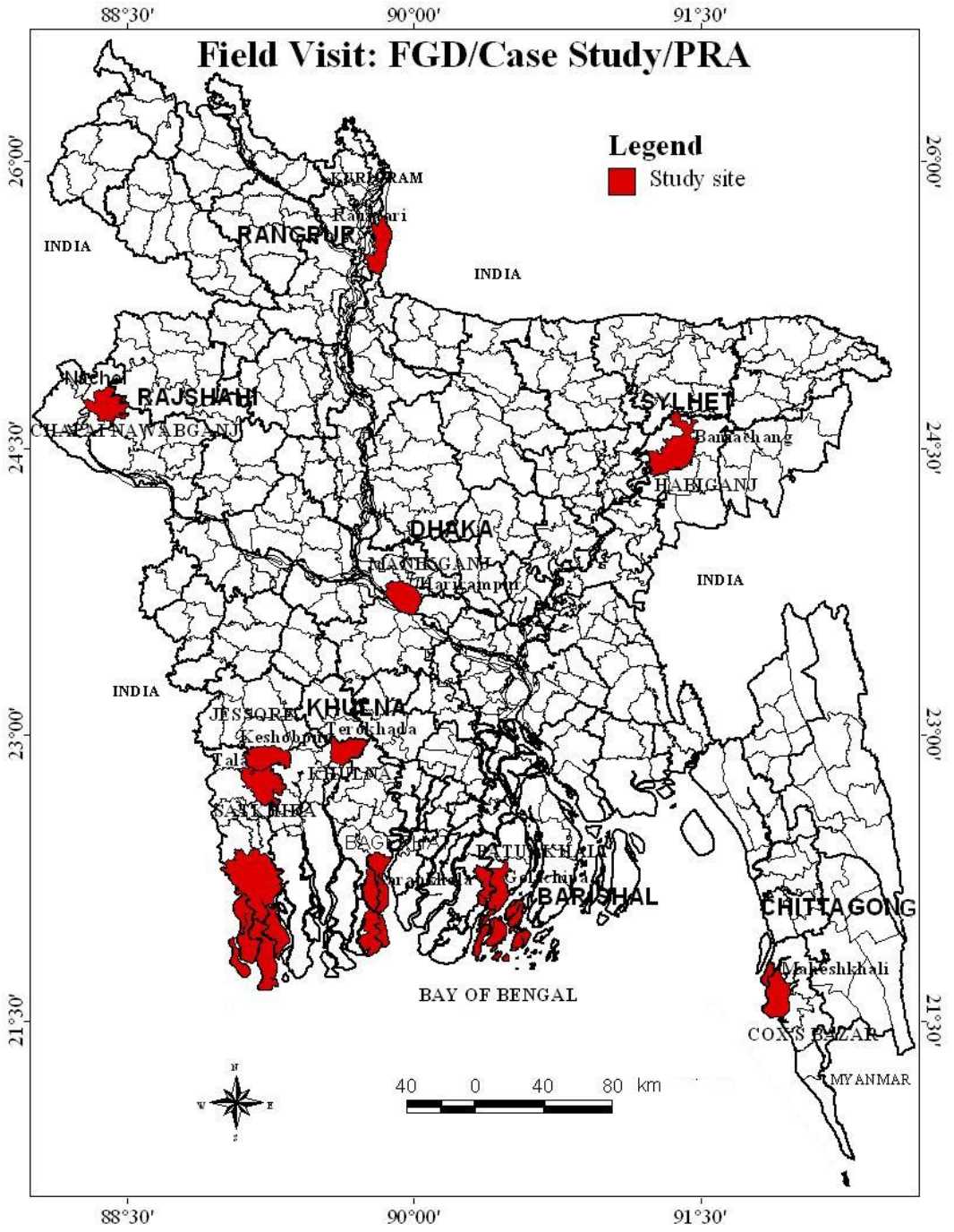
III. Methodology

- Literature collection & synthesise: National & Global
- Collection of secondary data: HIES, maps, climatic data etc.
- Collection of primary data: FGDs, Case studies, PRA sessions etc.
- Quantitative analysis: HIES-2005 & 2010
- Stakeholder consultations: Service providers & users from GO & NGOs Official – Local & Central/Higher Level
- Construction of household vulnerability or risk index
- GIS mapping: Spatial multivariate analysis

Collection of primary data

Tools

- Focus Group Discussions (FGDs)
- Case Studies
- Participatory Rural Appraisal (PRA)



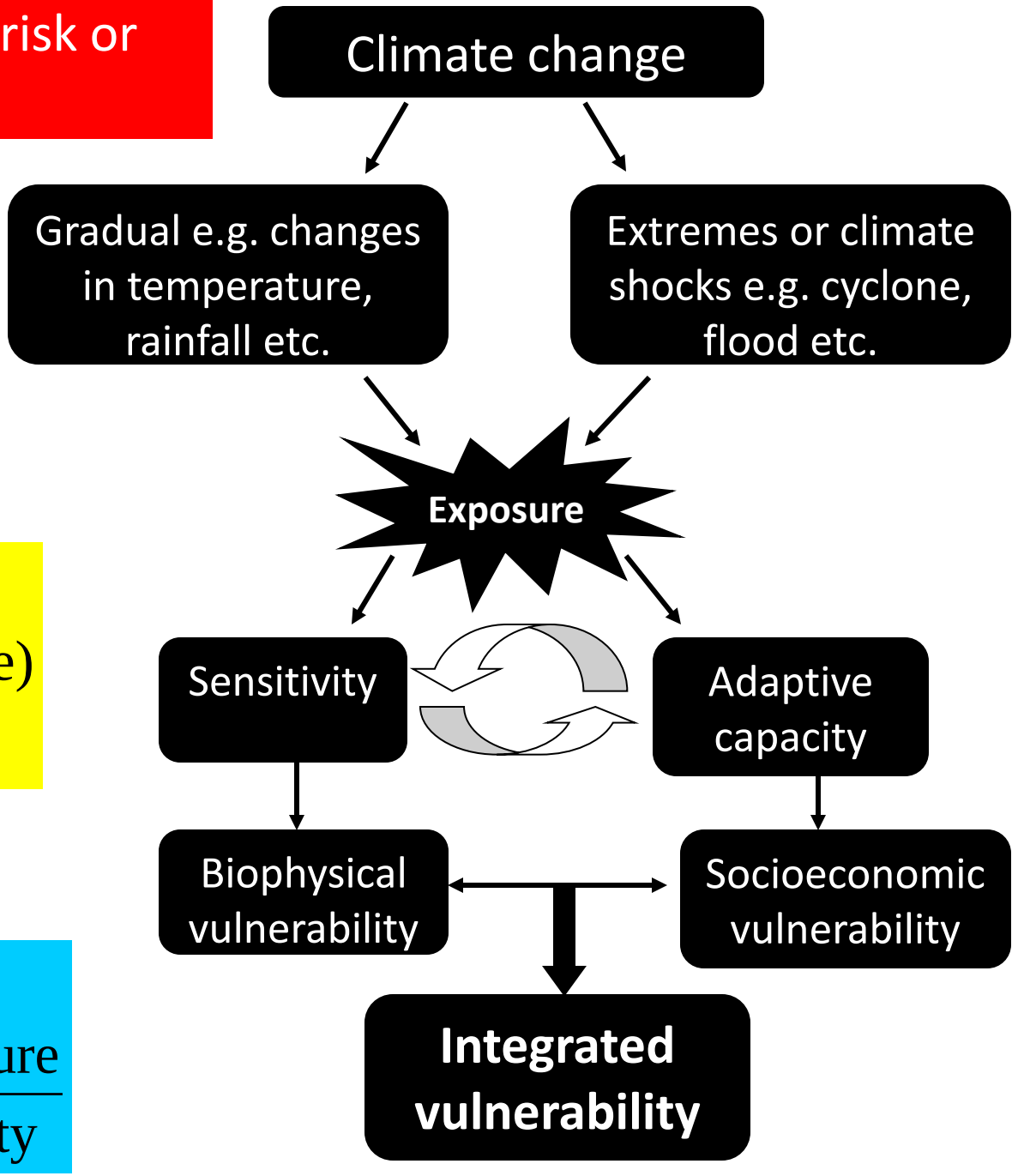
Model for climate change risk or household vulnerability

Vulnerability consists of adaptive capacity, sensitivity & exposure (IPCC TAR, 2001)

$$\textit{Vulnerability} = (\text{Sensitivity} + \text{Exposure}) - \text{Adaptive Capacity}$$

Or,

$$\textit{Vulnerability} = \frac{\text{Sensitivity} \times \text{Exposure}}{\text{Adapative Capacity}}$$

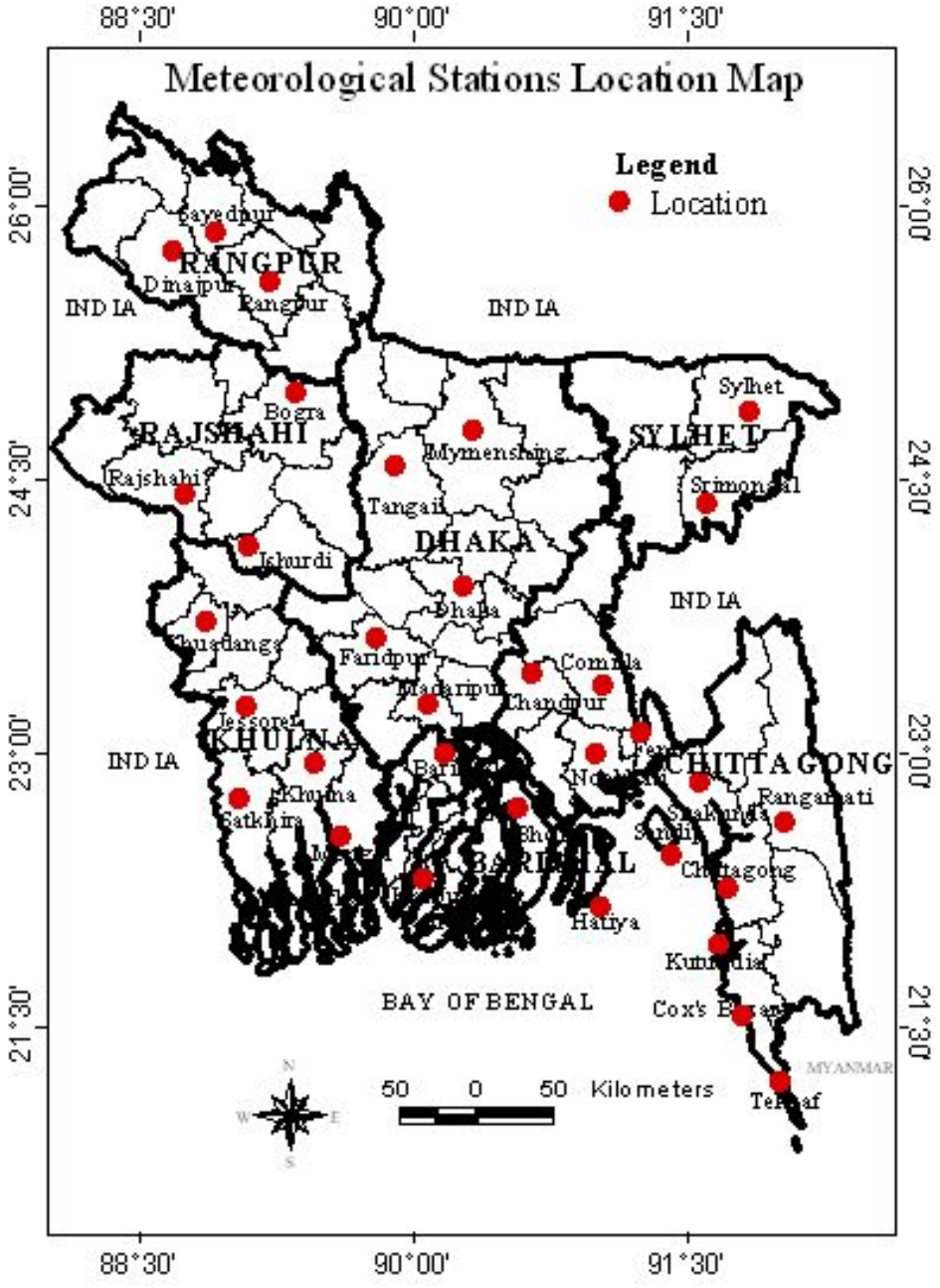


Model parameters: Adaptive Capacity, Sensitivity & Exposure

Determinants/ indicators of vulnerability	Description of each indicator selected for analysis	Unit of measurement	Functional relationship between indicator and vulnerability
(A) Adaptive	Capacity (AC)		
1) Household assets or wealth (HIES, 2010)	Ownership of major durable goods, livestock & fish farming, farm forestry, quality residential house, major agricultural assets, and other assets like stocks, bonds, jewelry etc.; money saver in bank or microfinance system; and nonagricultural income	Percentage of total household (hhold) or population who own	The higher the percentage of total population with asset ownership, and access to these income sources the lesser the vulnerability.
2) Incidence of poverty (HIES, 2010)	Head Count Rate (HCR) incidence of poverty (CBN method)/upper poverty line (UPL)	%of total household live below the UPL	The higher the percentage of poverty of total population, the higher the vulnerability.
3) Basic services (HIES, 2010)	(i) Social safety net programs (ii) School enrollment (>7 yr age) (iii) Literacy rate age 7 years and older (iv) Health services/medical facilities	%of total household or population	The higher the basic services, the lesser the vulnerability.
4) Infrastructures and institutions (BBS, 2010)	(i) Road networks (ii) Health service centre (iii) Primary co-operative society	Road density or number of said institutions	Higher the road density or number of health centre/co-operative society, the lesser the vulnerability.

