Session V: What Loss and Damage related lessons can we learn from recent extreme events?

Year 2012: Some Issues related to Loss and Damage in Bangladesh

Professor Ainun Nishat

BRAC University

Framework used in this presentation

- This presentation will focus on some of the weather related incidents that happened in Bangladesh, in 2012, that may possibly be identified as adverse impacts of climate change.
- These events may be analyze under "Loss and Damage" as being recognized under currently used parlance in "Climate Change Talks".

Definition of loss and damage

- Agreed definition of the term 'loss and damage' is yet to emerge;
- Included in Bali Action Plan in 2007; Cancun Adaptation Framework (2010) established a work programme to consider approaches to address loss and damage associated with climate change……..;
- In Durban in 2011, SBI identified three thematic areas for implementation of the work programme :
  - assessing the risk of loss and damage,
  - a range of approach to address loss and damage, and
  - the role of the Convention in the implementation of approaches to address loss and damage associated with the adverse effects of climate change.

What does it mean?

The Cancun Agreement provides the boundaries:

- Impacts from extreme weather, and
- slow onset events

Loss and damage includes a **spectrum of climate change impacts** from **slow onset process** like sea level rise to **extreme events** like cyclones.

Addressing loss and damage means understanding these events and processes but there will always be uncertainty.

So what can we do?

- **Mitigate:** More effective mitigation means lessor level of adverse impacts and lower level of adaptation in future.
- **Adapt:** The more we adapt to climate change (as opposed to climate variability) the less loss and damage we shall have to address tomorrow.
- **Address residual loss and damage:** **W**e may be be able acheive complete elemanation of GHGs through mitigation, and adapt to everything so there will always be residual loss and damage (essentially what‘s left over) so we need to develop mechanisms today to address inevitable loss and damage tomorrow.

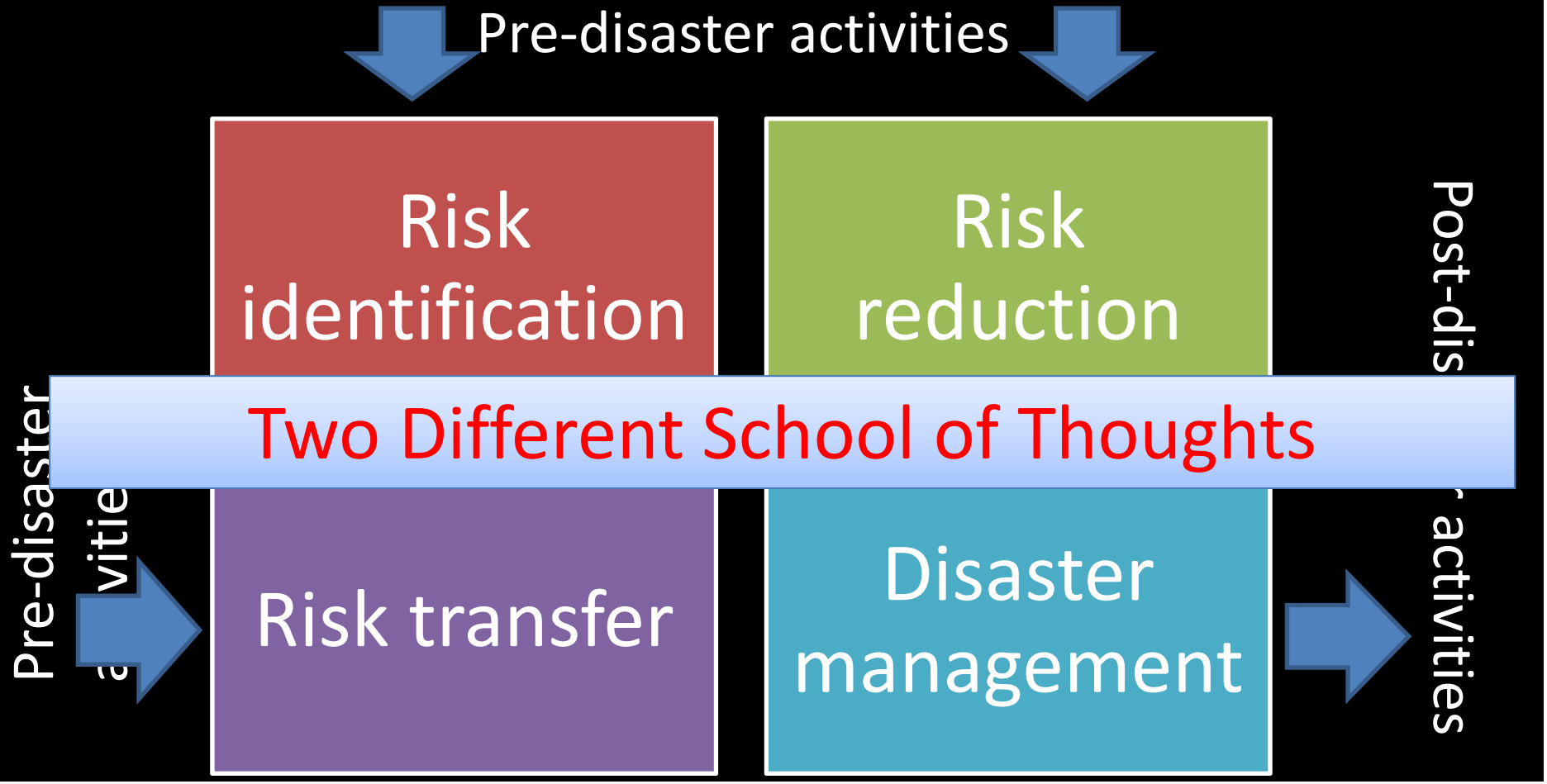
So we conceptualize!

- Loss and damage is beyond the level of adaptation for Rapid Onset Events (ROE).

- Loss and damage is impacts of Slow Onset Events (SOE) which in the long run may be critical in nature.

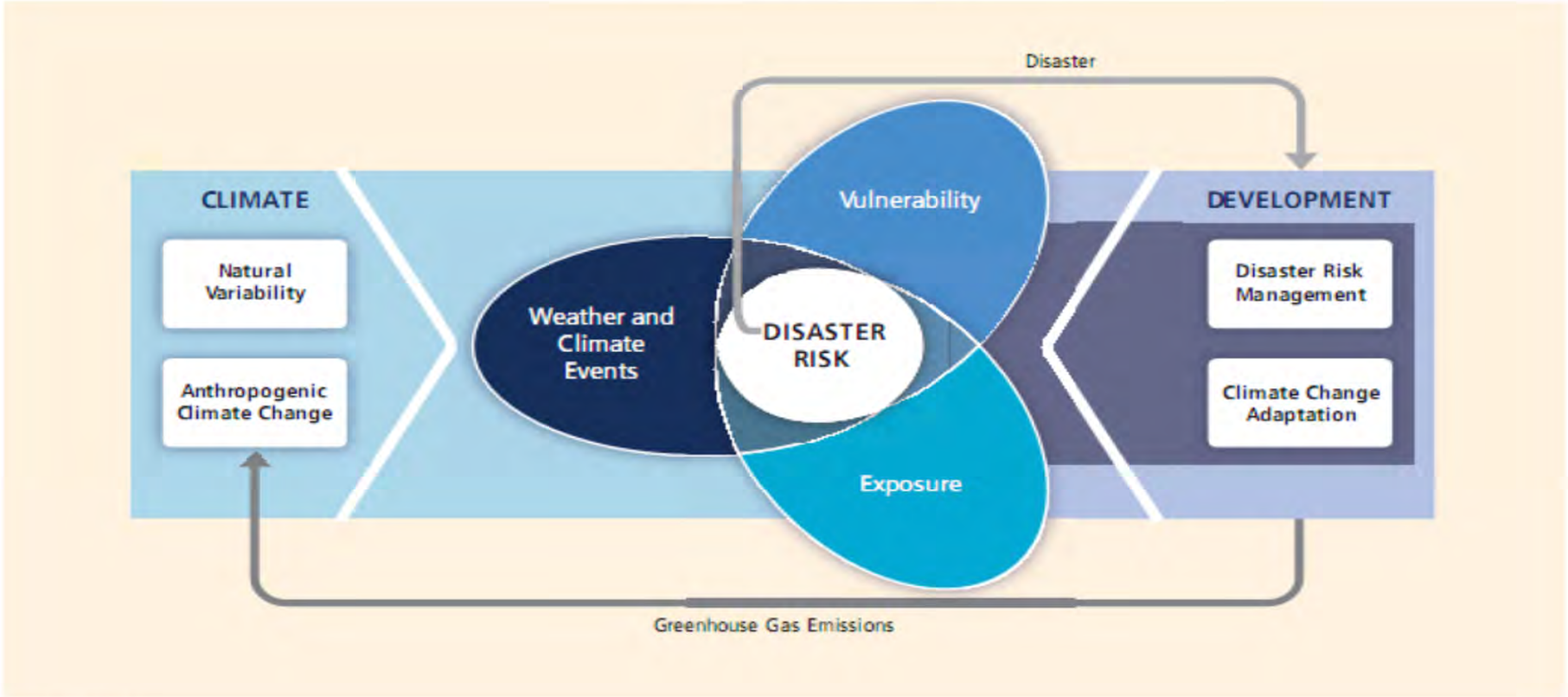
School of thoughts

- Four distinct public policies or components (objectives) (IDEA, 2005; Carreño, 2006; IDB, 2007; Carreño et al., 2007b)



