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adpc 20 years of reducing disaster risks in Asia and the Pacific

Long Lead Flood Forecast Application to Benefit Society: Experience of 2007 Bangladesh Floods

S.H.M. Fakhruddin
Technical Specialist, EWS
fakhruddin@adpc.net

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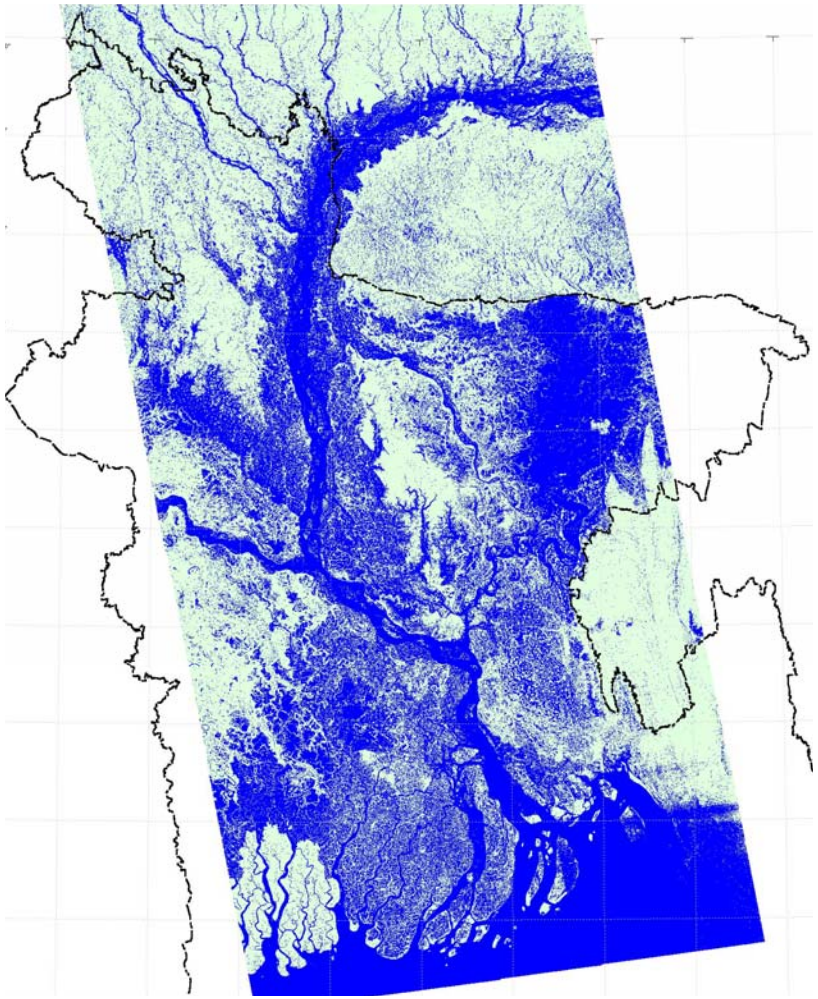
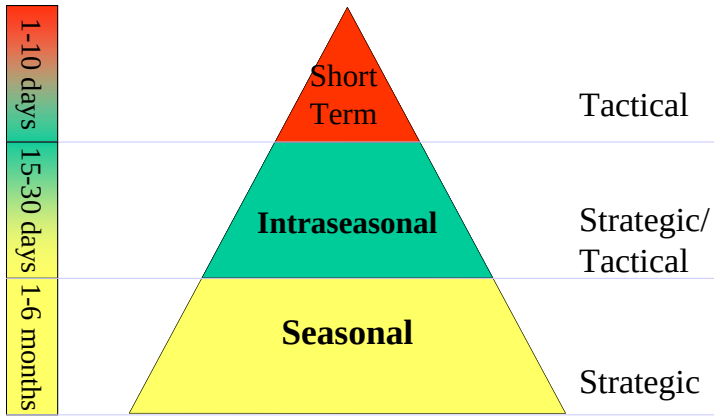
Presentation Outline

- Background- The CAFB project
- Institutional Mechanism
- Hazard Detection/Data Collection
- Warning Products
- Baseline Assessment
- Dissemination
- Community Response



CFAB- The Project

- Following the disastrous 1998 flooding when, without warning, flooding from both the Ganges and Brahmaputra covered 60% of Bangladesh for 3 months, the CFAB project was instigated.
- Also motivated by shorter term flooding that occurs most years but with sufficiently irregularity to be very disruptive
- India provides no upstream data to Bangladesh
- Purpose, extend the 2 days forecasts of FFWC to 1-10 days, 20-30 days and seasonal