Model parameters (cont'd): Sensitivity & Exposure

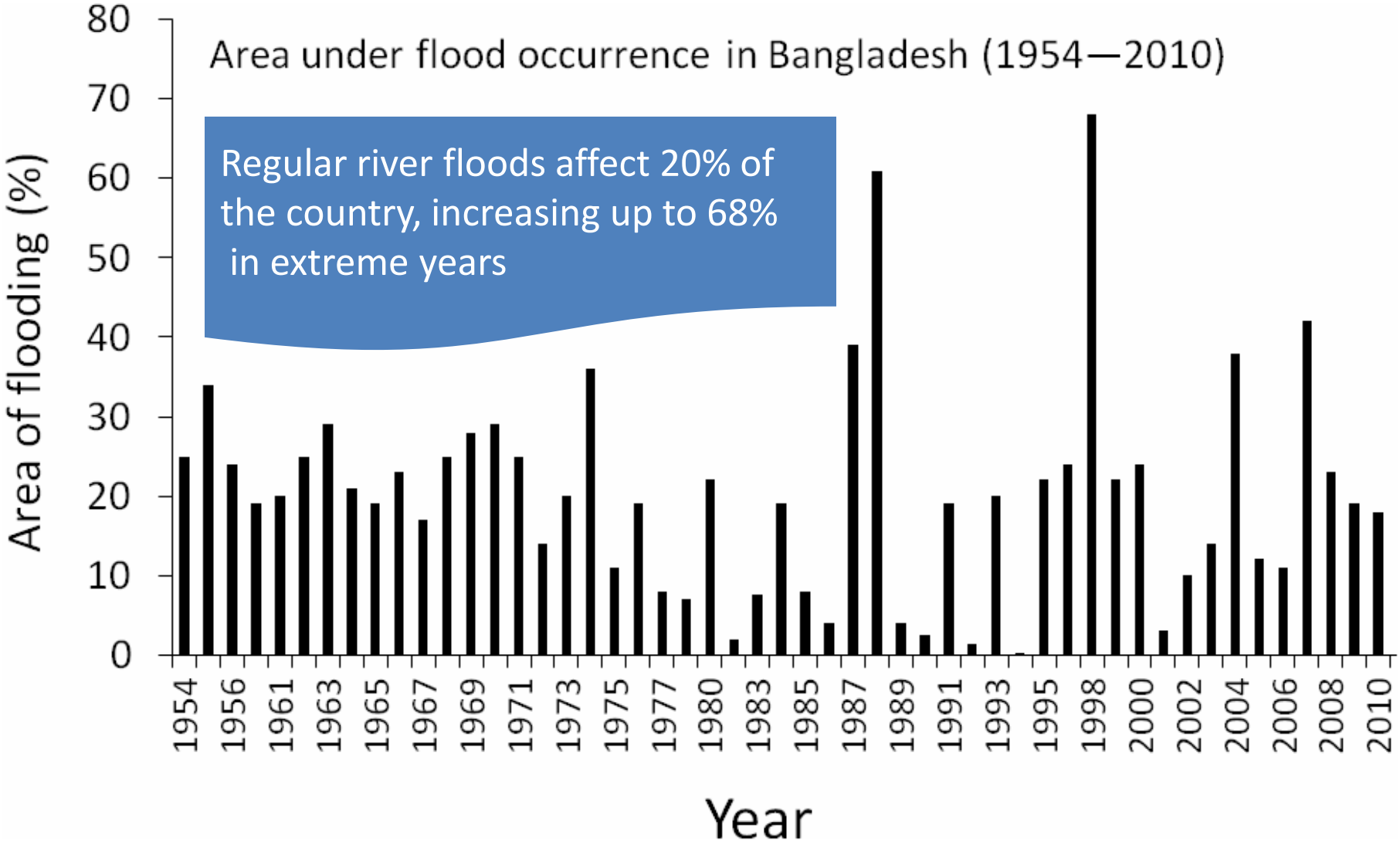
Determinants/ indicators of vulnerability	Description of each indicator selected for analysis	Unit of measurement	Functional relationship between indicator and vulnerability
(B) Sensitivity (S)			
5) Extreme climate i.e. climate shocks	Frequency of cyclones and floods	Number of occurrences/number of year experienced	The higher the frequency, the greater the vulnerability.
6) Current sensitivity (HIES, 2010)	Households who are affected by extreme weather events like flood, cyclone, heavy rain, drought etc. in 2010	Percentage of household affected by extreme weather events	The higher the percentage of household affected by extreme weather events, the higher the vulnerability.
(C) Exposure (E)			
7) Projected change in climatic parameters on 2050	(i) Change in temperature (ii) Change in summer precipitation	Percentage change from base value (2010)	Increasing temperature and precipitation, increase the vulnerability.



Meteorological observatories (●) in Bangladesh

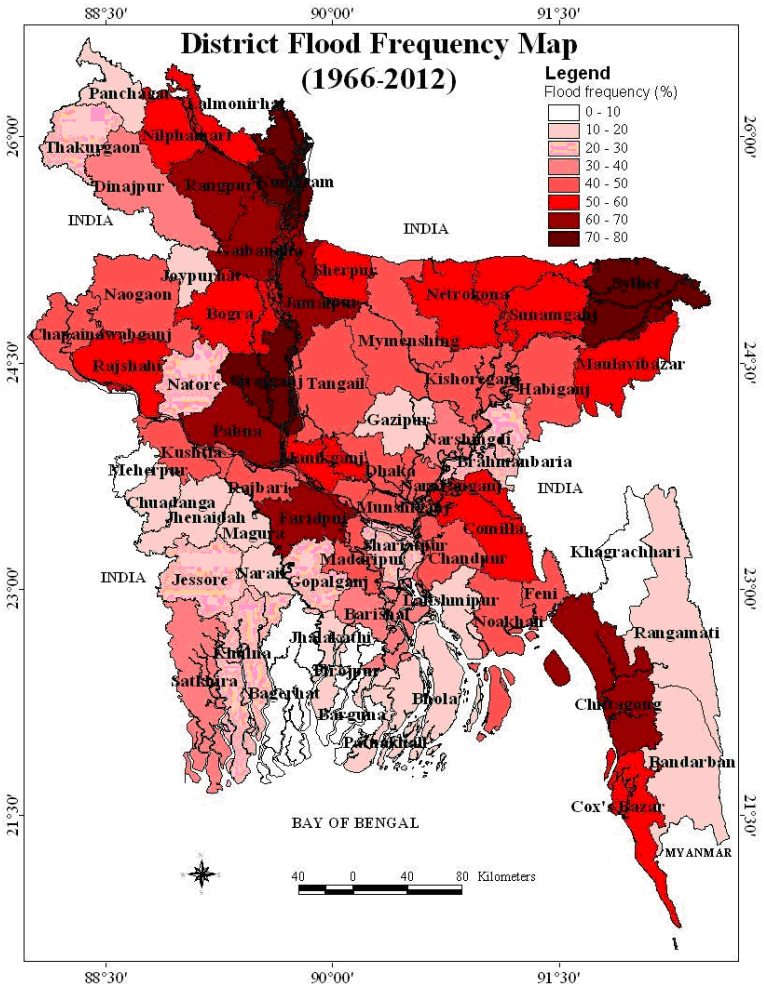
The temperature or rainfall data from the district observatories were averaged to find the mean value of respective division like BARISAL, CHITTAGONG, DHAKA, KHULNA, RAJSHAHI, RANGPUR & SYLHET

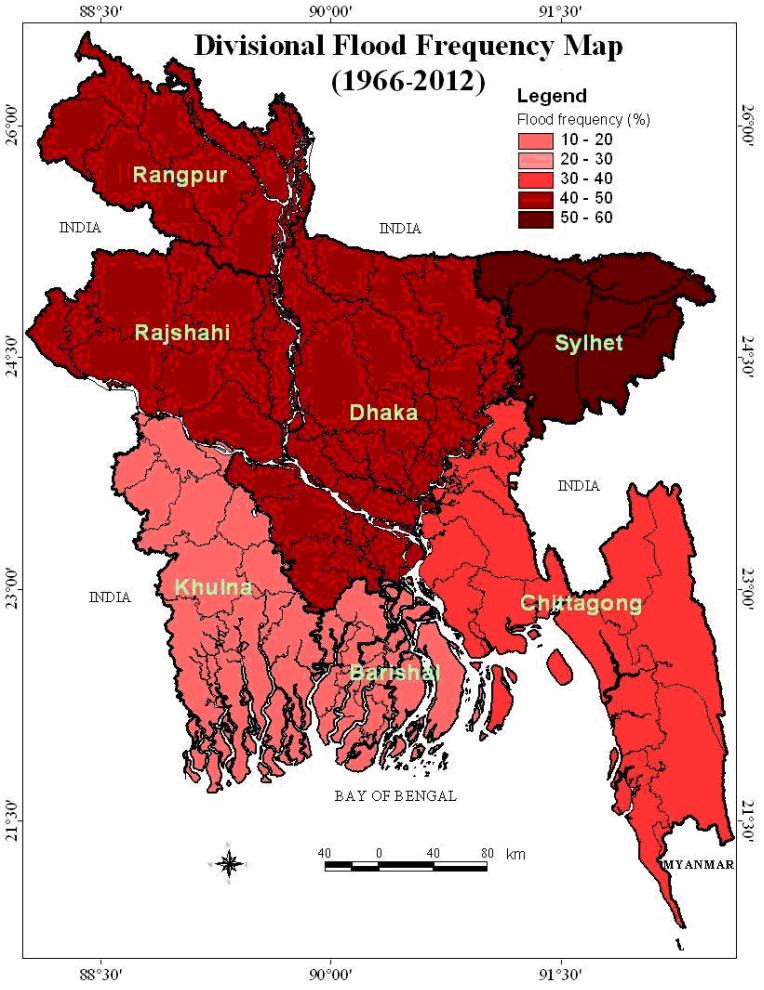
IV. Results & Discussion



Source: *http://www.ffwc.gov.bd* (site accessed on 11 April 2012).

Flood frequency at district & division level since 1966

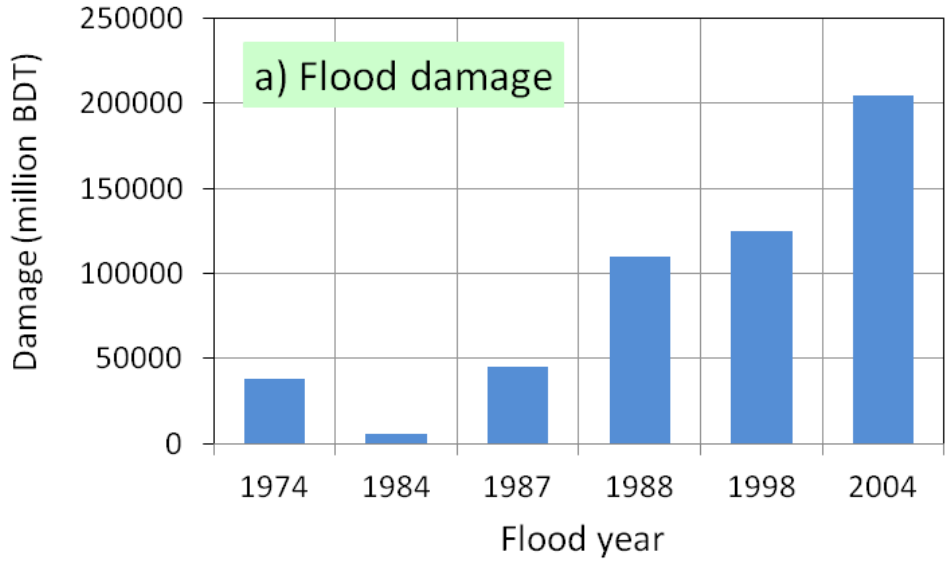




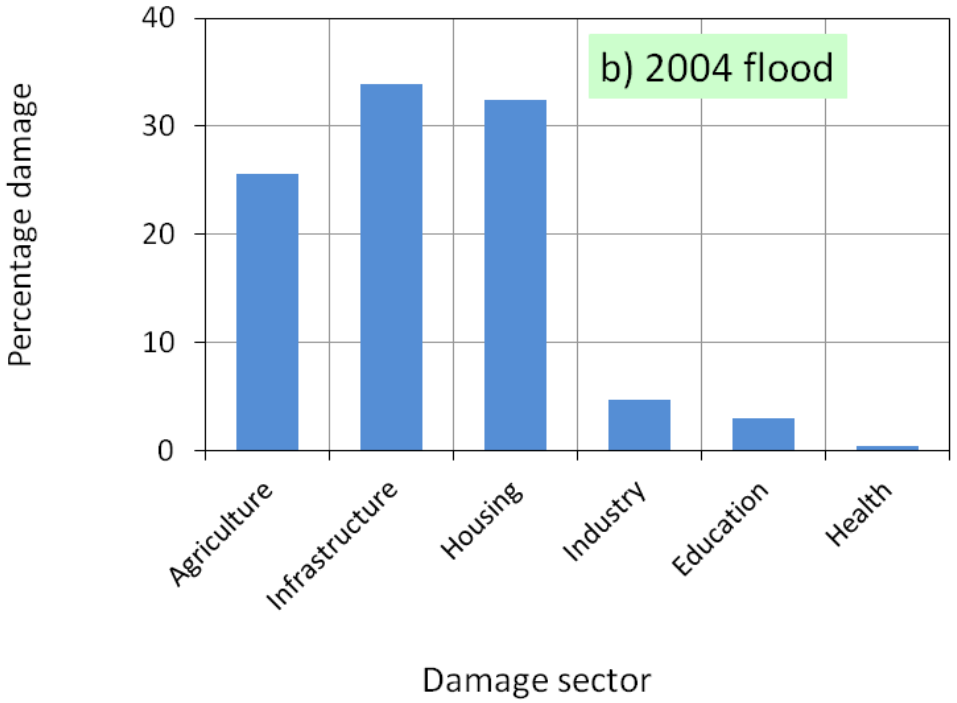
The number of flood hit at district level is weighted to the respective divisions