Combination of DRR and CCA

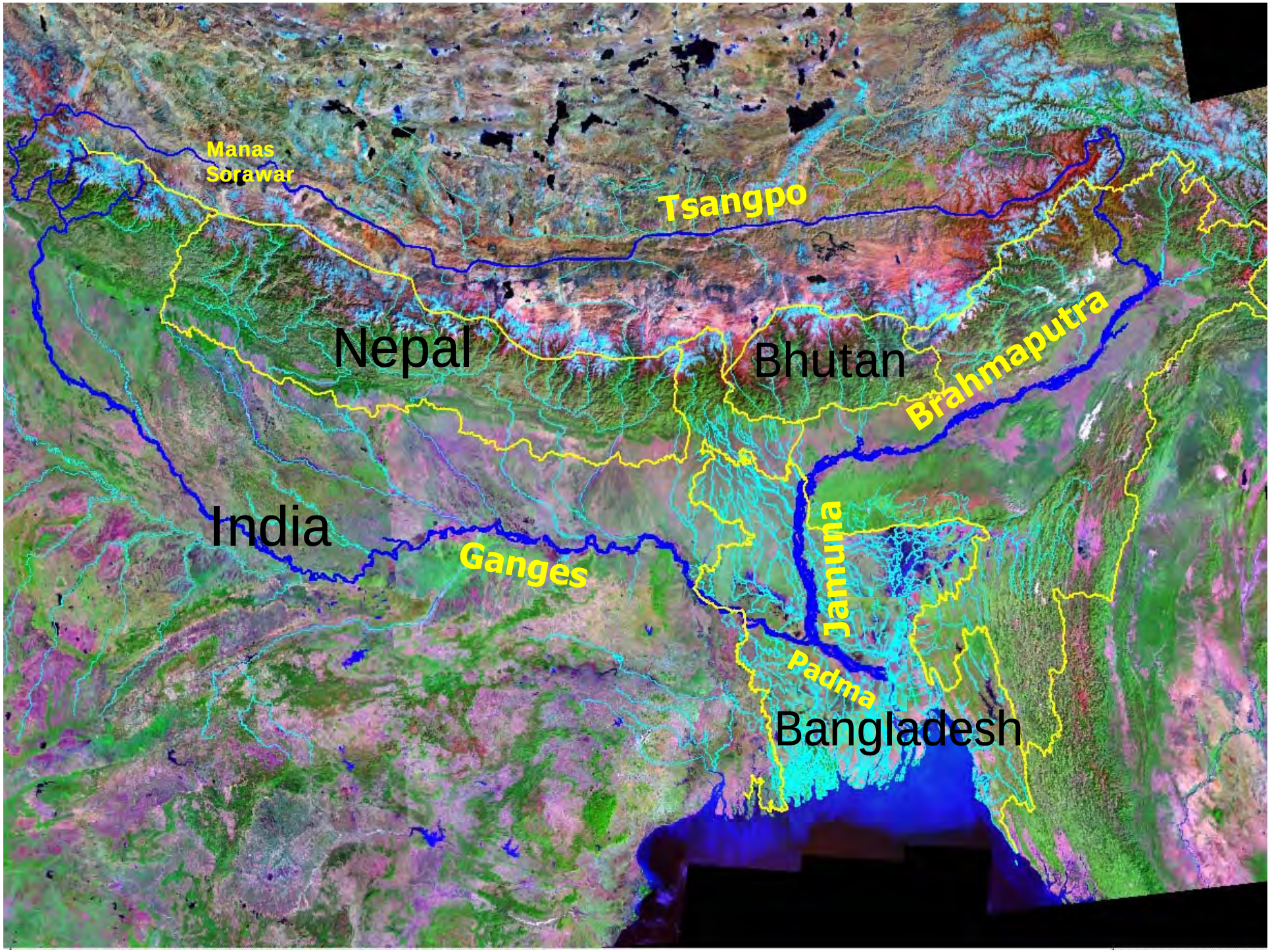
SREX SPM Graphics

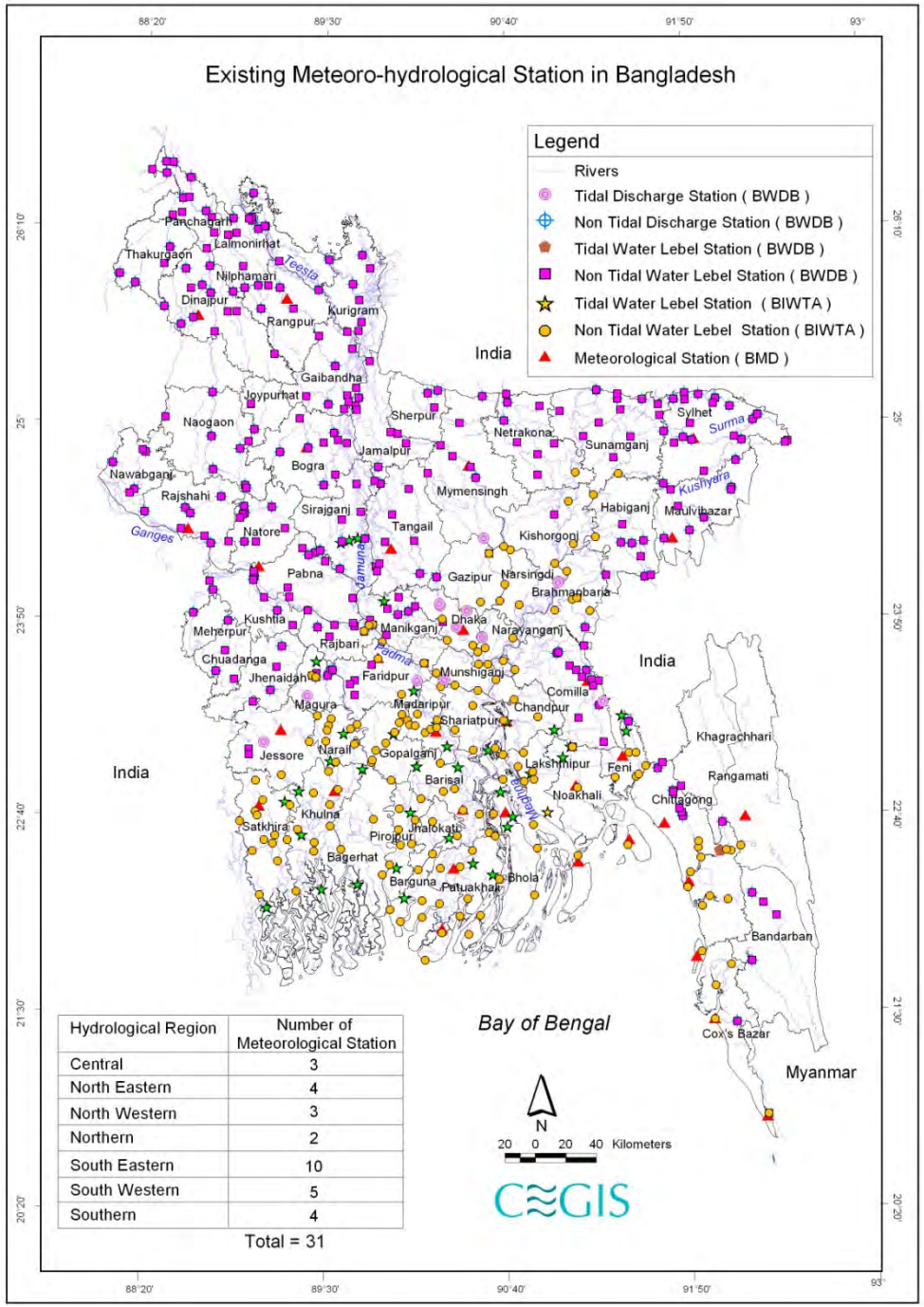


SPM. 1

(Source: IPCC, 2012)

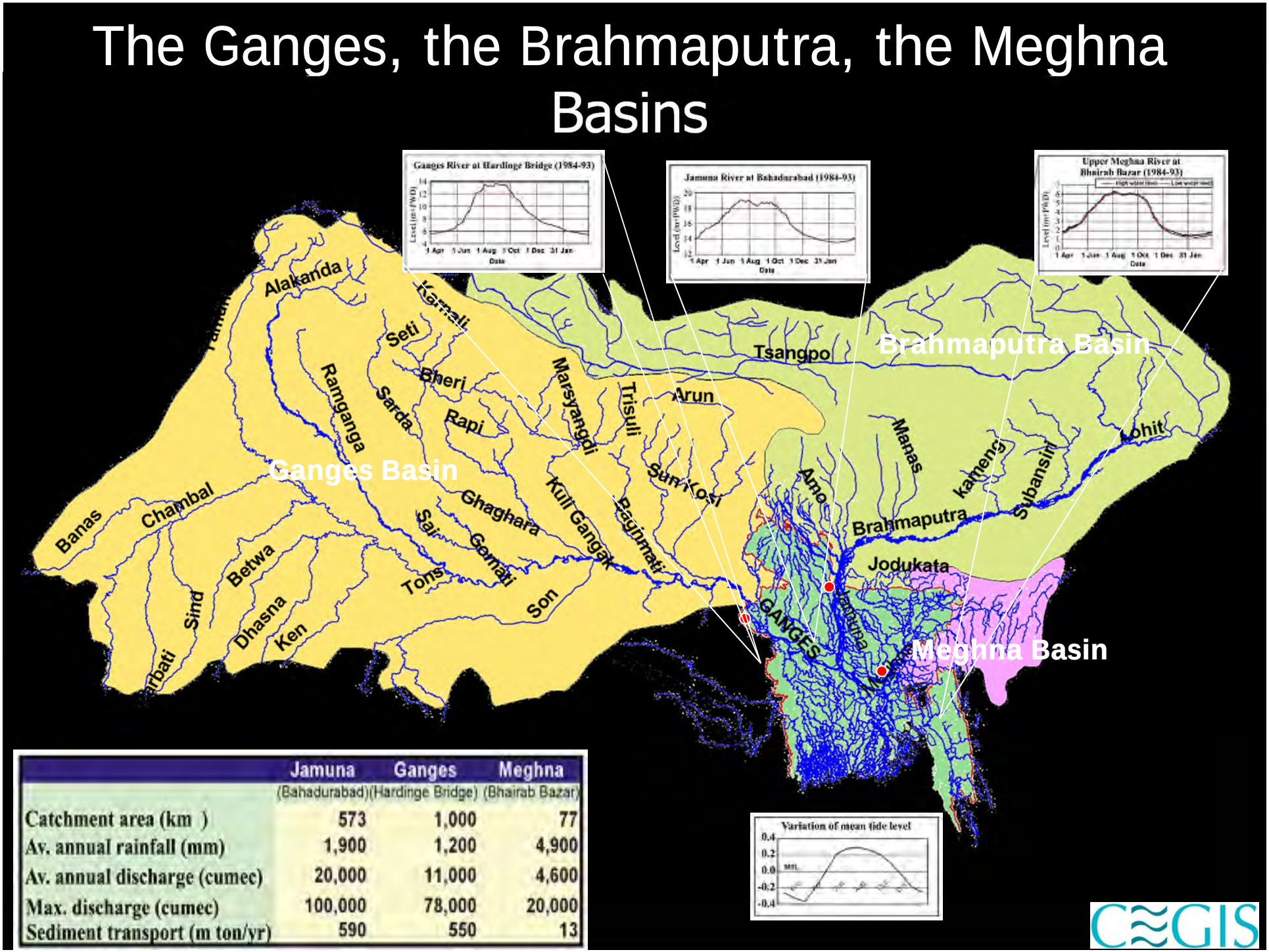
Loss and damage from the perspective of Rapid Onset Event : Flood of 2012


Manas
Sorawar
Tsangpo
Nepal
Bhutan
Brahmaputra
India
Ganges
Jamuna
Padma
Bangladesh