%frequency= (Total number of incidence/Number of year experienced)x100

Damage due to historical floods in Bangladesh

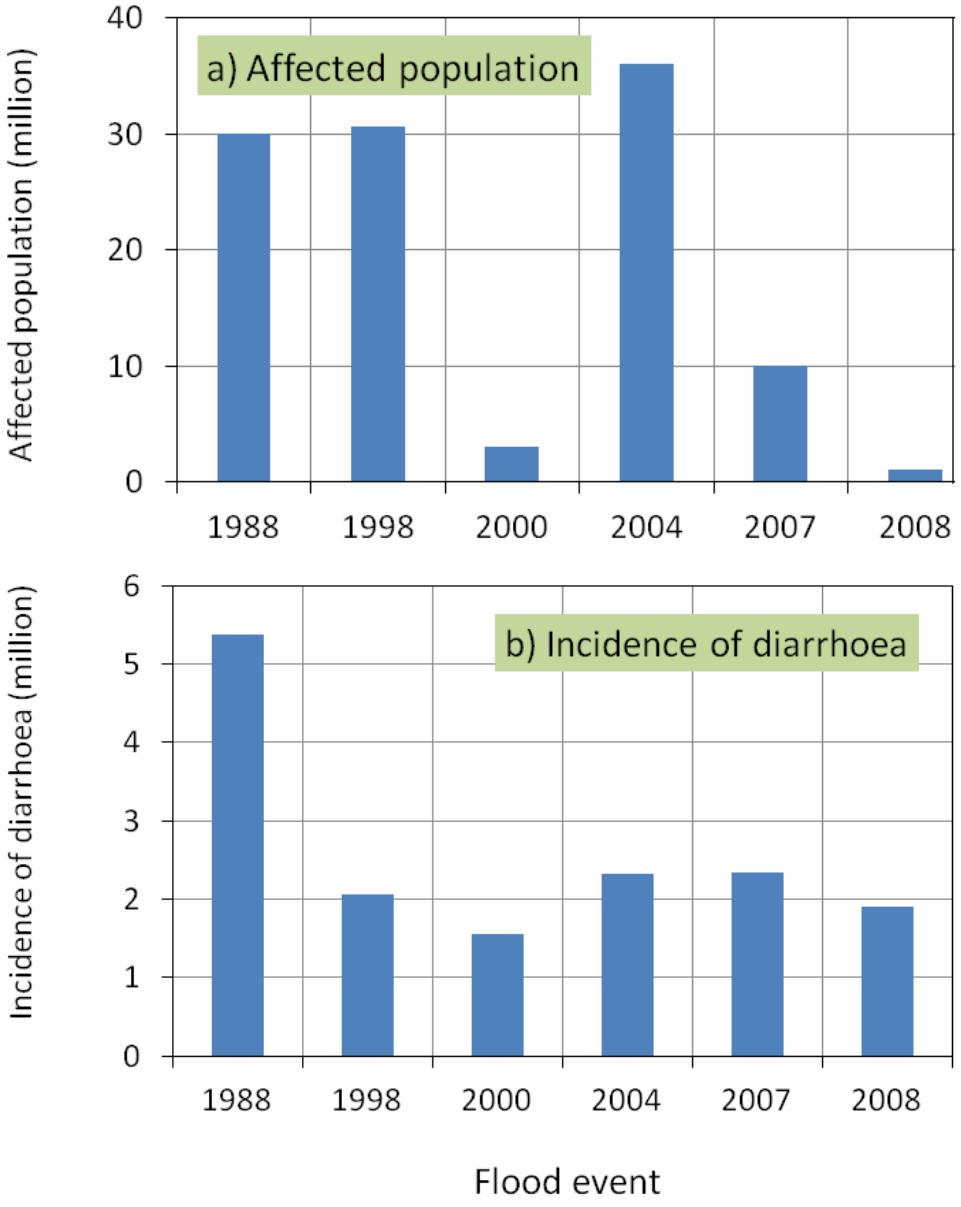


The damage due to flood is tremendously increasing from 80s. The 2004 flood event was found most devastating in term of the damage occurred which took highest toll of the country's flood history



Most of the toll was occurred due to the damage related to infrastructure, housing and agriculture

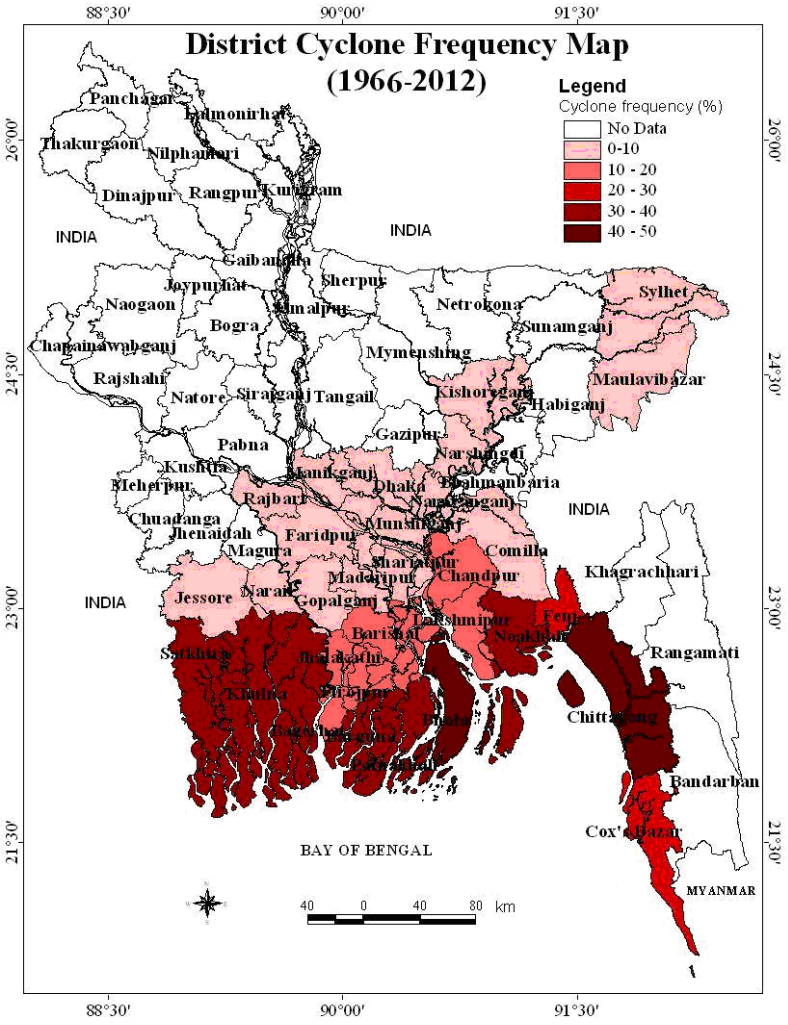
Population affected & Diarrhoeal incidence due to historic floods

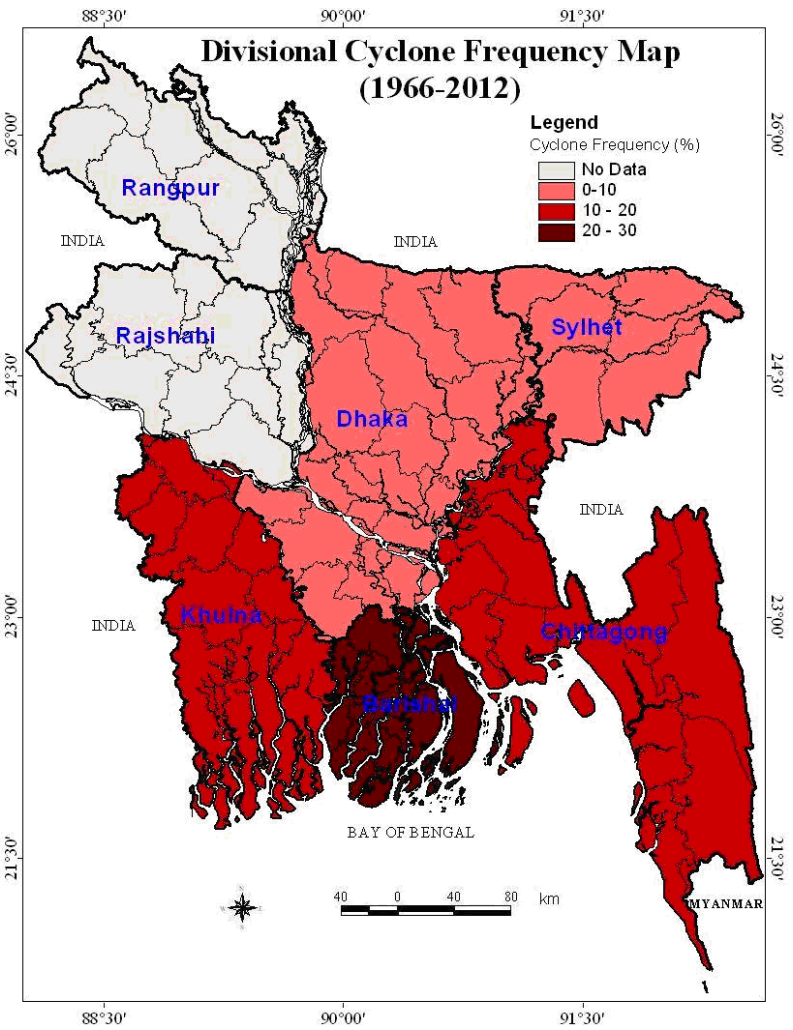


The most massive flood events occurred in the recent past especially on 1988, 1998 and 2004 when more than 30 million people were affected for each flood event

Diarrhoeal incidence in 1998 flood has been decreased by more than 50% compared to 1988 mainly due to extensive programmes taken by GO & NGOs. Although most programmes are still operating, but the diarrhoeal incidence has been increased from 2000 to 2007 due to the increased frequency of flood events i.e. recurring floods.

Cyclone frequency at district & division level since 1966

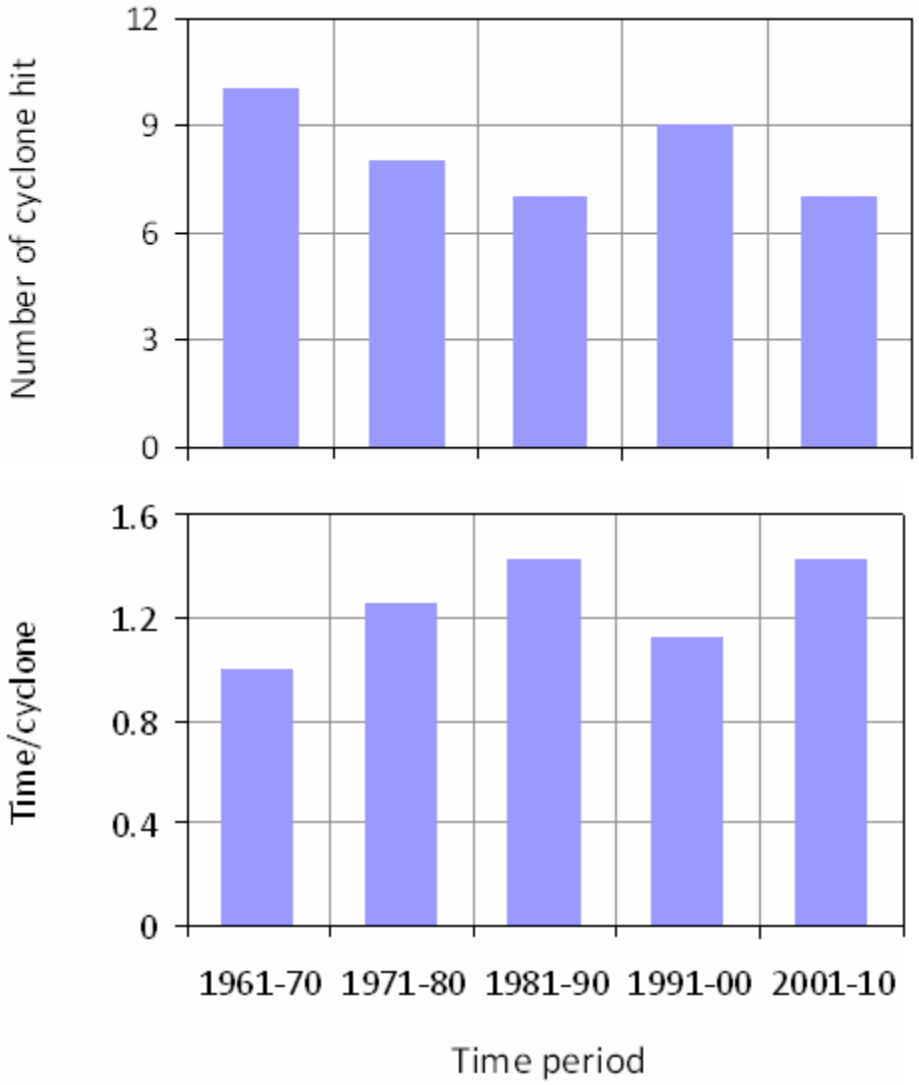




The number of cyclone hit at district level is weighted to the respective division