Monitoring stations of BWDB

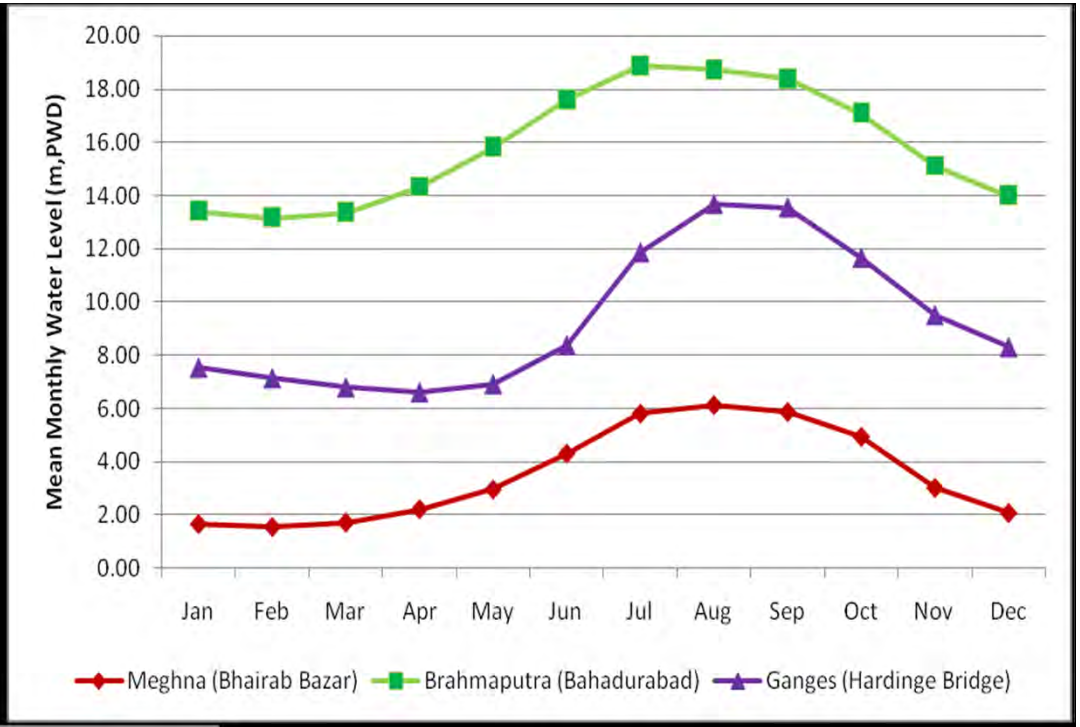
The Ganges, the Brahmaputra, the Meghna Basins

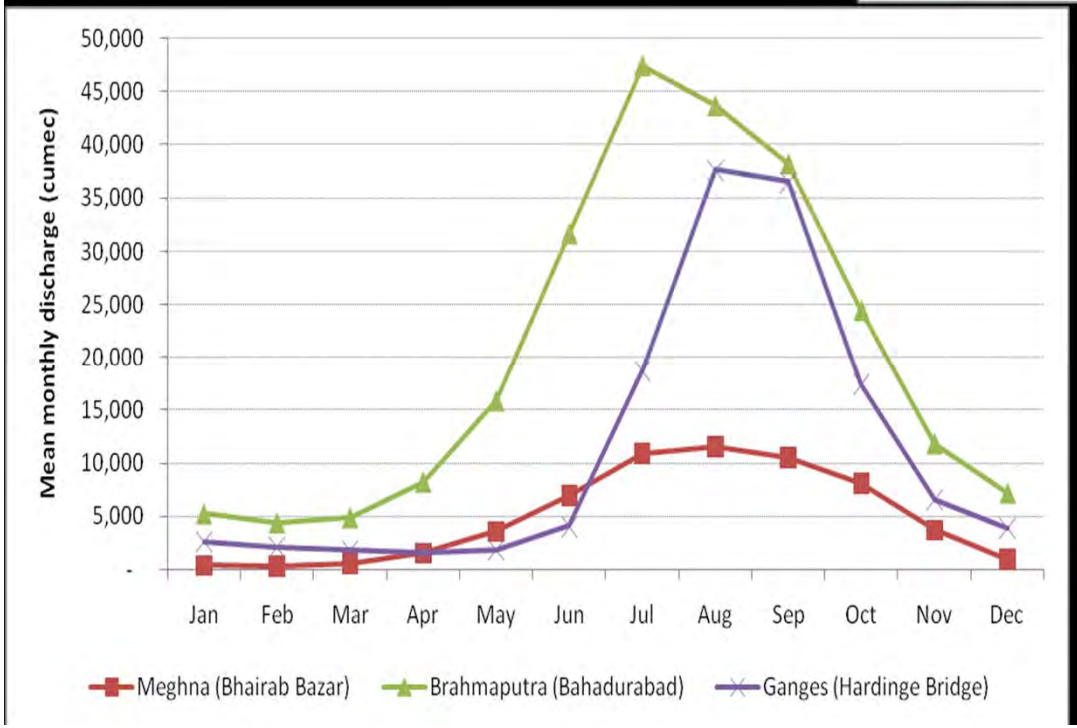


	Jamuna (Bahadurabad)	Ganges (Hardinge Bridge)	Meghna (Bhairab Bazar)
Catchment area (km)	573	1,000	77
Av. annual rainfall (mm)	1,900	1,200	4,900
Av. annual discharge (cumec)	20,000	11,000	4,600
Max. discharge (cumec)	100,000	78,000	20,000
Sediment transport (m ton/yr)	590	550	13

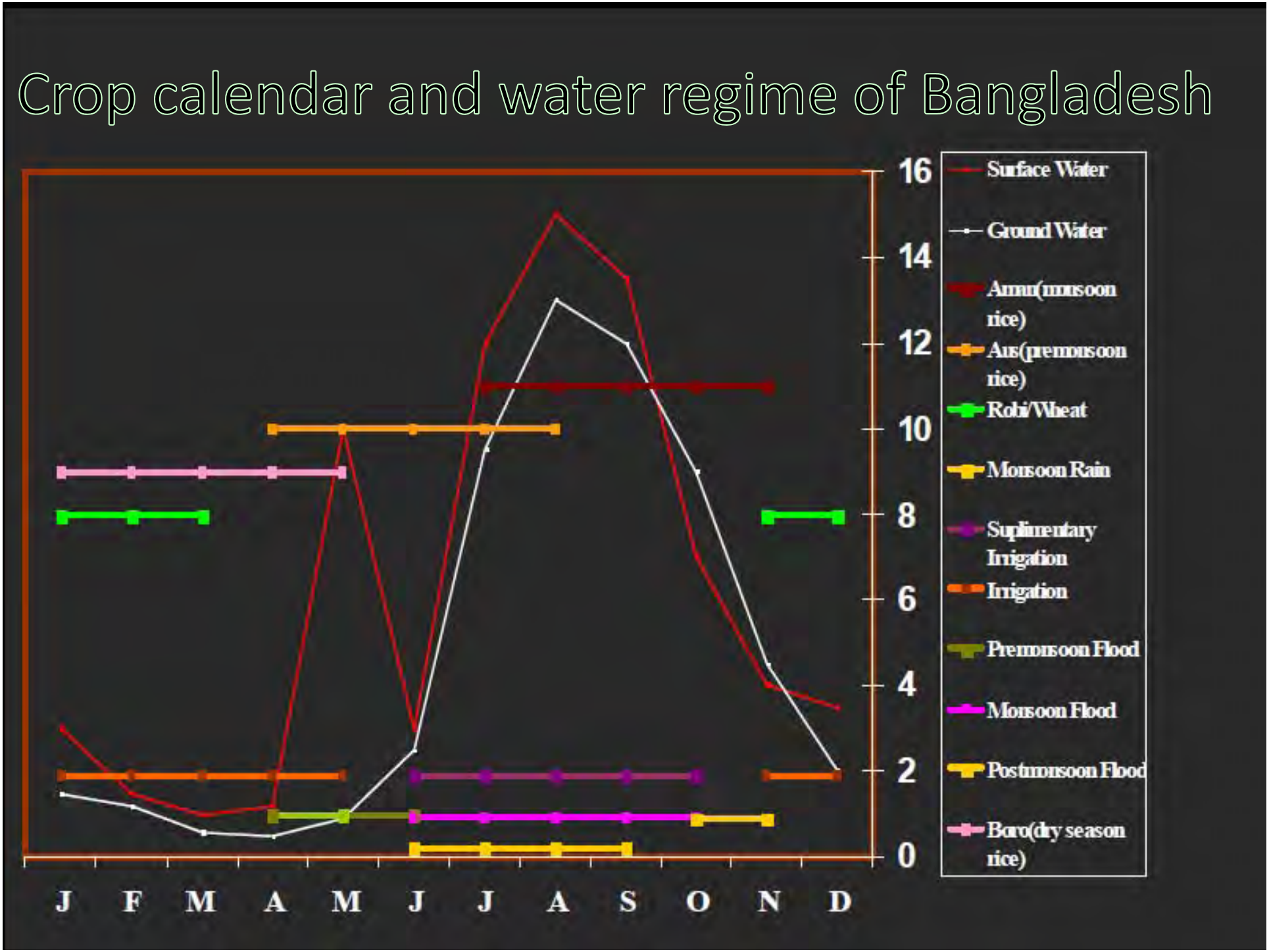
CEGIS

- The flood peak in the Brahmaputra and Meghna occur in July and August, while the peak in the Ganges occurs in August and September.