%frequency= (Total number of incidence/Number of year experienced)x100

Cyclonic hit in Bangladesh from 1961

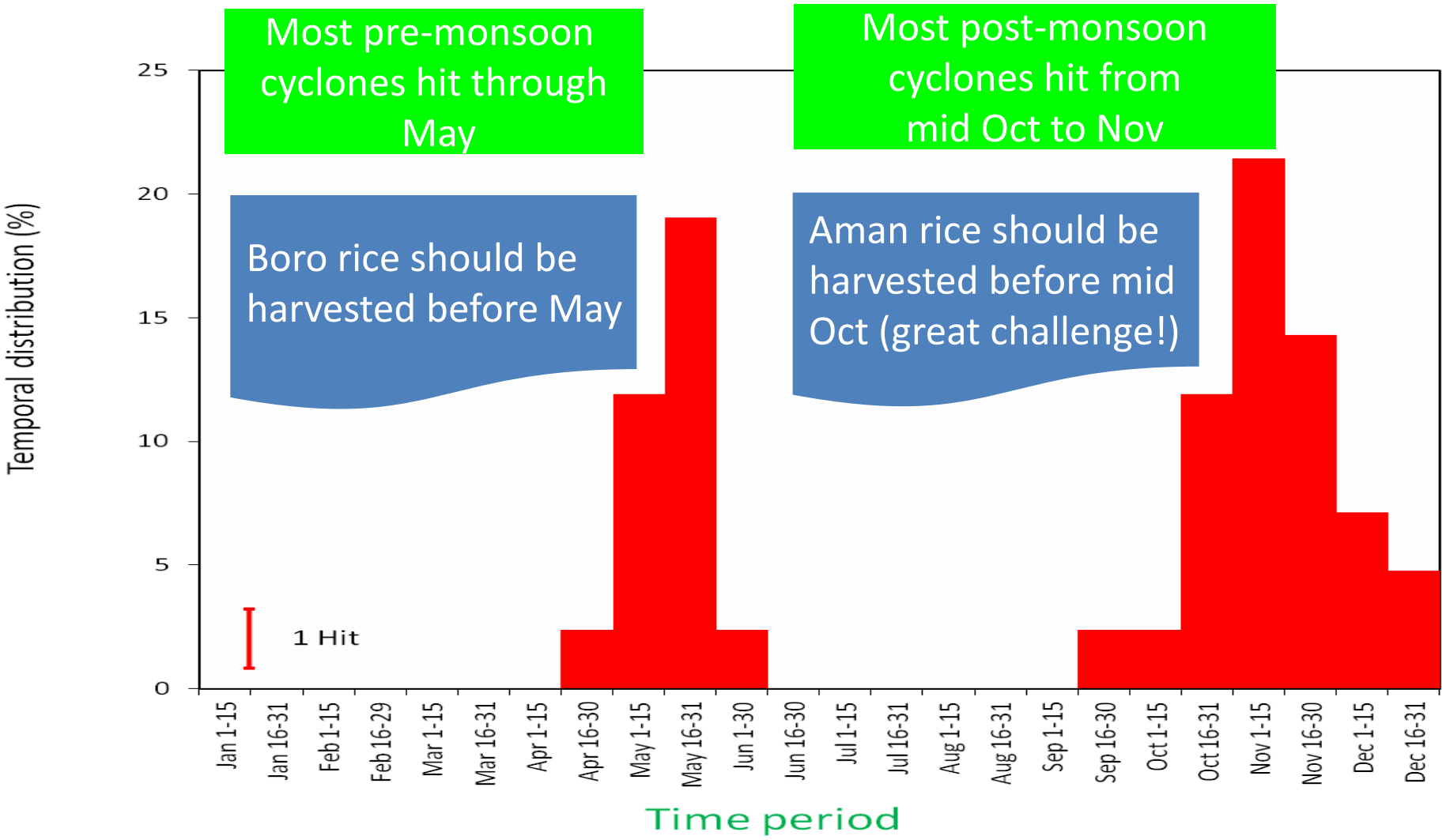


Frequency of cyclonic hit in Bangladesh is remarkably higher during the last 50 years from 1961

On an average only 1.2 year is enough for a cyclonic hit

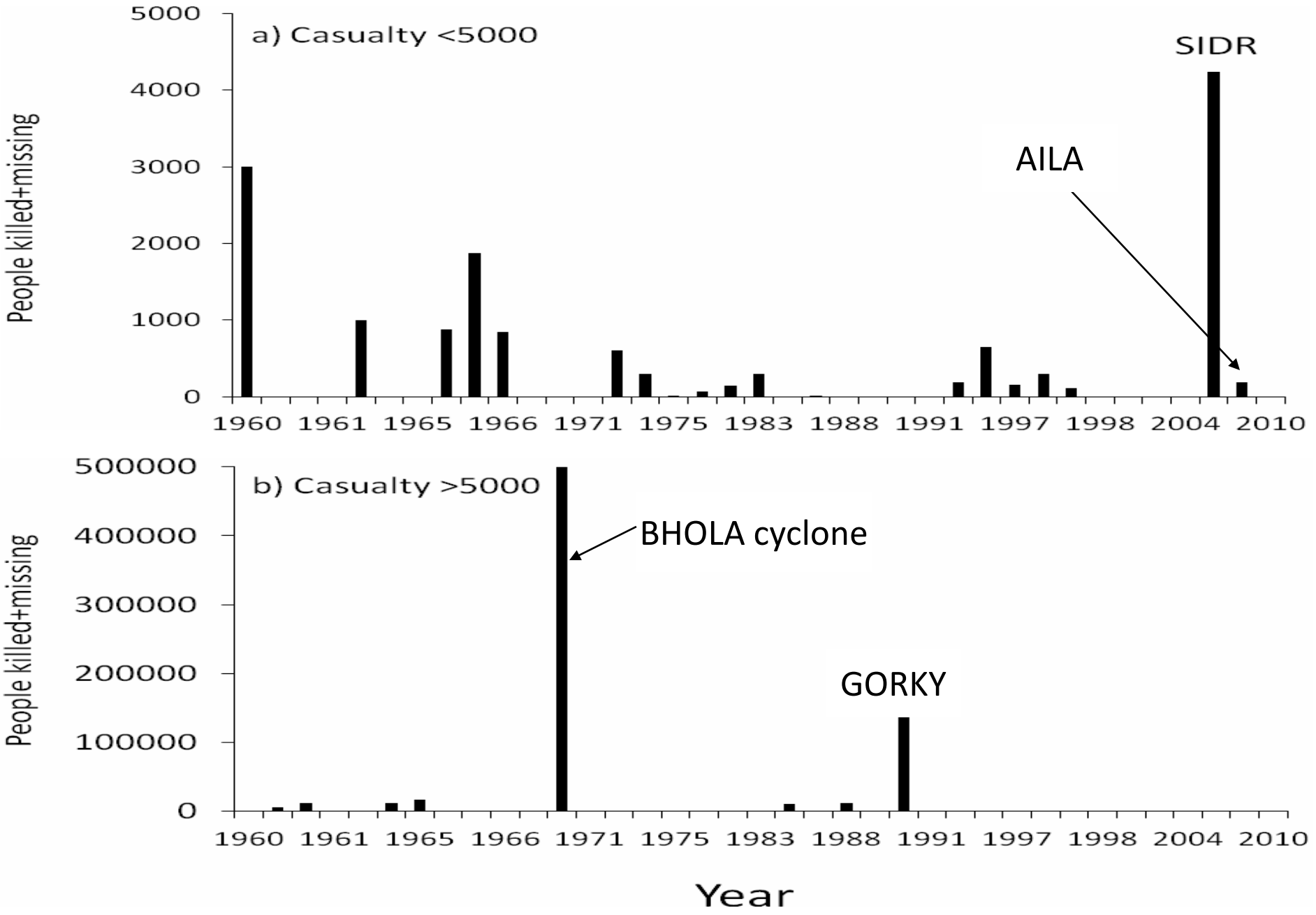
Number of (upper) cyclonic hit in Bangladesh coast over last 50 years from 1961, and the time (lower) required for a cyclone.

Temporal distribution of sea cyclone hit in Bangladesh since 1960 to date



About 36% of total cyclone struck during pre-monsoon season and 64% at post monsoon. Source: BMD.

Human casualty due to historic cyclone from 1960 in Bangladesh



Some great devastations from historical cyclonic hits in Bangladesh coast

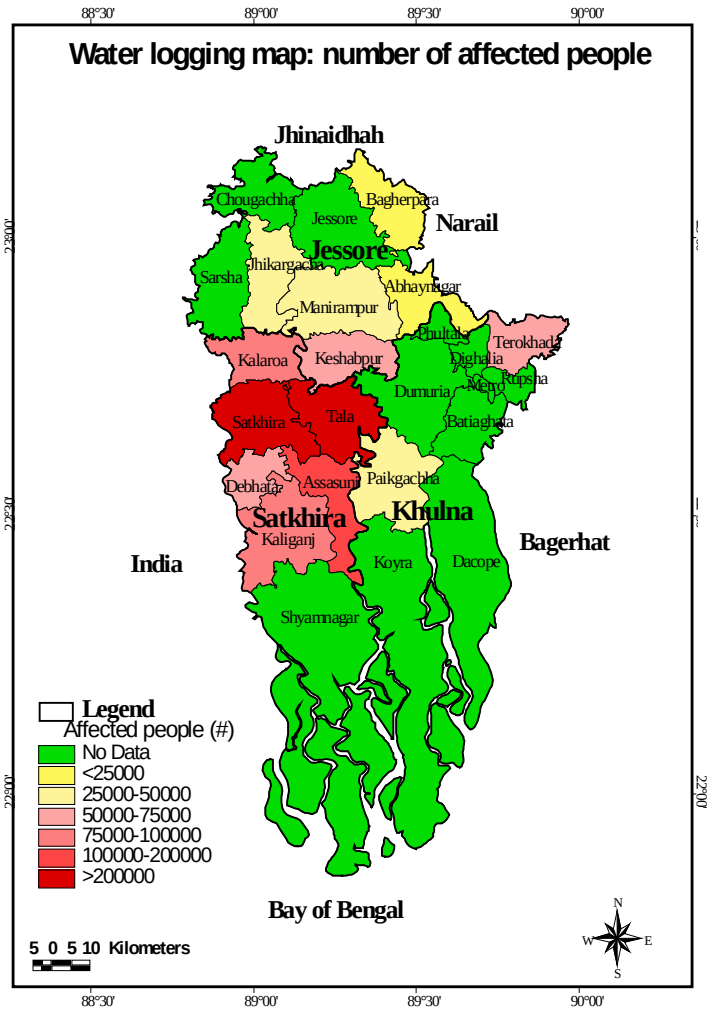
BHOLA cyclone (12 November 1970); toll 500,000

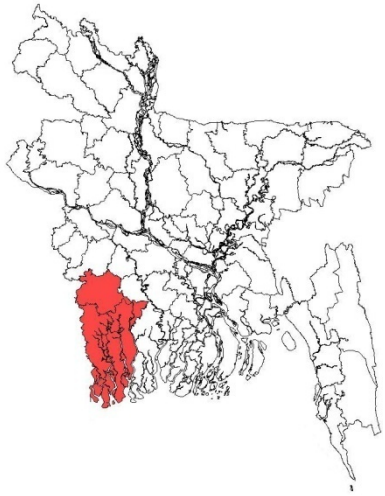
GORKY (29 April 1991); toll 150,000

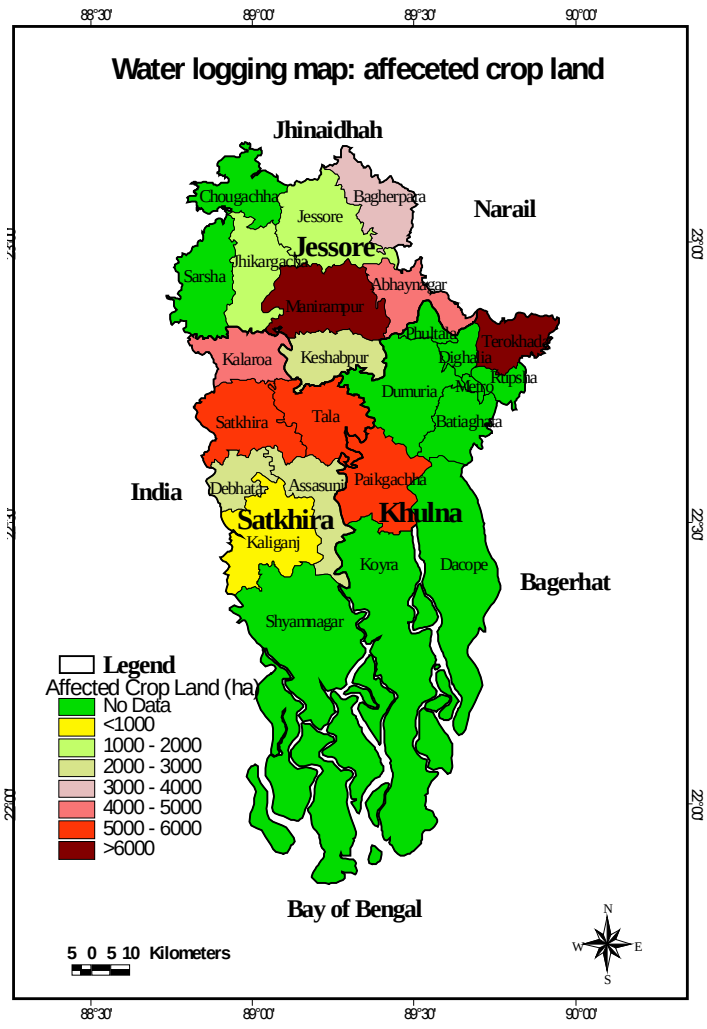
SIDR (15 November 2007); toll 3,363

AILA (25 May 2009); toll 190

Water logging in South-West (SW) Bangladesh







Number of affected people and crop land from different Upazilas of Jessore, Satkhira and Khulna districts due to monsoon flooding and subsequent water logging in 2011. Data source: D-Form of respective district, visit to concerned local offices and unpublished reports.

Worst case scenarios due to prolonged/permanent (year round) water logging

Water logging in Tala Union, Satkhira

Water logging in Tetulia Union, Tala, Satkhira

Main cause of water logging – River bed siltation

Water logged District	Main silted up river
Satkhira	Kobadak, Betna
Jessore	Kobadak, Vadra
Khulna	Ataharobaki, Chitra

Silted up Kobadak river in Satkhira

Salinity

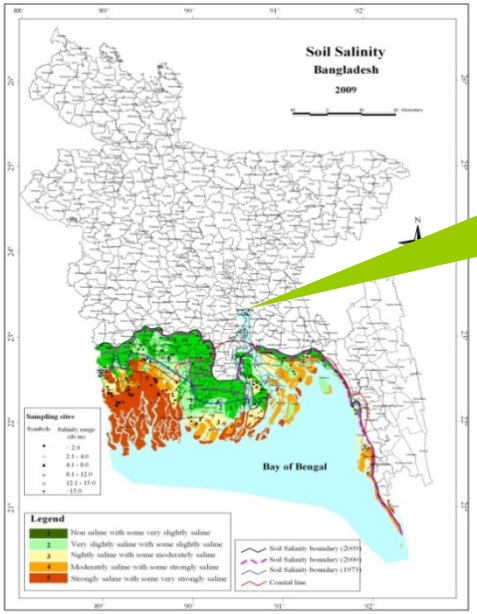
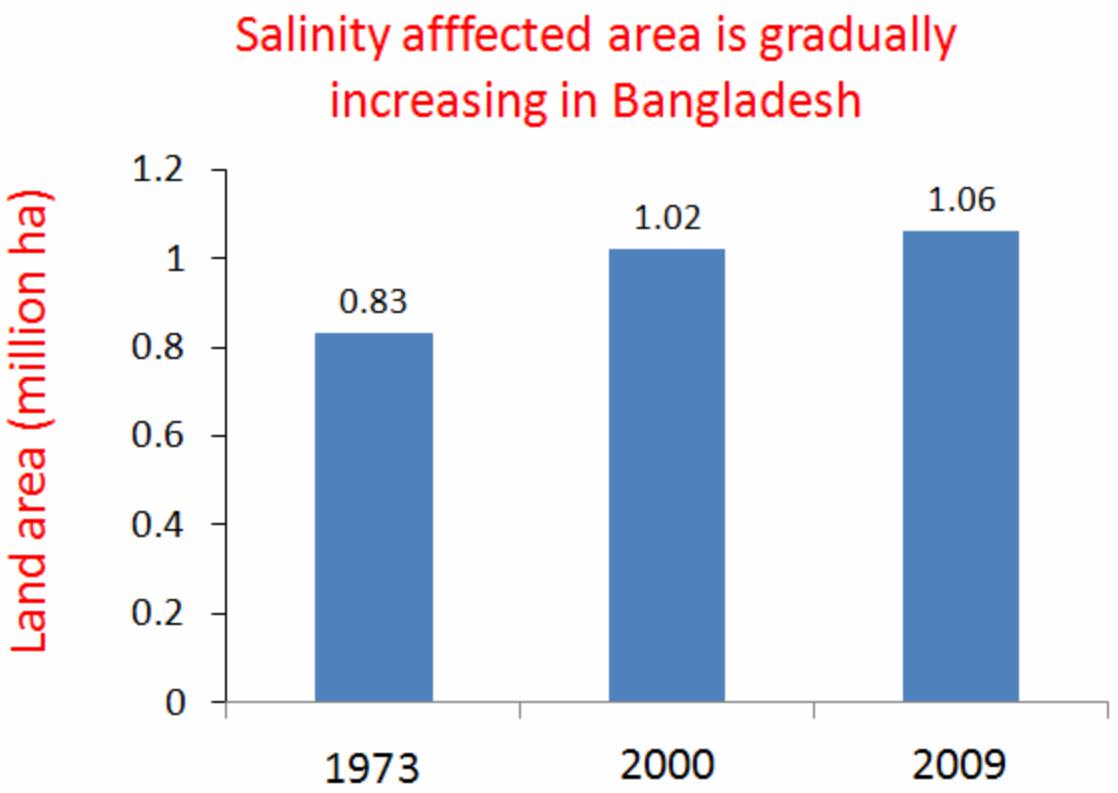


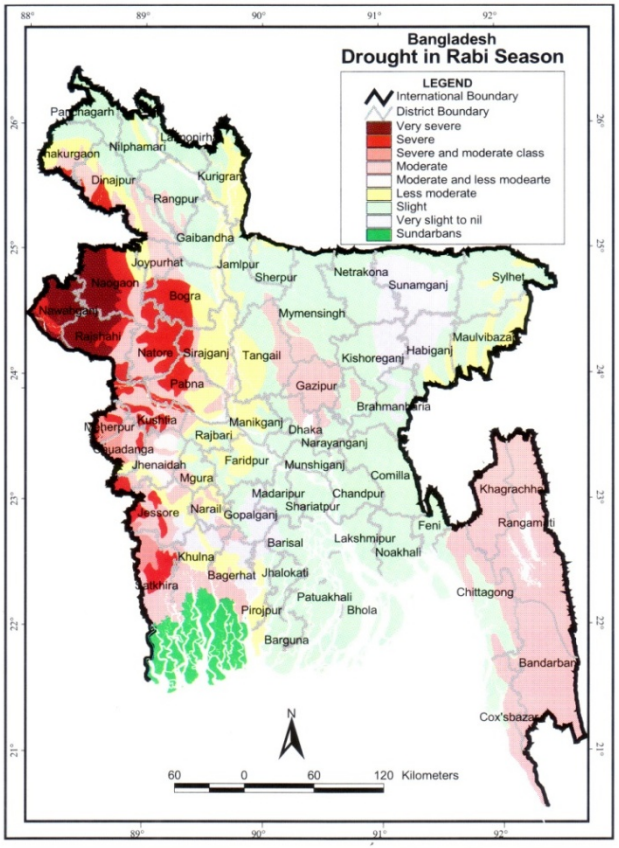
Fig. Changes of salinity prone areas from 1973 to 2009.

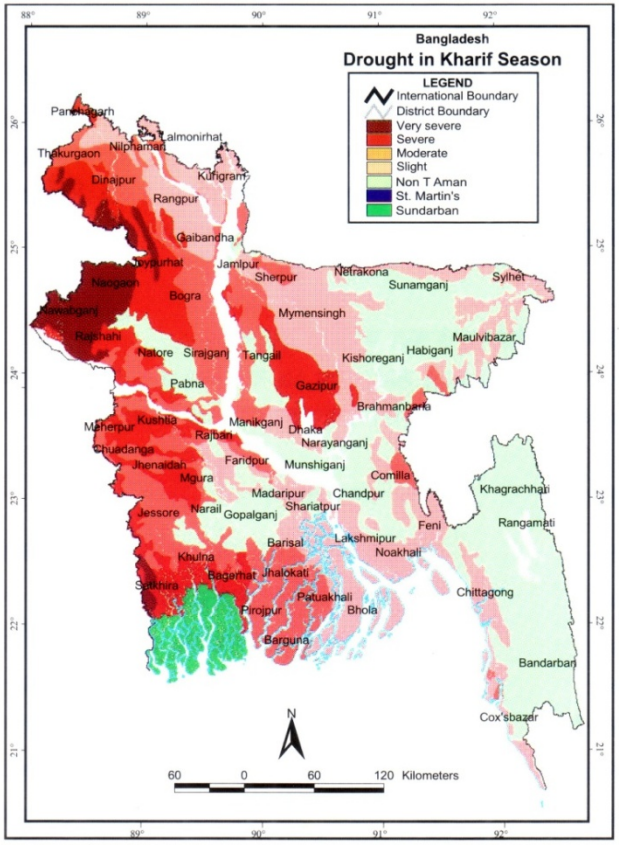
Photograph: Land remains fallow till the harvest of T. Aman due to salinity and soil drying in Atolia, Shyamnagar, Satkhira (16 Feb 2012).

In dry season, saline water intrusion is occurred as much as about 100 km inside the Bangladesh from the Bay of Bengal along the tributary channels and rivers, and one third land area of Bangladesh is under tidal excursions

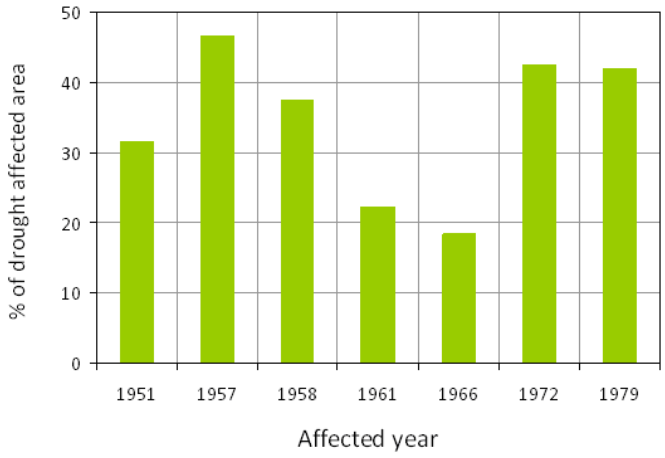


Drought



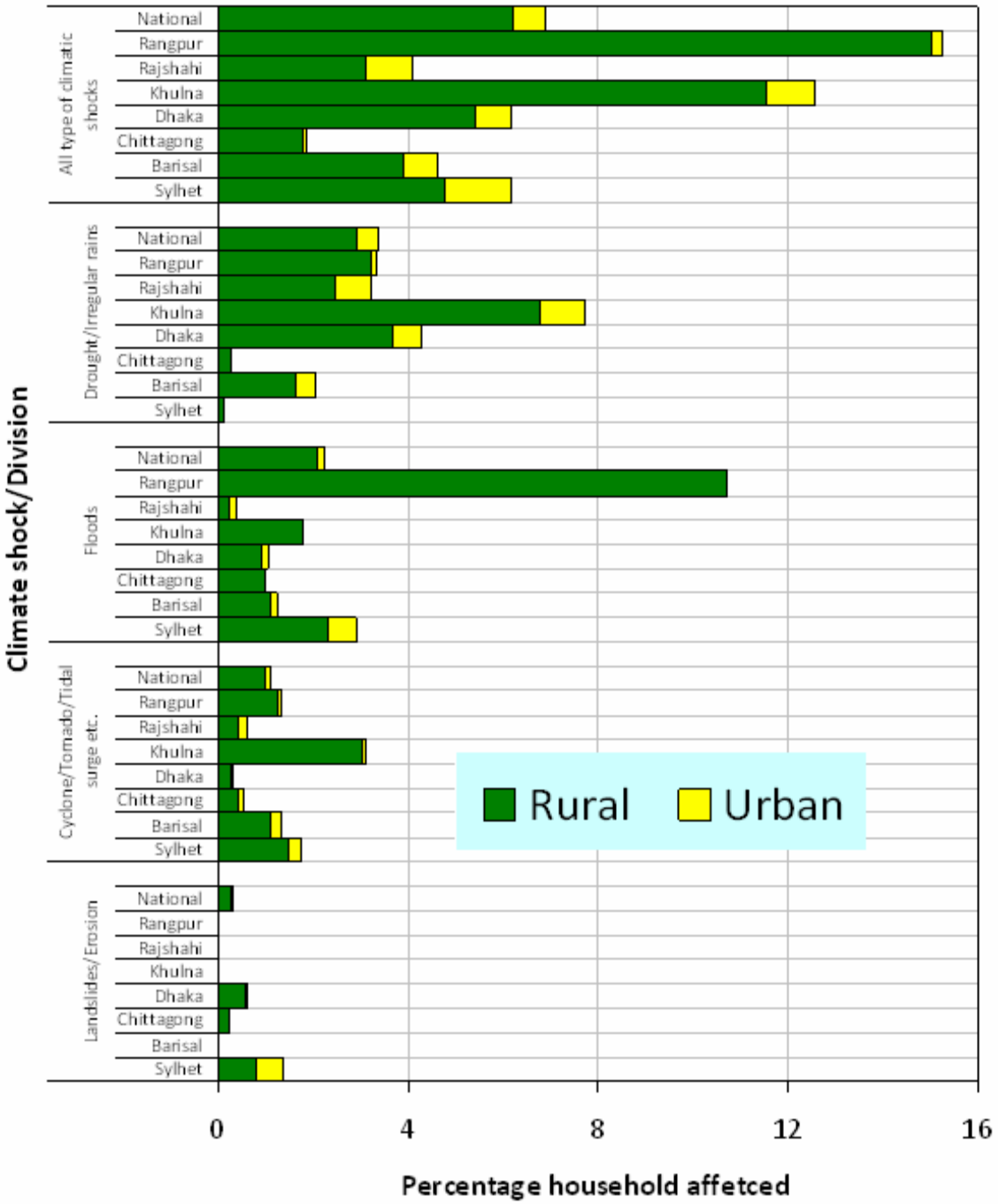


Meteorologically drought occurs when evapotrnaspiration exceeds the rainfall



Drought affected areas of Bangladesh

Effect of drought on growing rice crop



Division-wise people exposure to different type of climatic shocks

Rangpur division is most vulnerable to flood & Khulna division for erratic rain or cyclone (Survey year 2010)

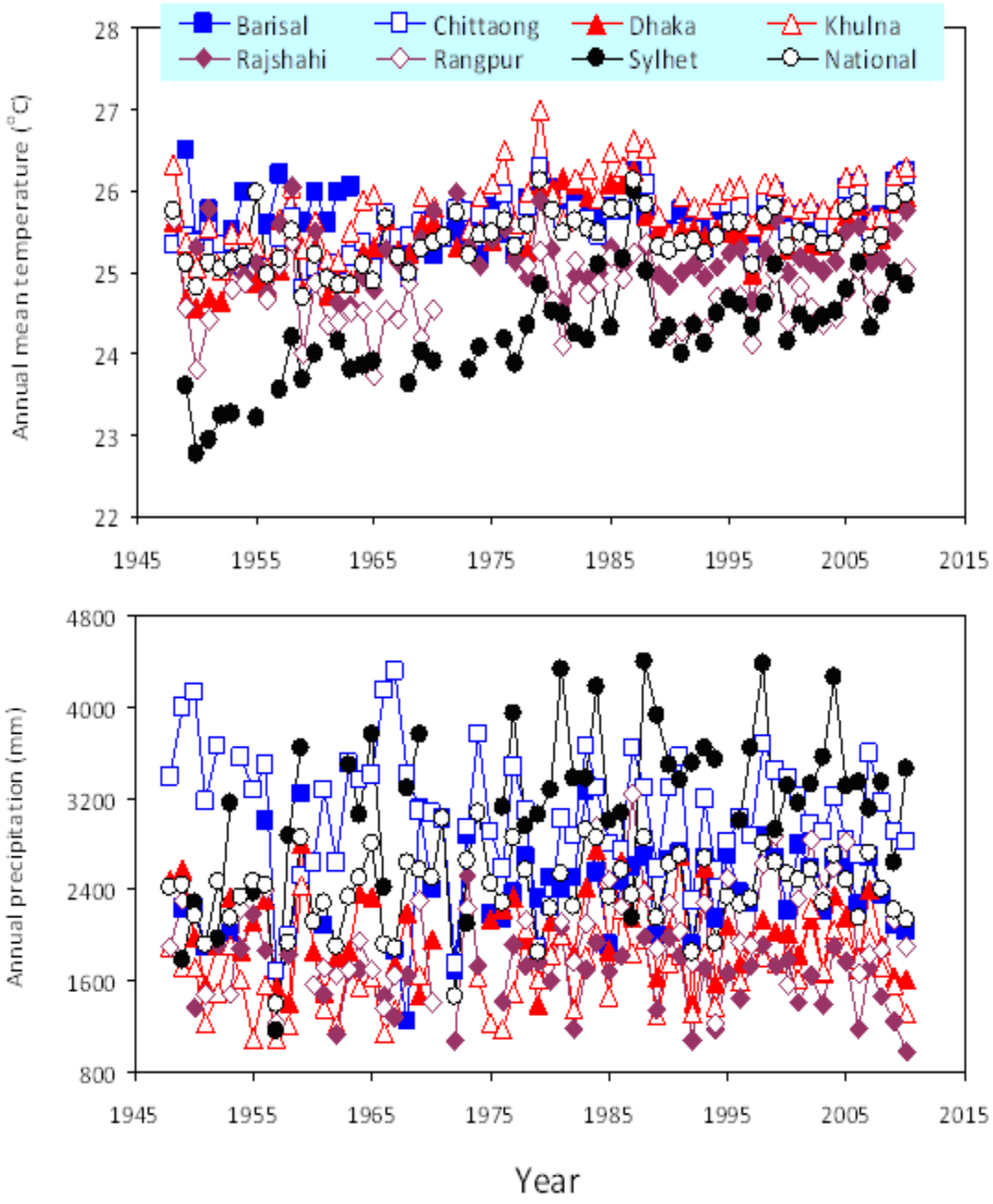
Percentage of rural and urban household experienced by different type of climatic shocks in the different divisions of Bangladesh (HIES 2010)