Crop calendar and water regime of Bangladesh



Untimely floods in 2012

(Source: FFWC, 2013)

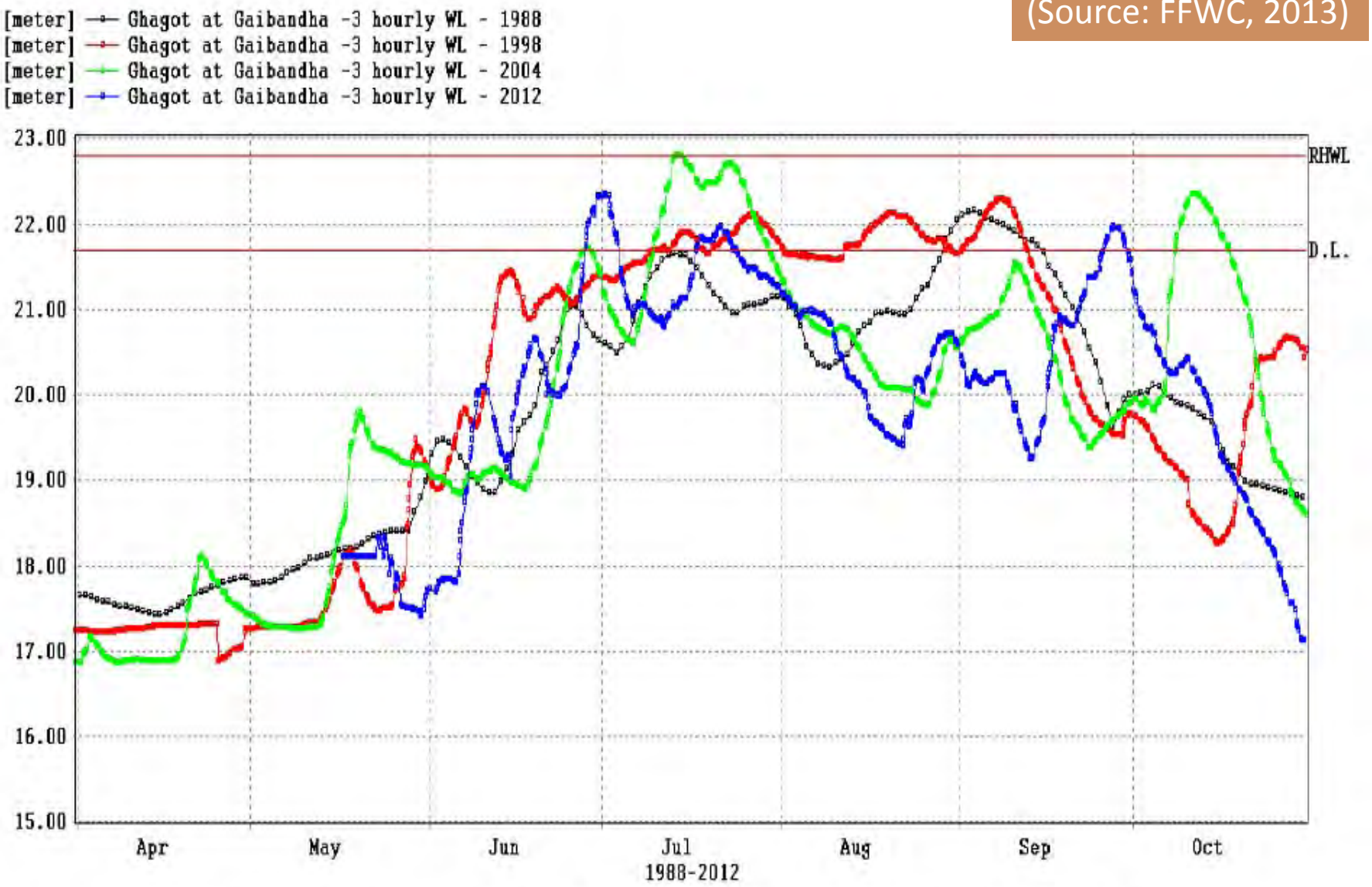


Figure 3.3 : Comparison of Hydrograph on Ghagot at Gaibandha

Another examples of unusual flood

(Source: FFWC, 2013)

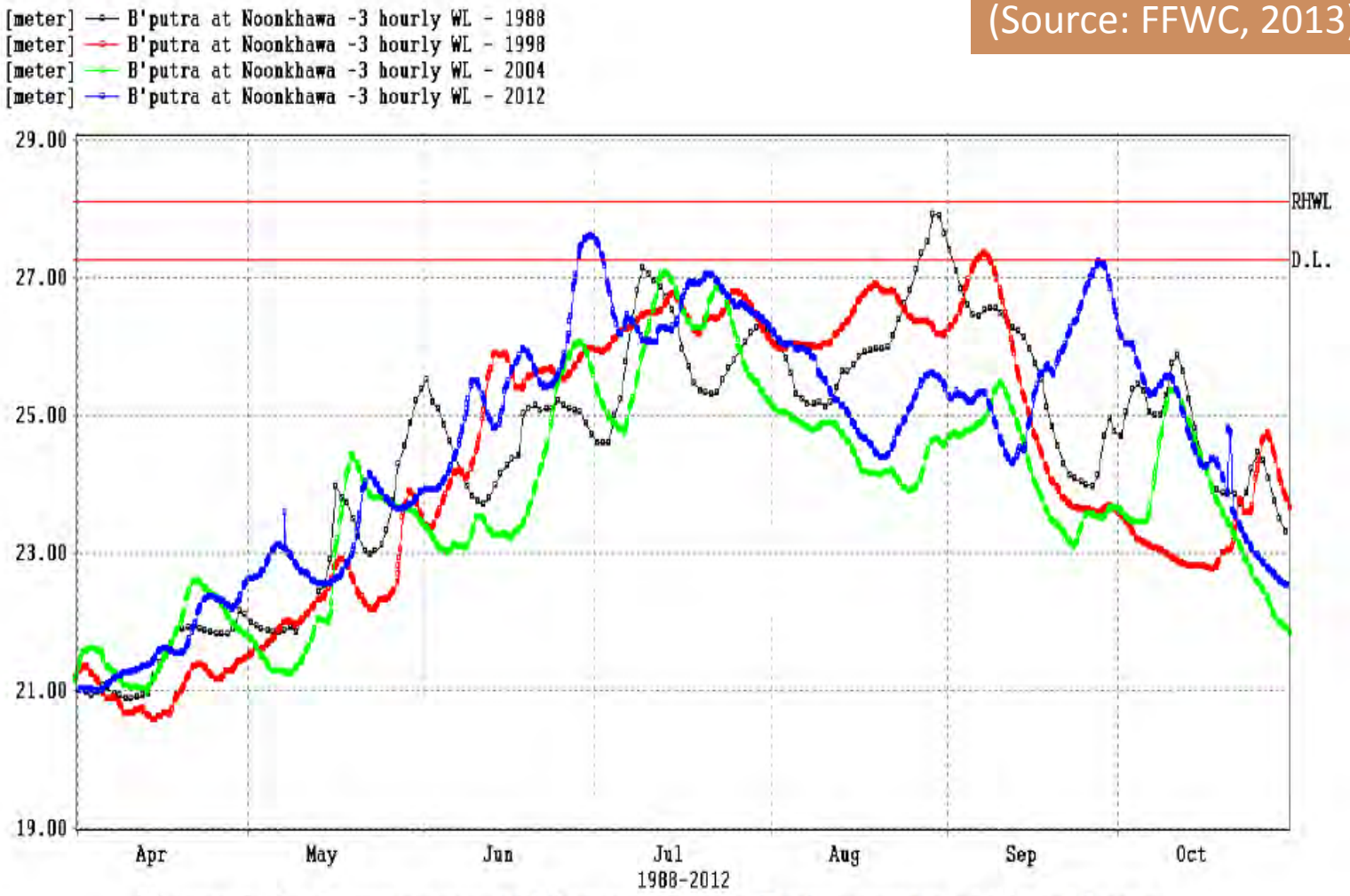


Figure 3.7 : Comparison of Hydrograph on Brahmaputra at Noonkhawa

unusual flood in the Brahmaputra

(Source: FFWC, 2013)

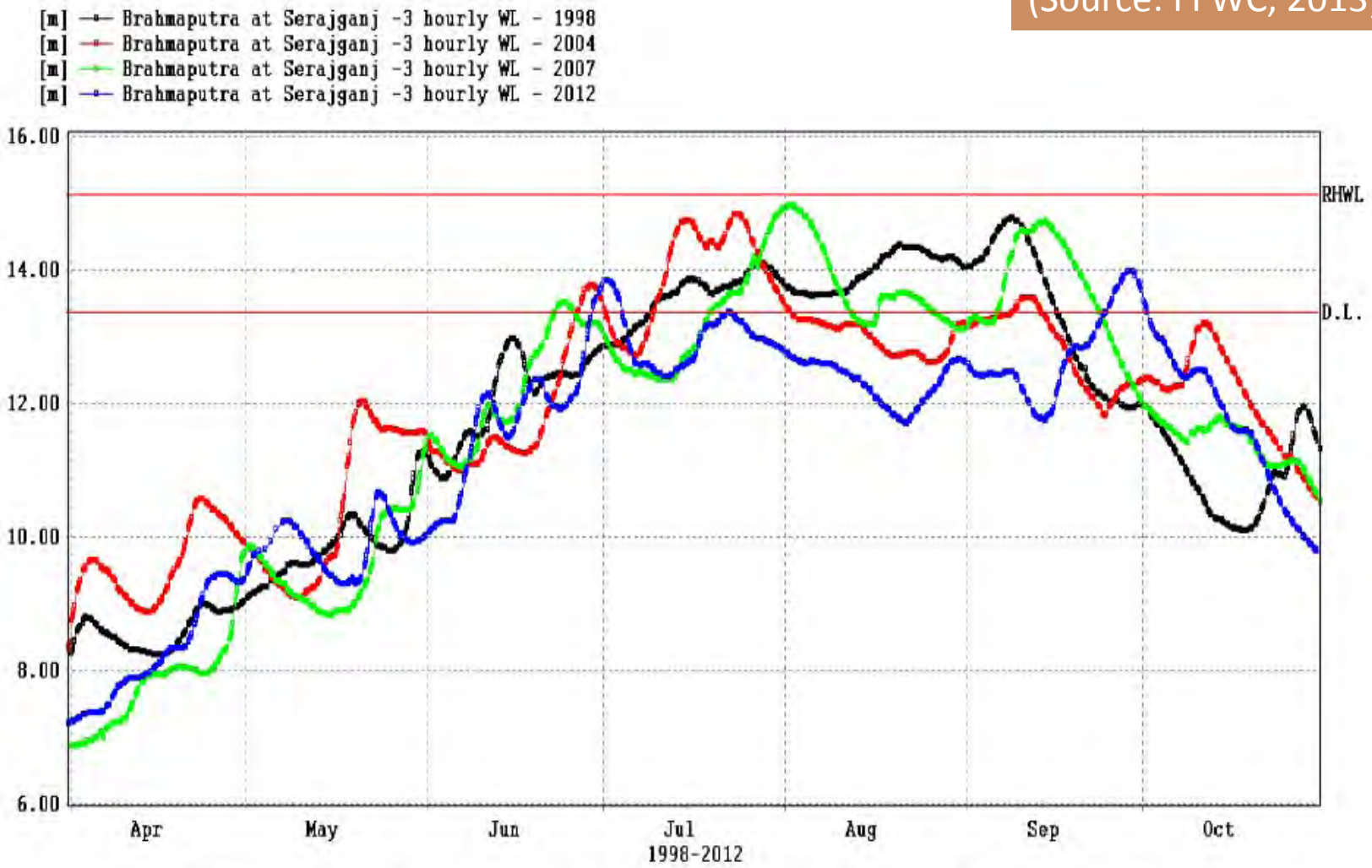


Figure 3.9 : Comparison of Hydrograph on Jamuna at Serajgonj

B. Unusual flood depth

Sl. No	River	Station	Recorded Maximum (m)	Danger Level (m)	Peak of the year (m)			Days above Danger level		
					2012	1998	1988	12	98	88
1	Surma	Kanaighat	15.26	13.20	15.58*	15.00	15.10	28	73	75
2	Surma	Sylhet	11.95	11.25	11.97	11.72	11.95	10	14	21
3	Surma	Sunamgonj	9.46	8.25	9.19	8.90	9.03	21	56	62
4	Kushiyara	Amalshid	18.28	15.85	17.89	17.60	17.50	9	54	65
5	Kushiyara	Sheola	14.60	13.50	14.47	14.14	14.09	10	37	80
6	Kushiyara	Sherpur	9.68	9.00	9.28	NA	NA	13	NA	NA
7	Jariajanjail	Kangsha	13.37	9.75	10.94	NA	NA	35	NA	NA
8	Manu	Manu Railway Bridge	20.42	17.07	18.2	18.63	18.95	1	6	66
10	Manu	Moulvi Bazar	15.50	11.75	12.08	11.68	13.01	1	-	25
11	Khowai	Habigonj	12.00	9.50	11.7	11.44	11.06	3	8	14
12	Upper Meghna	Bhairab Bazar	7.66	6.25	5.96	7.33	7.66	-	68	68
13	Gumti	Comilla	13.56	10.38	10.6	12.79	11.80	-	17	17

(Source: FFWC, 2013)

Flood depth in Surma river was highest than ever!

Some examples of unusual flood

(Source: FFWC, 2013)

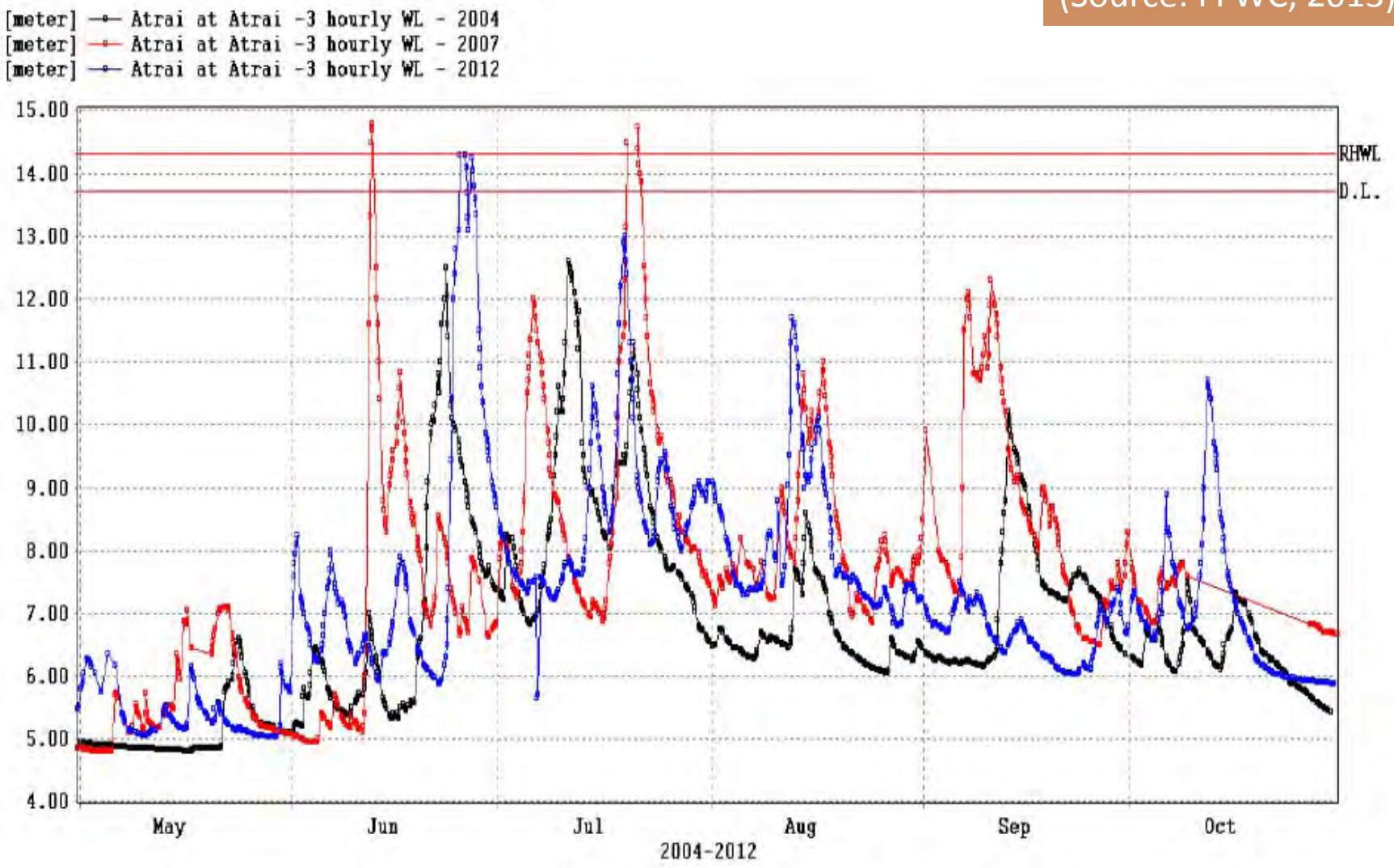


Figure 3.6 : Comparison of Hydrograph on Atrai at Mohadevpur

Some examples of unusual flood

(Source: FFWC, 2013)

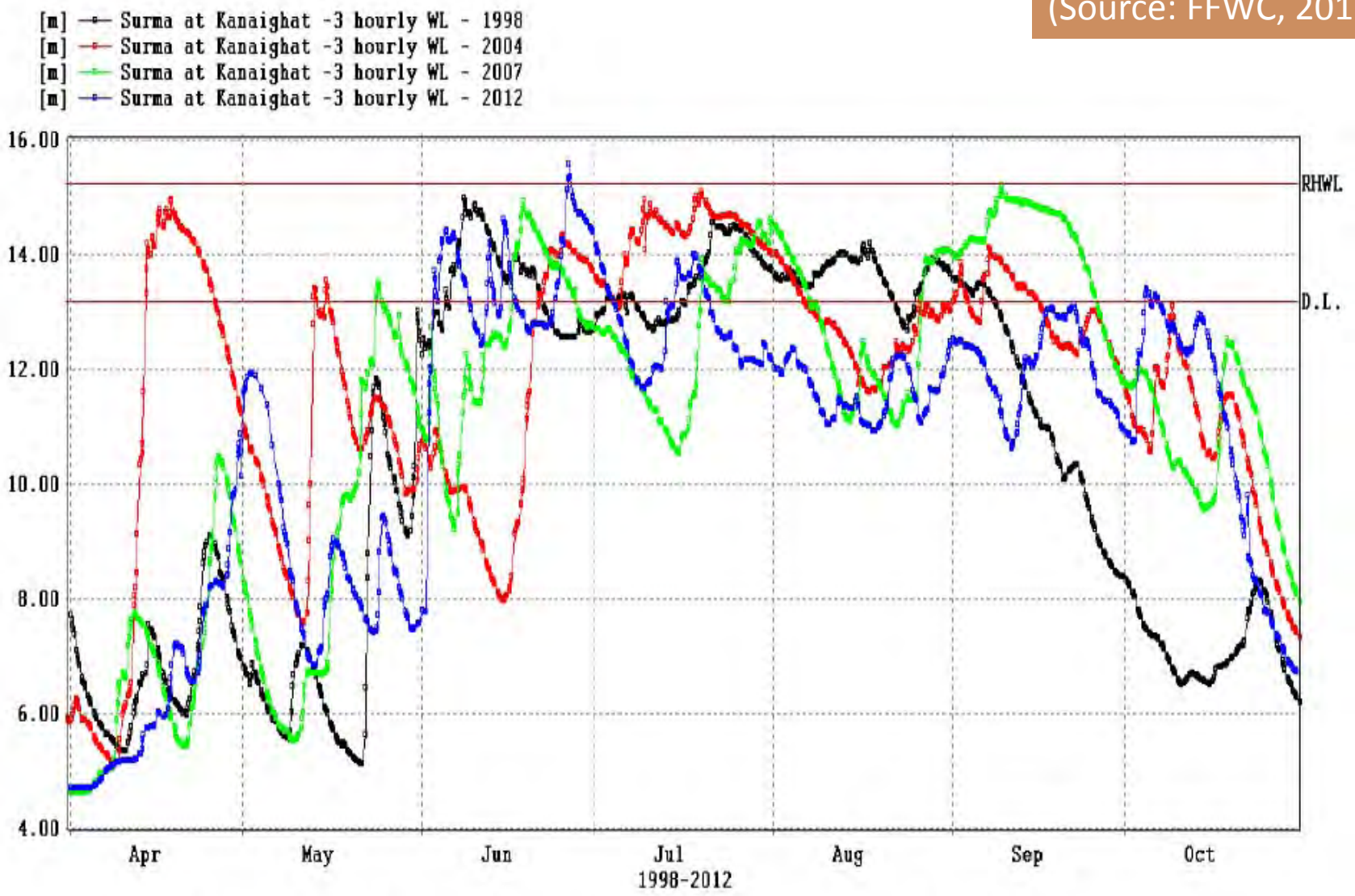


Figure 3.22 : Comparison of Hydrograph on Surma at Kanaighat

A. Timing of flood

(Source: FFWC, 2013)

2	TEESTA	DALIA	52.70	16/07/2012
3	TEESTA	KAUNIA	29.98	05/08/2012
4	JAMUNESWARI	BADARGANJ	32.85	20/09/2012
5	GHAGOT	GAIBANDHA	22.35	01/07/2012
6	KARATOA	CHAK RAHIMPUR	20.33	24/09/2012
7	KARATOA	BOGRA	13.68	18/09/2012
8	BRAHMAPUTRA	NOONKHAWA	27.6	30/06/2012
9	BRAHMAPUTRA	CHILMARI	24.48	27/09/2012
10	JAMUNA	BAHADURABAD	20.56	30/06/2012
11	JAMUNA	SERAJGONJ	13.98	28/09/2012
12	JAMUNA	ARICHA	9.84	28/09/2012
13	OLD BRAHMAPUTRA	JAMALPUR	16.7	30/09/2012
14	OLD BRAHMAPUTRA	MYMENSINGH	10.7	27/07/2012
15	BURIGANGA	DHAKA	4.95	23/07/2012
16	BALU	DEMRA	5.28	23/07/2012
17	LAKHYA	NARAYANGONJ	5.66	23/07/2012
18	TURAG	MIRPUR	5.15	25/07/2012
19	TONGI KHAL	TONGI	5.88	26/07/2012
20	KALIGANGA	TARAGHAT	8.14	30/09/2012

Flood in September/October is not common in Bangladesh!