Table: Number of people[1] affected by the different type of climatic shocks in the survey year 2010 in Bangladesh (HIES 2010)

Division	Cyclone/Tornado/Tidal surge etc.		Drought/ Irregular rains		Floods		Landslides/ Erosion		All type of climatic shocks		
R/U	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Total
National	1,253,573	134,051	3,950,974	635,201	3,038,659	141,476	421,189	70,232	8,542,129	956,138	9,498,267
Barisal	92,199	16,763	134,107	33,527	92,199	8,382	-	-	318,504	58,672	377,176
Chittagong	127,690	25,538	76,614	-	280,918	-	63,845	-	497,991	25,538	523,529
Dhaka	132,152	13,215	1,717,978	290,735	436,102	52,861	277,520	13,215	2,537,321	356,811	2,894,132
Khulna	476,065	8,656	1,055,999	147,147	276,983	-	-	-	1,800,392	155,803	1,956,195
Rajshahi	81,256	34,824	452,711	139,296	46,432	23,216	-	-	568,791	185,728	754,519
Rangpur	195,966	12,248	502,162	24,496	1,677,955	-	-	-	2,351,587	36,744	2,388,331
Sylhet	148,245	22,807	11,403	-	228,070	57,017	79,824	57,017	467,543	136,842	604,385

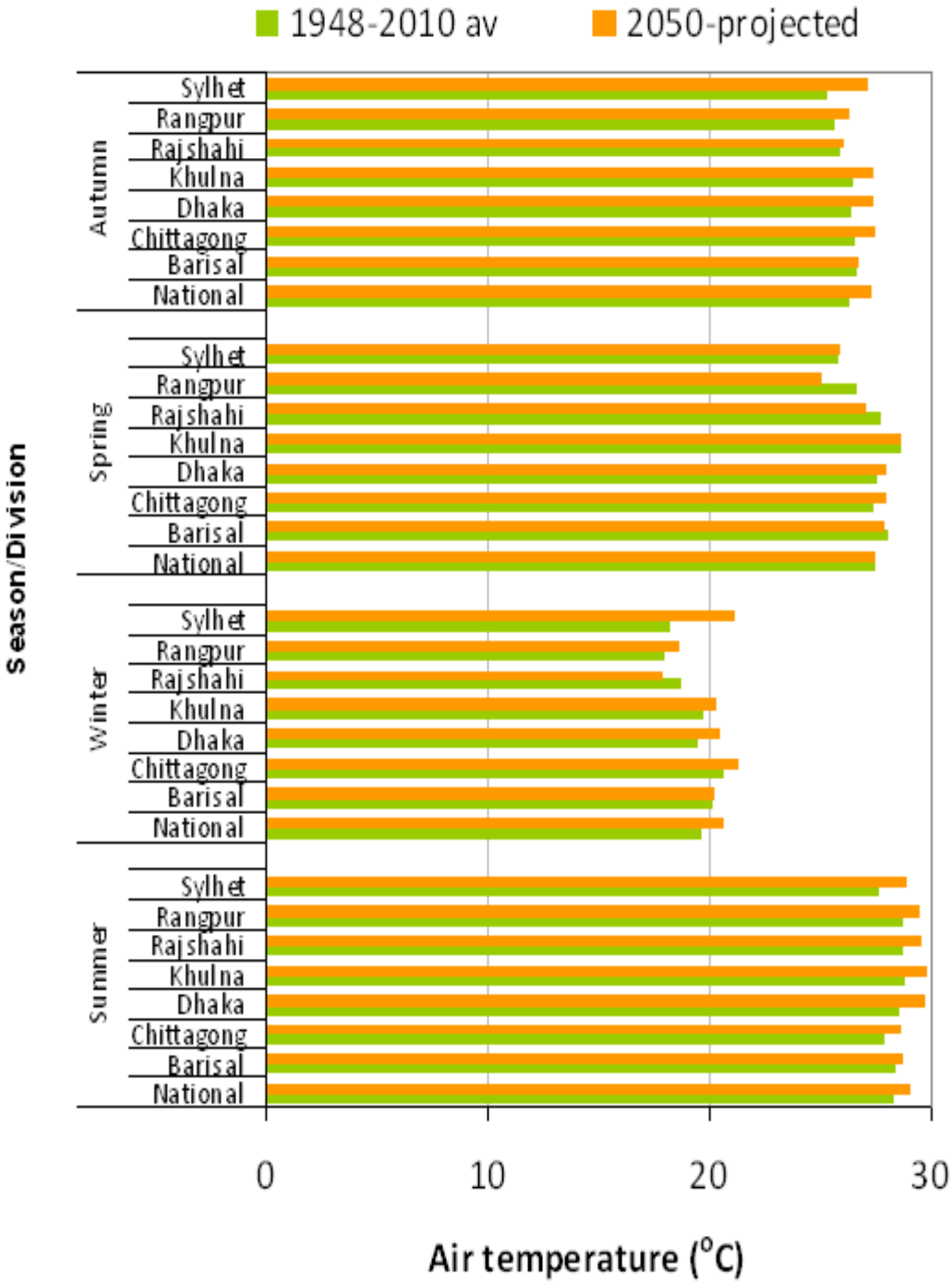
[1] Estimation based on the Population Census 2011 (Provisional).

Temperature and rainfall pattern with time in Bangladesh



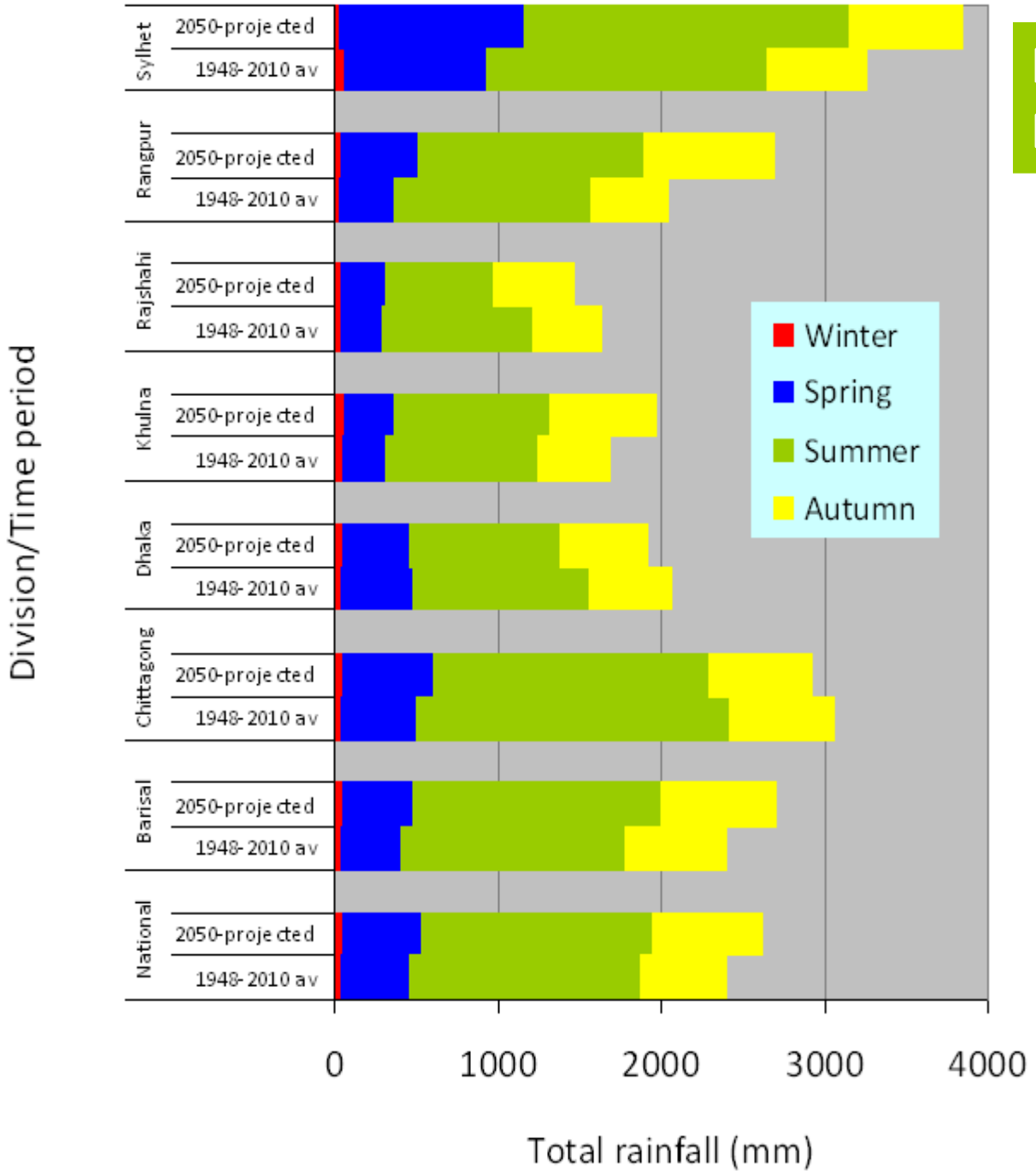
Division-wise pattern

Climate change projection in Bangladesh

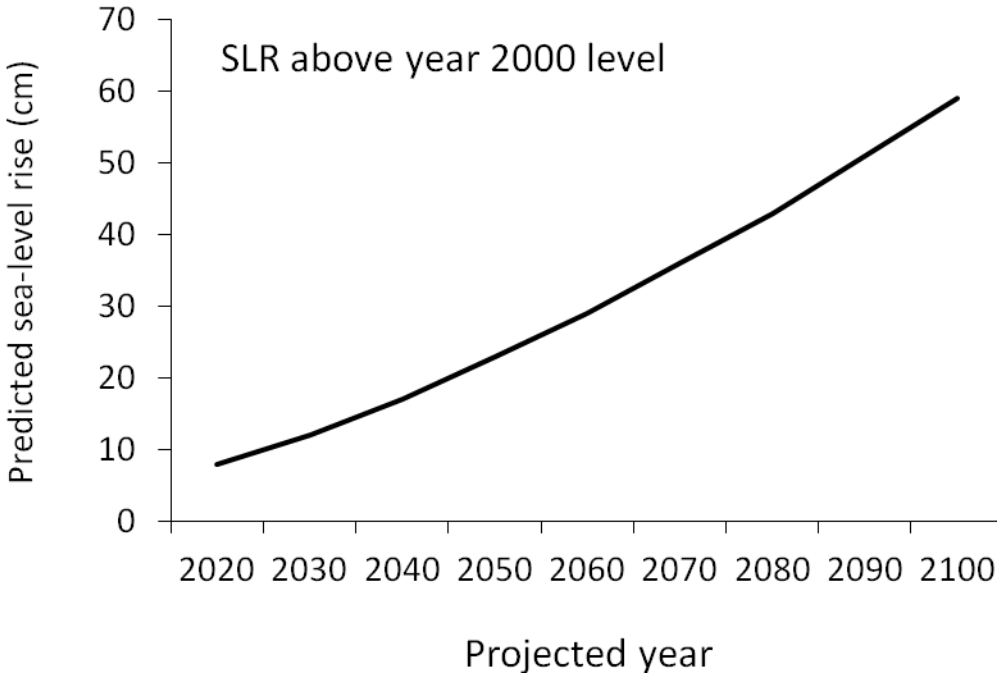


Temperature projection

Rainfall projection in Bangladesh



Sea level rising



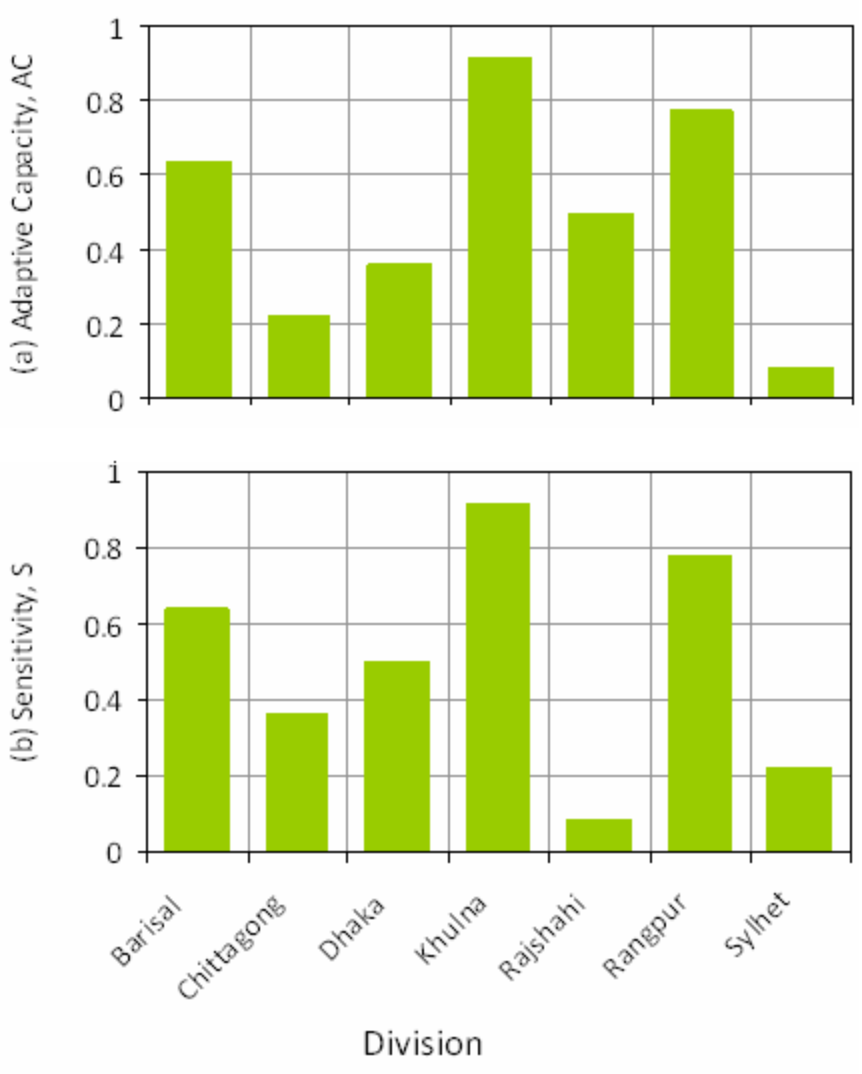
Climate projection summary for Bangladesh