A. Timing of flood

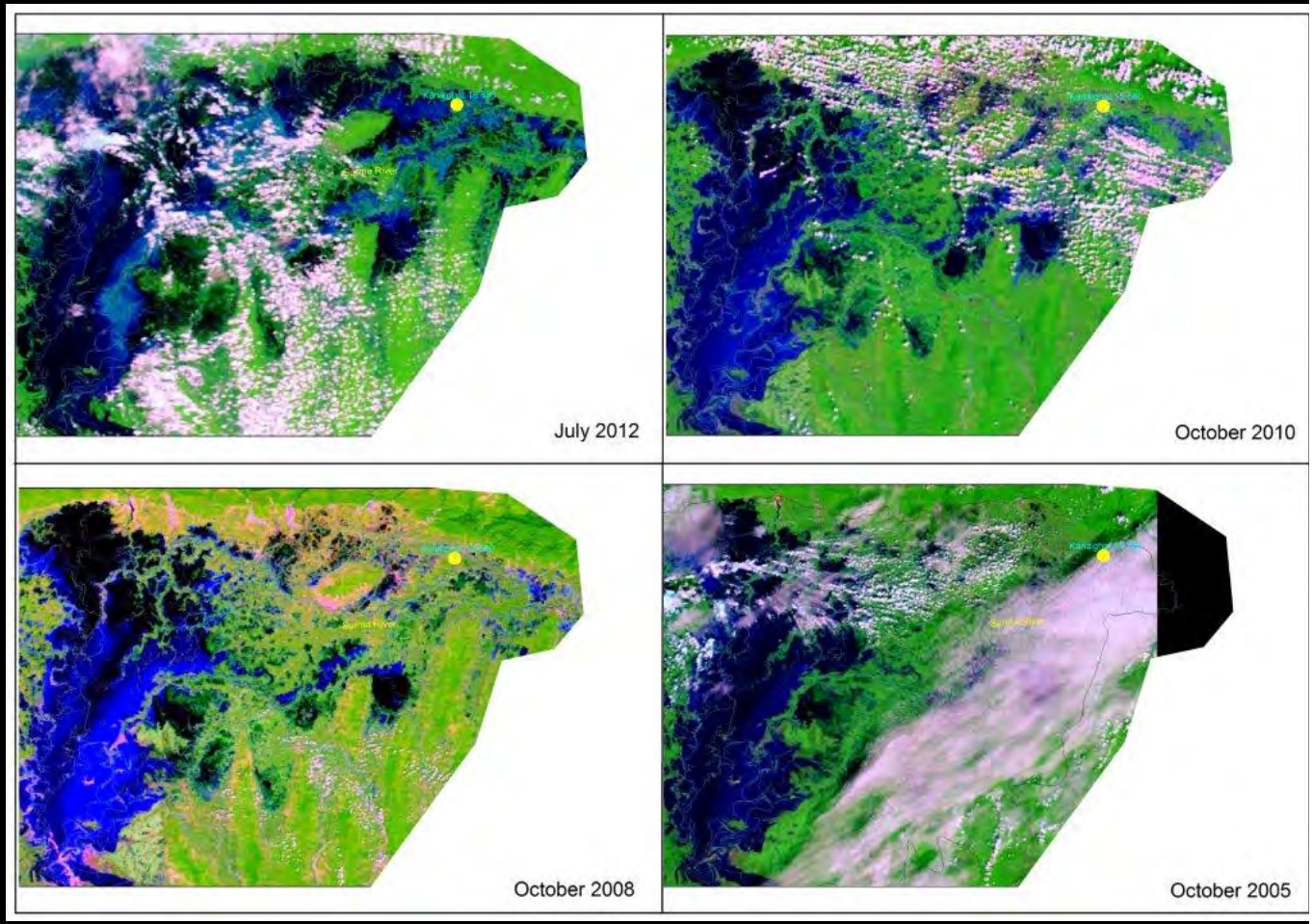
(Source: FFWC, 2013)

25	PUNARBHABA	DINAJPUR	32.65	07/07/2012
26	ICH-JAMUNA	PHULBARI	28.01	07/07/2012
27	TANGON	THAKURGAON	49.77	07/07/2012
28	UPPER ATRAI	BHUSIRBANDAR	38.9	08/07/2012
29	MOHANANDA	ROHANPUR	20.45	26/09/2012
30	MOHANANDA	CHAPAI-NAWABGANJ	20.28	25/09/2012
31	LITTLE JAMUNA	NAOGAON	14.45	21/07/2012
32	ATRAI	MOHADEBPUR	17.63	08/07/2012
33	GANGES	PANKHA	21.59	24/09/2012
34	GANGES	RAJSHAHI	17.87	26/09/2012
35	GANGES	HARDINGE BRIDGE	13.56	26/09/2012
36	PADMA	GOALONDO	9.17	29/09/2012
37	PADMA	BHAGYAKUL	6.75	29/09/2012
38	GORAI	GORAI RAIL BRIDGE	12.09	27/09/2012
39	GORAI	KAMARKHALI	8.09	27/09/2012
40	ICHAMATI	SAKRA	3.67	06/07/2012
41	MATHABHANGA	CHUADANGA	8.94	28/09/2012
42	MATHABHANGA	HATBOALIA	11.36	27/07/2012

Flood in September is not common in Bangladesh!

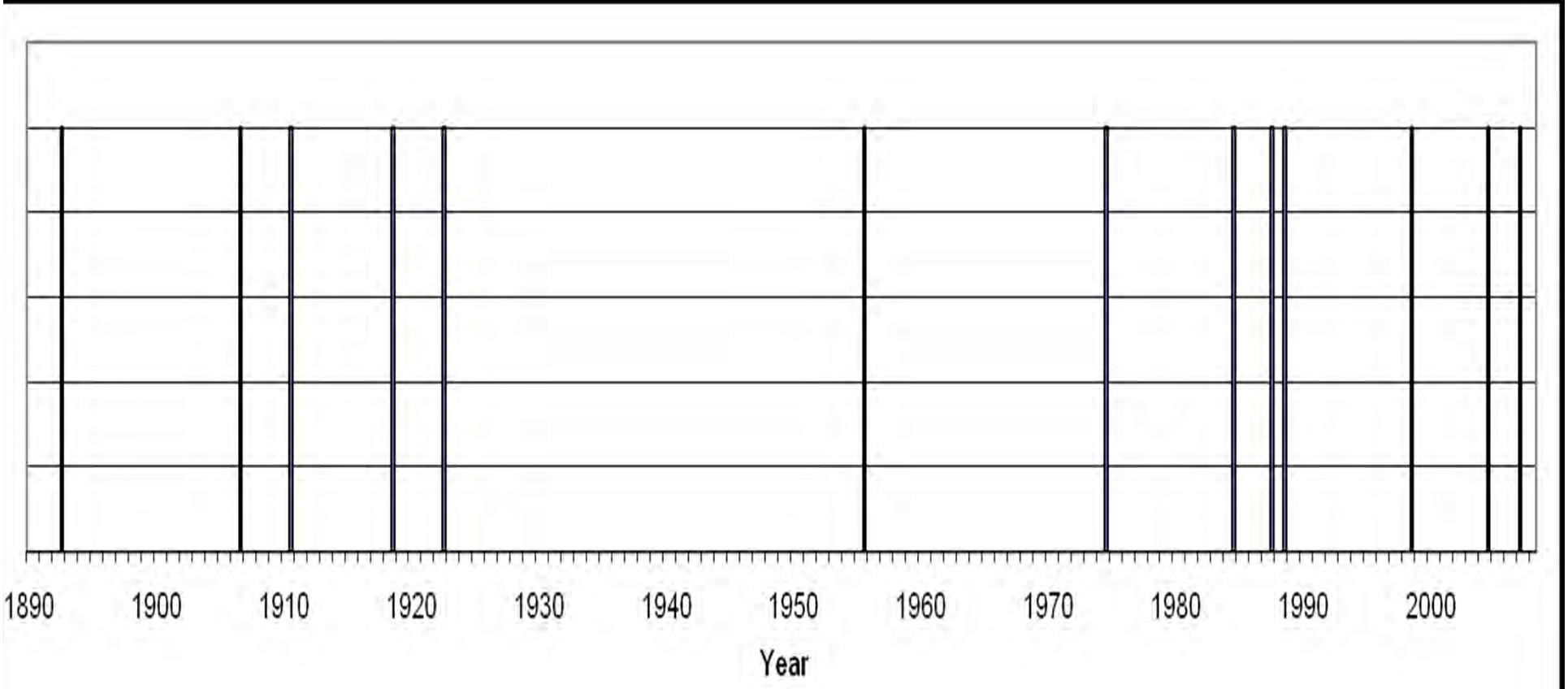
Flood damage of Aman Crop

Flood in late 2012 destroyed the aman crop in the haor area (look at the yellow dot from historical imagery)



Source: Modis Satellite Imagery

Historical mega flood events in Bangladesh (1890-2007)



(Messerli and Hofer, 2006)

Erratic rainfall of 2012

Rainfall statistics (2012)

Month	Brahmaputra Basin(mm)		Ganges Basin(mm)		Meghna Basin(mm)		South Eastern Hill Basin(mm)		Monsoon average (mm)	
	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual
May	315.4	139.9	191.8	54.9	491.0	269.0	290.4	133.6		
June	433.5	301.7	327.0	256.6	621.0	675.0	599.8	748.7		
July	496.1	339.9	397.8	284.5	650.5	505.7	728.5	726.5		
August	339.7	215.0	337.8	210.0	537.9	425.3	536.9	429.7	2178.8	1664.0
September	353.4	282.1	298.7	261.1	449.2	217.4	317.9	179.3		
Total	1938.1	1278.6	1553.1	1067.1	2749.6	2092.4	2473.5	2217.8		
% More/Less	34% less		31% less		23.9% less		10.3% less		23.6% less	

In 2012 cumulative rainfall was far low than expected!