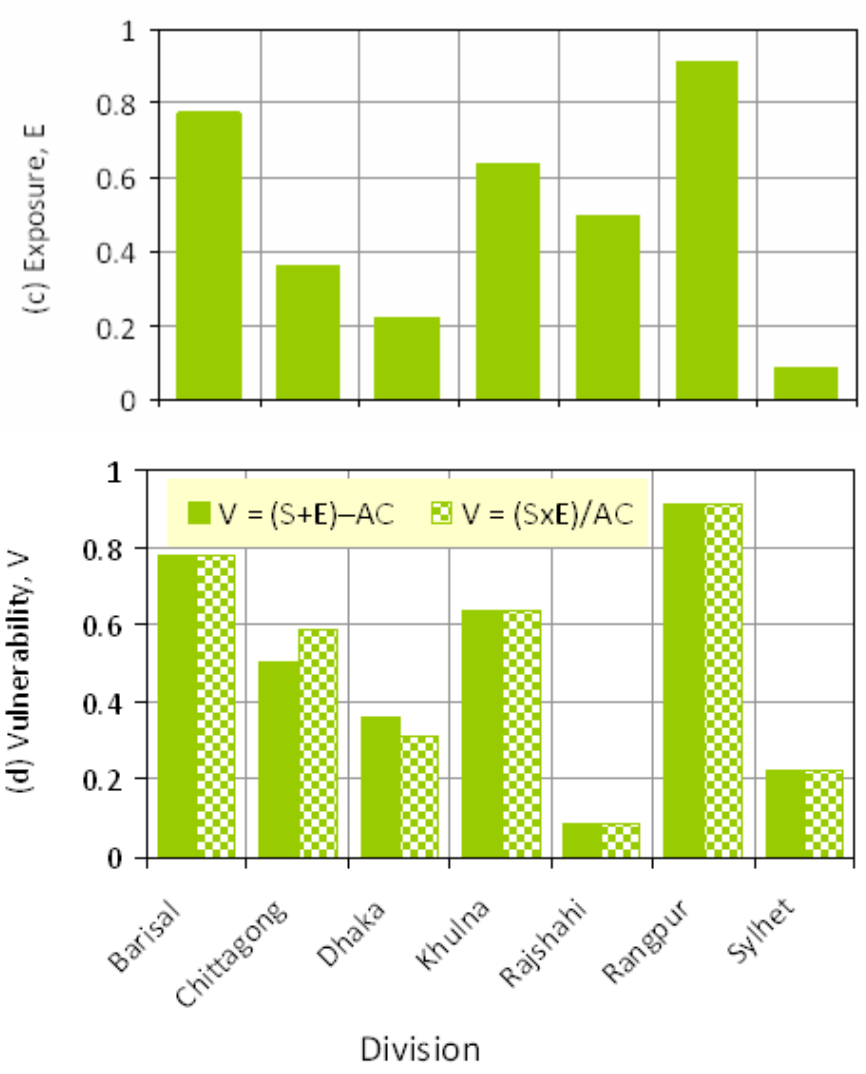
Projected year	Temperature change (°C)			Precipitation change (%)			Sea level rise, SLR (cm)
	Annual	DJF	JJA	Annual	DJF	JJA	
2030	1.0	1.1	0.8	5	-2	6	14
2050	1.4	1.6	1.1	6	-5	8	32
2100	2.4	2.7	1.9	10	-10	12	88

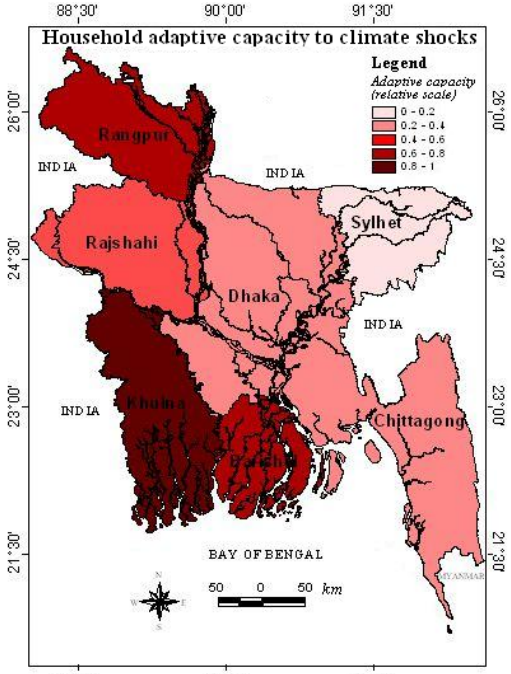
Source: Adopted from Agarwala et al. (2003), IPCC (2001) TAR

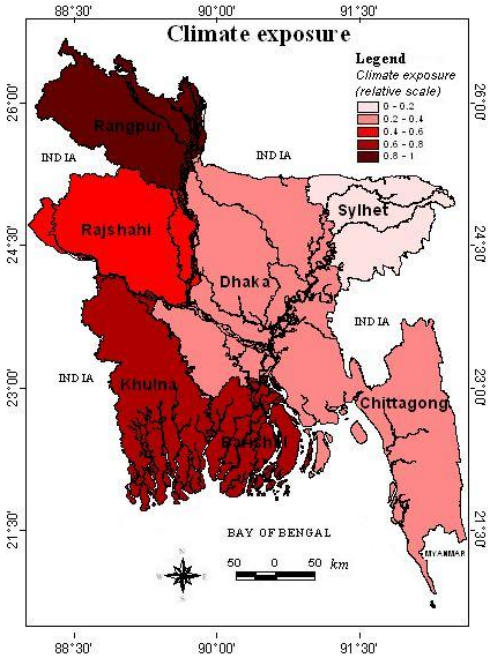
Model output for measuring vulnerability

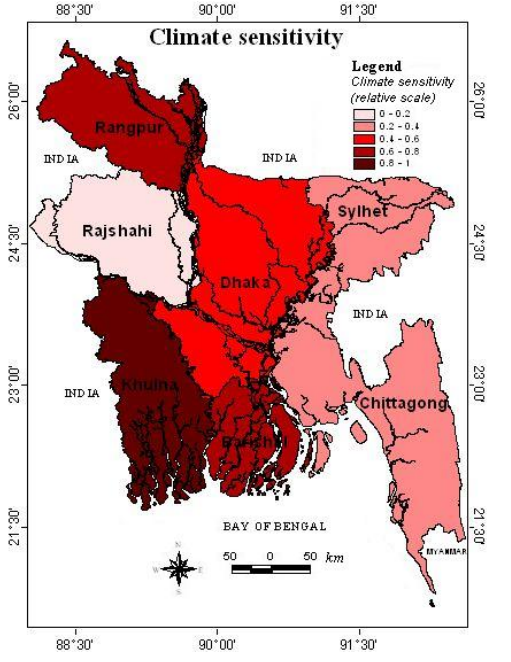
Adaptive capacity, sensitivity, exposure & vulnerability due to climate change in Rural Bangladesh

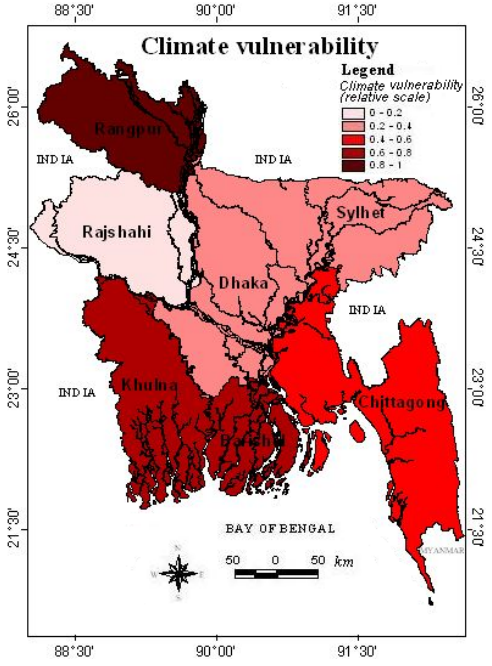












Vulnerability mapping

Khulna division:

- Higher adaptive capacity & climate sensitivity
- Moderate to higher vulnerability

Rangpur division:

-All index are medium to higher

- Higher vulnerability

Sylhet division:

-All indices are lower to moderate

- Moderate vulnerability

Strategy/policy to reduce vulnerability

Components	Direction of change
Adaptive capacity	Increase
Sensitivity	Decrease
Exposure	Decrease

Improvement of *Adaptive Capacity/Resiliency*

Responsibility	Promotion of
Household	Income, house quality, remittance, microfinance activity, school enrollment, literacy rate, alternative livelihood options (handicrafts, poultry/cattle rearing, plant nursery, aquaculture etc.), on standby during disastrous time with food, fuel and saving etc.
Community	Awareness to disaster and its preparedness training, security of livestock and food storage system, cooperative society, protection of dam/embankment, and cottage industries at local level (like tailoring, bamboo and cane, jute goods, earth goods, jewelries etc.)
State	Road, bridge, culvert, public transportation, educational institutes, hospital/health service, cyclone/flood protection centre or boat shelter for fisher man, poverty reduction, *social safety net service*

Reduction of *Sensitivity* to climate change

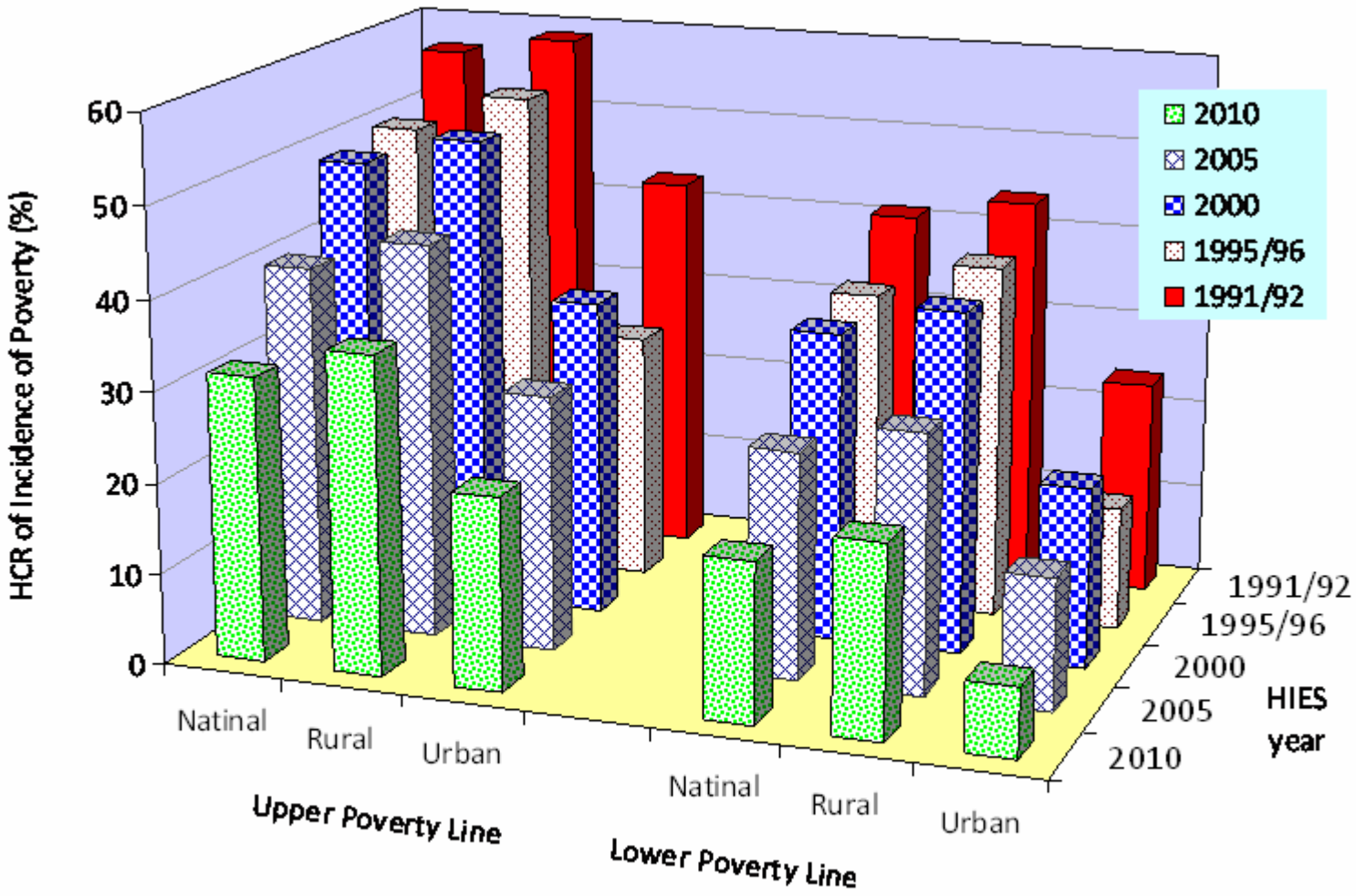
Extreme event	Means of reduction
Flood	Construction of strong embankment with adequate sluice gate and modern flood protection centre, river or canal dredging/de-siltation
Cyclone	Establishment of strong embankment with adequate sluice gate, modern cyclone centre with coastal design, multi-layered green belt with monocotyledons tree
Water logging	Elevating the *beels*, roads, homestead, institutes etc.
Salinity	Inhibit the intrusion of saline water from sea by strong coastal embankment, proper management of sluice gates, rain water harvest
Drought	Construction of water reservoirs, excavation or re-excavation of ponds, channels/canals, ditches, mini-pond; rain/flood water harvest