Monthly profile

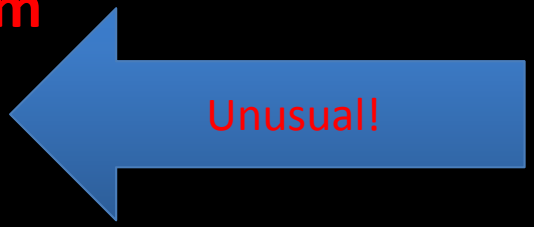
- **May 2012**
  - **Monthly Maximum at Kanaighat 511.0 mm**
  - **1-day maximum at Dalia: 147.0 mm**
  - **10-day maximum at Sylhet: 299.0 mm**

  June 2012
  - **Maximum, at Kanaighat : 1453 mm (exceeded previous monthly total rainfall)**
  - **1-day maximum, at Chittagong : 373.0 mm**
  - **10-day maximum, at Chittagong : 847.0 mm**
- **July 2012**
  - **Maximum, at Kanaighat : 1453 mm (exceeded previous monthly total rainfall)**
  - **1-day maximum, at Chittagong : 373.0 mm**
  - **10-day maximum, at Chittagong : 847.0 mm**

(Source: FFWC, 2013)

Monthly profile

- **August 2012**
  - **Maximum at Swandip : 893.0 mm**
  - **1-day maximum at Lama: 225.0 mm**
  - **10-day maximum at Coxss Bazar: 569 mm**
- **September 2012**
  - **Maximum at Sandwip : 893.0 mm**
  - **1-day maximum at Lama: 225.0 mm**
  - **10-day maximum at Coxss Bazar: 569 mm**
- **October 2012**
  - **Monthly Maximum at Kanaighat : 586.0 mm**
  - **1 day maximum at Kanaighat: 549.0 mm**
  - **10 day maximum at Kanaighat: 300.0 mm**

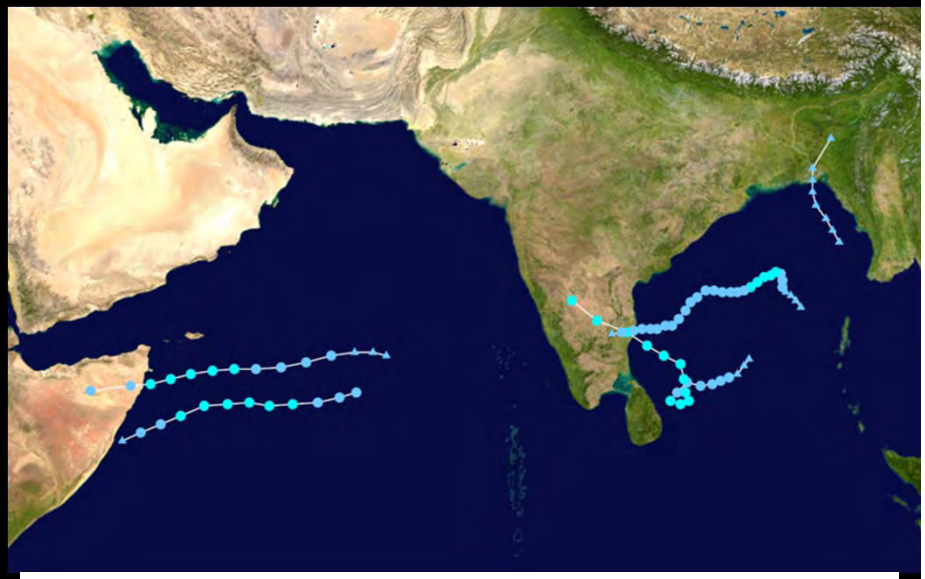


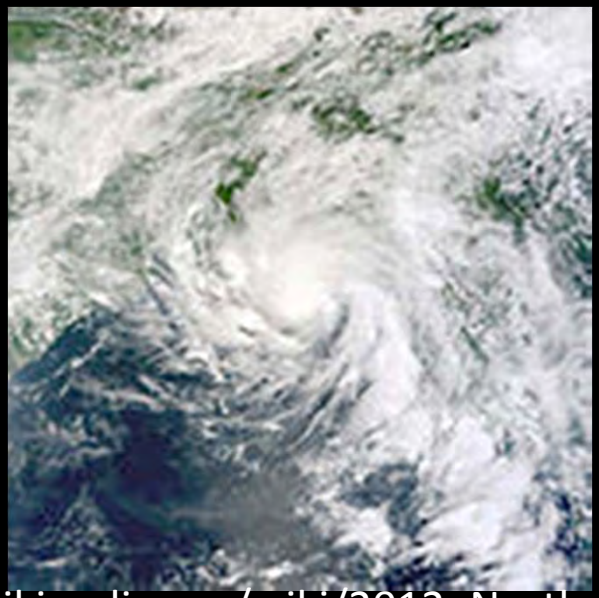
(Source: FFWC, 2013)

Cyclones in Bay of Bengal in 2012

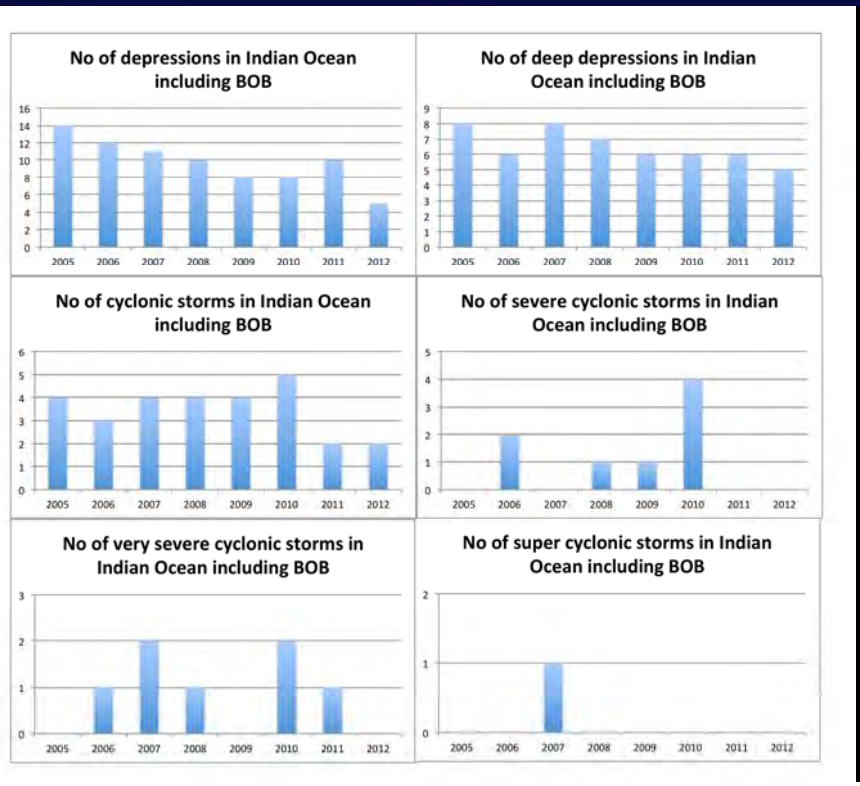
C. Cyclone hit twice in 2012!

- 6-Apr-2012 (death 25, affected 55,121)
- 10-Oct-2012 (death 108, affected 129,558)
- Total economic loss USD 56.1 Million





http://en.wikipedia.org/wiki/2012_North_Indian_Ocean_cyclone_season



Short duration heavy rainfall of 2012

D. Short duration heavy rain: Suffering in Chittagong Land Slide

Ref: The Daily Star (July 28th, 2013)

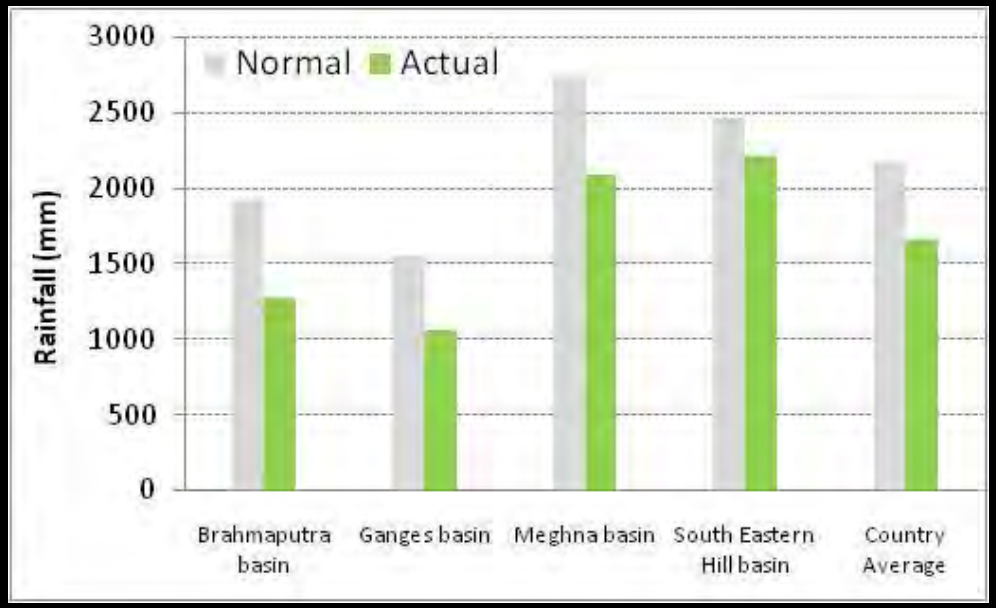
- Landslides in Chittagong hills killed 28 people last year (2012), 17 in 2011, 11 in 2008, and 127 in 2007, raising concerns about the safety of those living in illegal houses on the hilltops, slopes and in foothills. Local Authorities have the reasons behind these issues are

1. The people do not want to move out for not having alternatives.
2. no alternative housing arrangements so that they could relocate.
3. influential people with political blessing grab land, build houses