Reduction of *Exposure* to climate change

Climatic event	Means of reduction
Flood	Introduction of early/short duration (e.g. BRRI-33, BINA-7 etc. for rice) and submergence tolerant (e.g. BRRI-42, 43. BINA Shail etc. for rice) or tall statured/deep water (e.g. local aman rice) crop varieties, floating agriculture (e.g. vegetable production, seedling production etc.), encourage of water tolerant tree species
Cyclone	Early harvest with early planting or with short duration varieties, plantation of water and storm resistant tree like coconut, palmyra palm, date palm etc.
Water logging	Alternation in livelihood (i.e. from crop to fish or ducks), floating agriculture, encourage of existing water-logged tree species
Salinity	Coastal zoning e.g. rice and/or shrimp production zone, adjustment of crop rotation, cultivation of salinity tolerant crops (cowpea, mung bean, sunflower etc.) or varieties (e.g. BRRI-47 for rice)
Drought	Cultivation of C4 crops with high water use-efficiency (hence little water user like maize), cultivation of wheat or pulses instead of *Boro* rice in dry season, introduction of drought/heat resistant or drought escaping (BRRI-33; short duration 118 days, hence drought escaper) varieties

Social Protection in Bangladesh

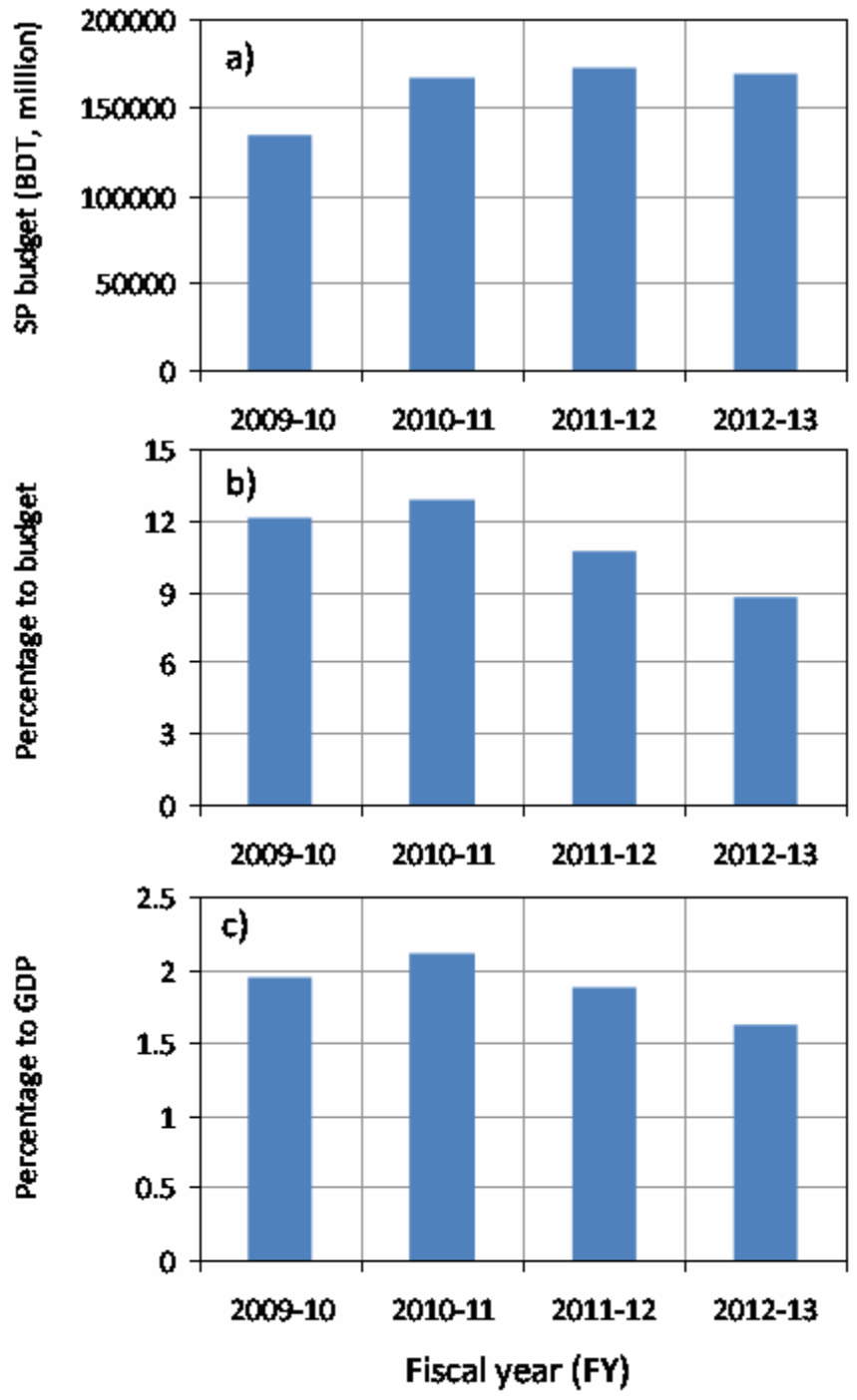
Poverty profile with time in Bangladesh



Despite impressive gains in poverty reduction in the last decade, the poor still accounted for 35% (UPL) of the rural population in 2010

Head Count Rate (HCR) incidence of poverty (CBN method), HIES 1991/92 to 2010. Source: BBS (2011a). HIES: Household Income & Expenditure Survey

Social protection financing in Bangladesh



Although the budget for social protection is slowly increased, however, its allocation to national budget and GDP is gradually decreased

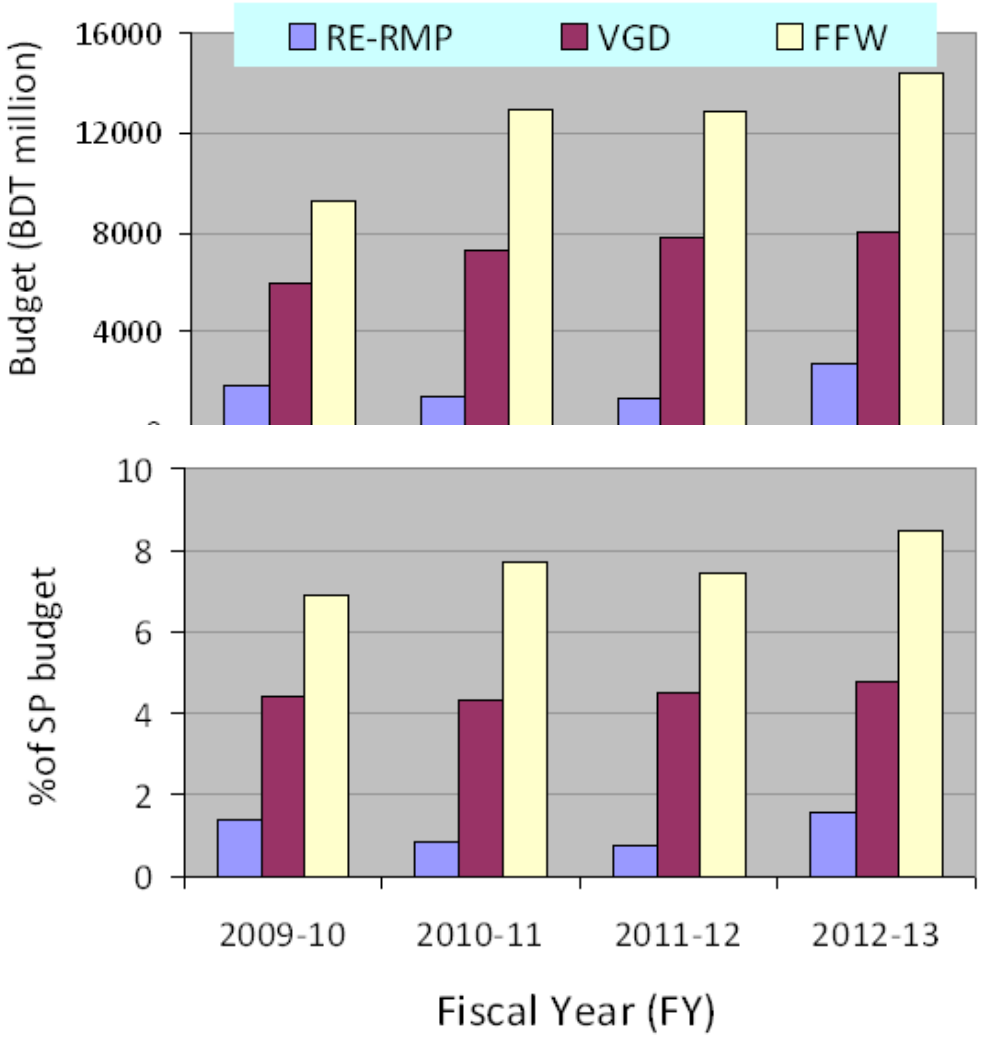
Budget of SP/social protection (a) and its allocation to national budget (b) and GDP (c). Source: Budget document, Ministry of Finance, GoB.

Social protection intervention in Bangladesh

To save the poor/hunger/disadvantaged groups Bangladesh has more than 30 public social safety net programmes. However, most largest tools are-

-	VGD = Vulnerable Group Development
-	RE-RMP = Rural Employment- Rural Maintenance programme
-	FFW = Food-For-Work
-	CLP = Char Livelihood Programme

Programmes Budgeting



CLP's budget

1st Phase (2004-2010)	DFID : £50 million GoB : BDT 100 million
2nd Phase (2010-2016)	DFID : £70 million AusAid : £8.235 million GoB : BDT 140 million

Constraints, effectiveness and scale-up potentialities of major social safety net programmes in Bangladesh

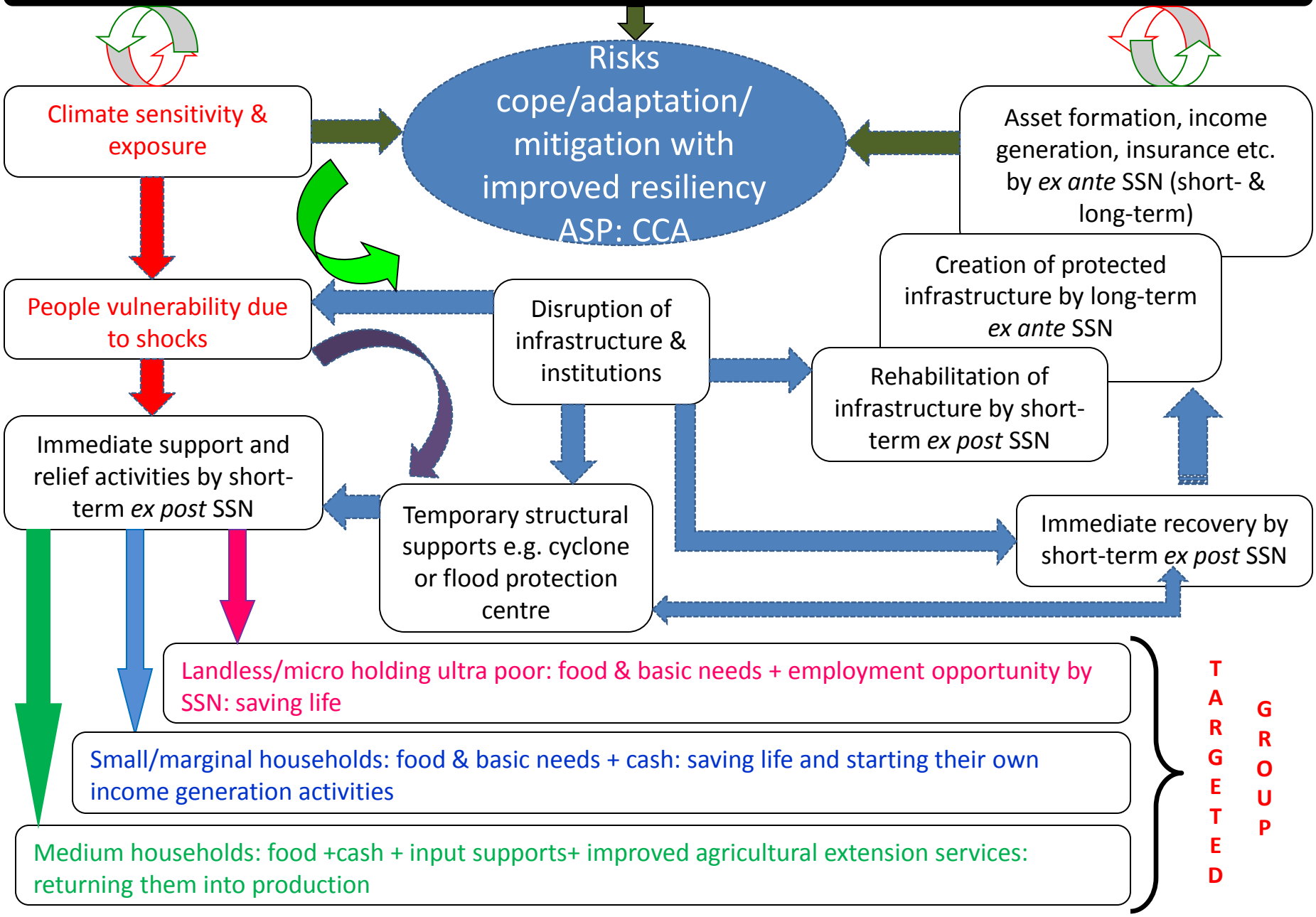
It is identified that most social safety net programmes operating by the Government of Bangladesh have some limitations either in institutional or in operational capacity which should have to scaled up in order to (refer to paper for details):

-	Serve the real hunger/poor;
-	Reduce the system loss/leakage;
-	Reduce unusual administrative intervention;
-	Enhance environmental protection;
-	Increase the employment opportunity/ household income;
-	Increase the climate-resiliency/CCA

In all fairness we need a model for *adaptive social protection* (ASP) through better integration/coordination among the three domains: social safety net (SSN), disaster risk management (DRM) and climate change adaptation (CCA)

What is that model?

ADAPTIVE RESEARCH ON CLIMATE CHANGE AGENDA



Proposed conceptual model/analytical framework for integrating CCA, SSN and DRM in Bangladesh

Thank you

Acknowledgment

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