LOSS AND DAMAGE FROM THE PERSPECTIVE OF SOE

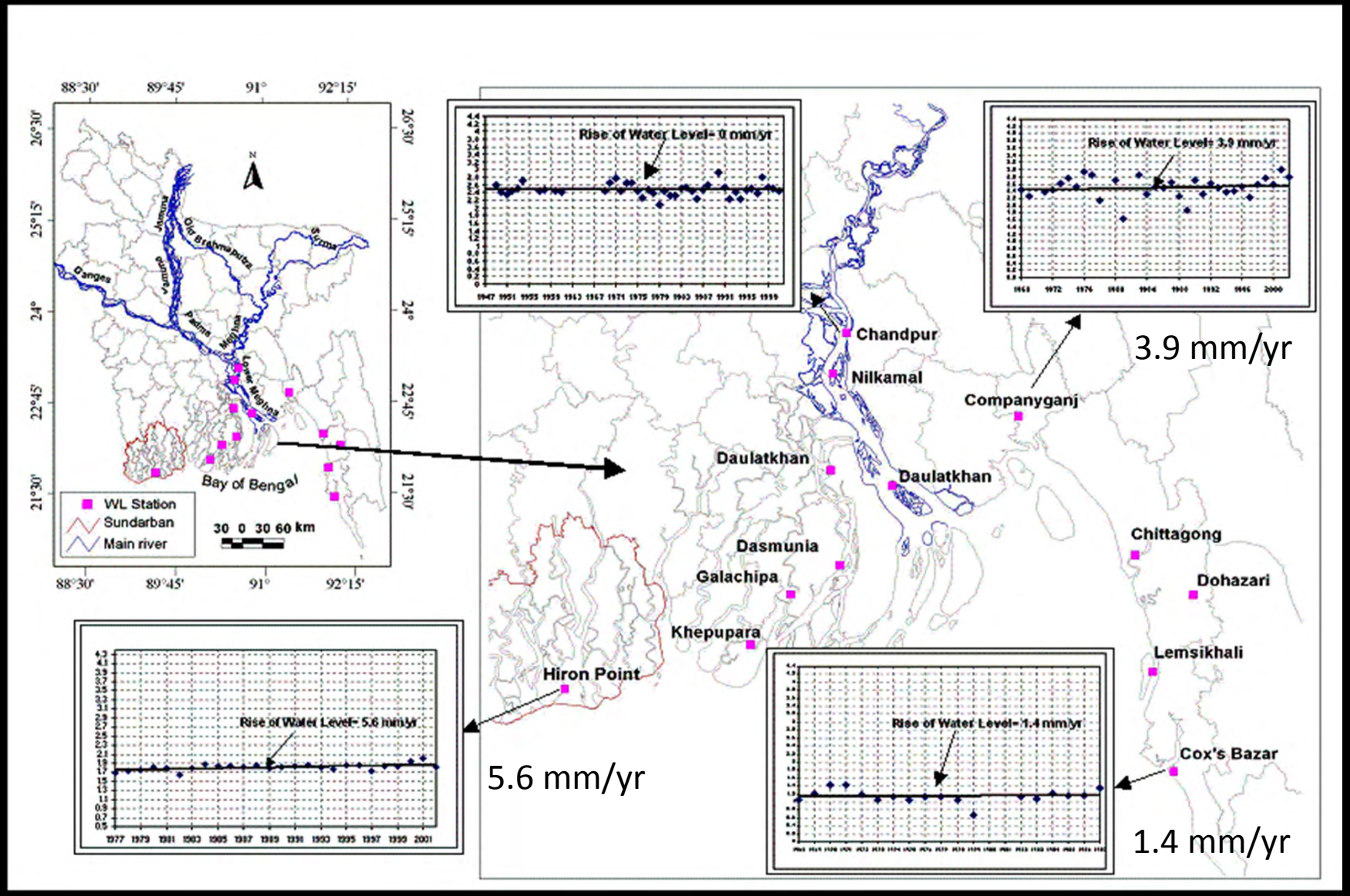
E. Prevalence of drought in 2012

- Total annual rainfall was far below than expected. NW and SW region boro production suffered a lot due to scarcity of irrigation water.
- Contradicts with the IPCC's estimate of 33% increase in rainfall!



(FFWC, 2013)

F. SLR Trends in different points of Bangladesh



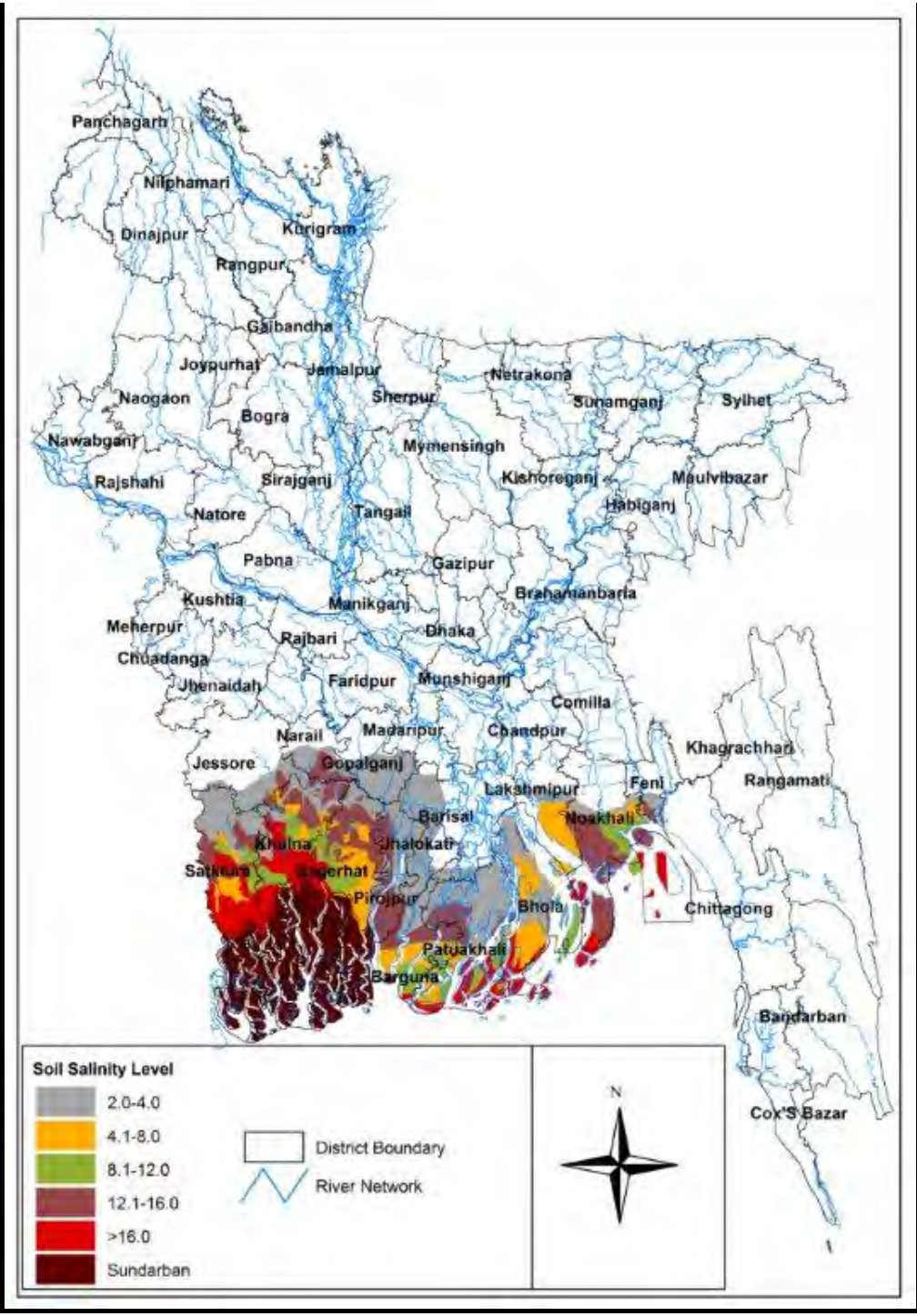
The rate of sea level rise is far more than the historical assessments!

H. Soil salinity

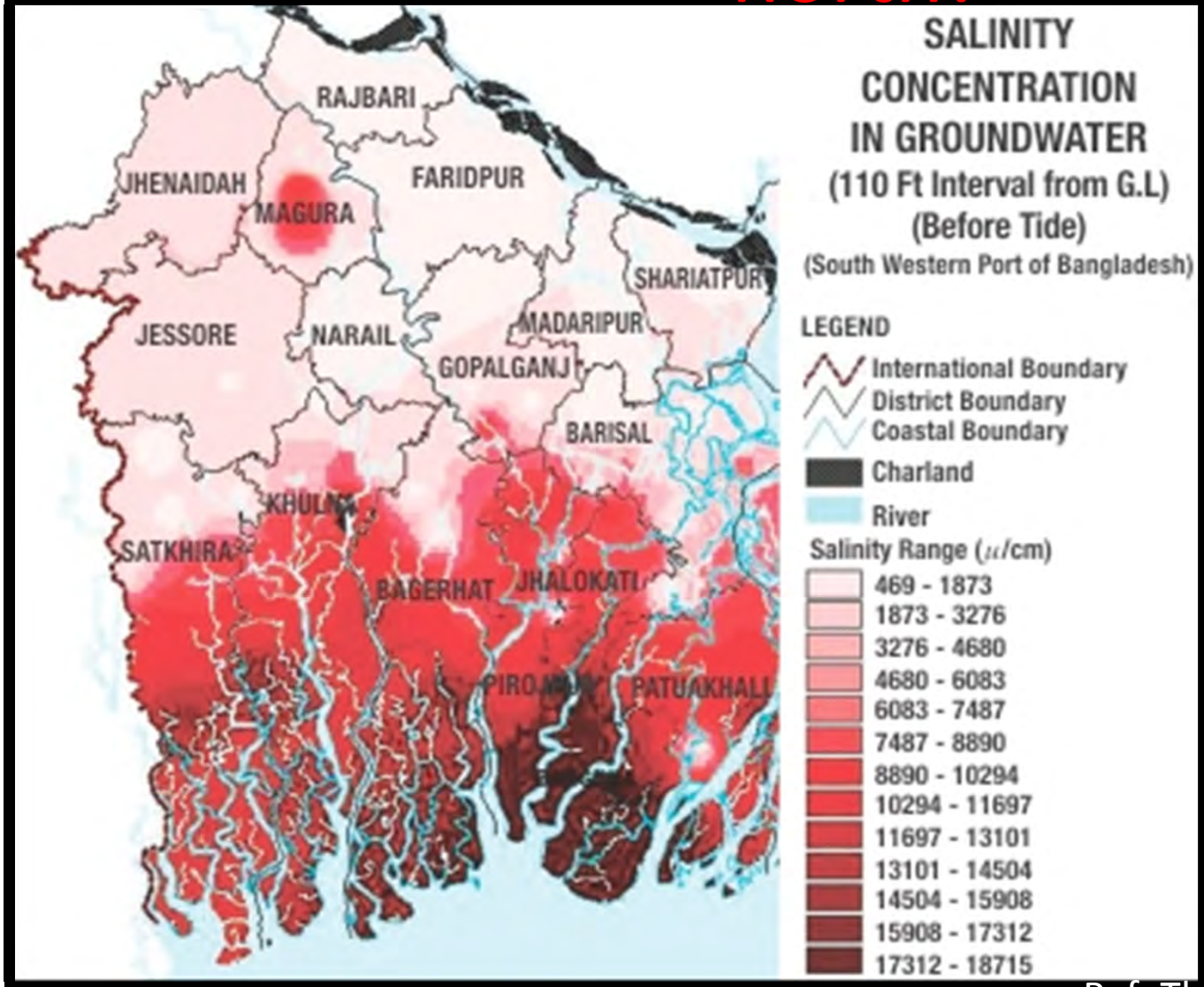
Increasing soil salinity is pushing the agrarians from the coastal zone to migrate.

One out of every 10 family is migrating!

(Map redrawn based on Survey of SRDI, 2009)



I. Groundwater salinity has reached far north!



Ref: The Daily Star (August 25, 2013)

What are the responses of communities

- Adaptation by local communities
  - In the “char lands” and north Bangladesh farmers are switching over to maize in place of rice.
  - They are adapting to erratic rainfall by irrigation in the peak of the monsoon
  - New varieties of HYVs are being introduced;

  - People are moving out (temporary/ semi-permanent (not seasonal) out migration taking place from coastal belt.

Changes in time of flowering

" Kadam" in bloom in front of BRAC University;
Photograph taken on 15th December 2012

THANKS!