Probabilistic forecast to allow proper risk assessment

The CFAB Project Goals

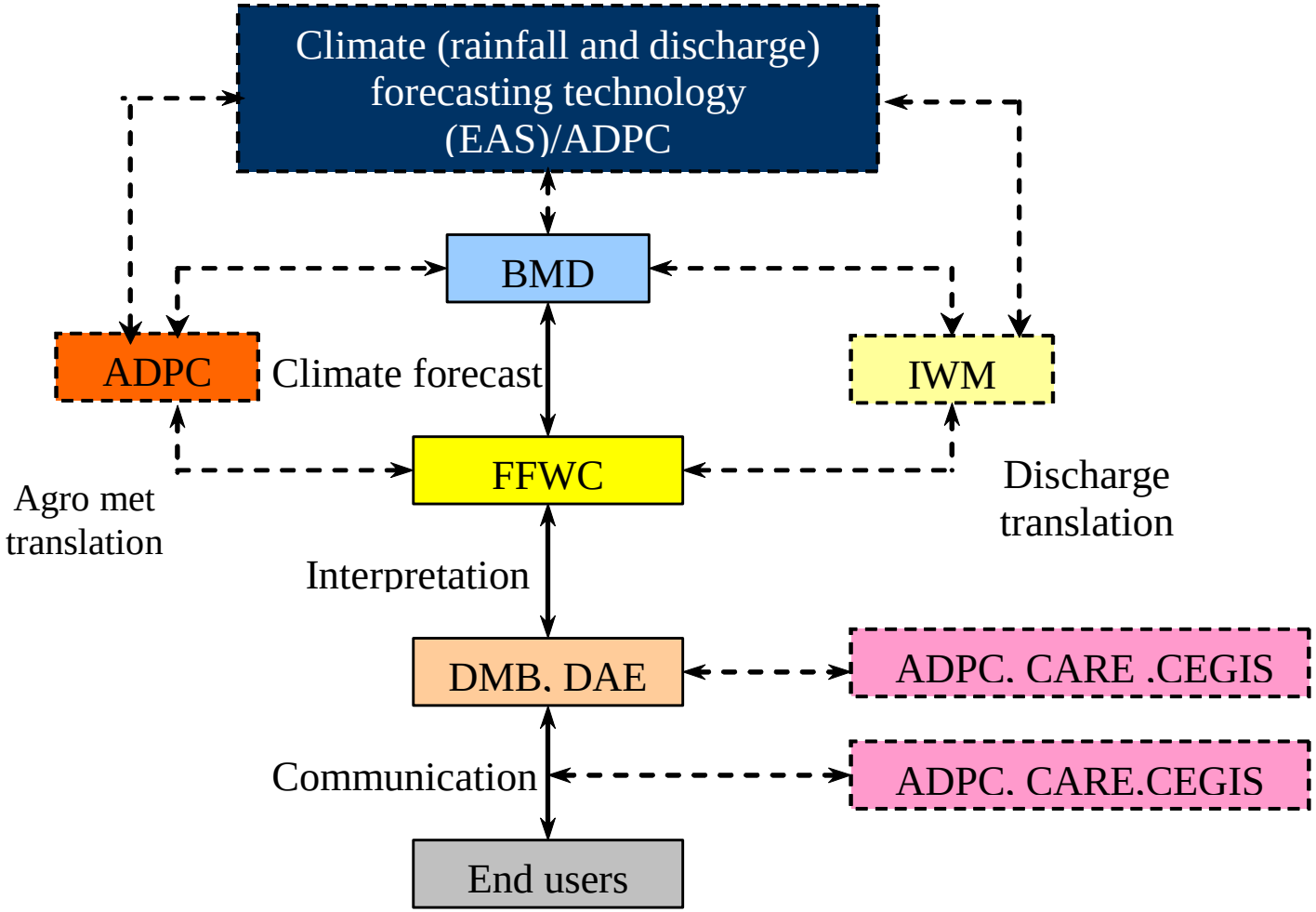
- Develop resilient forecast schemes that capitalize on skillful modeling techniques and advanced data sources at time-scales: 1-6 months, 20-25 days, 1-10 days (2000)

- Develop an infrastructure within Bangladesh to:

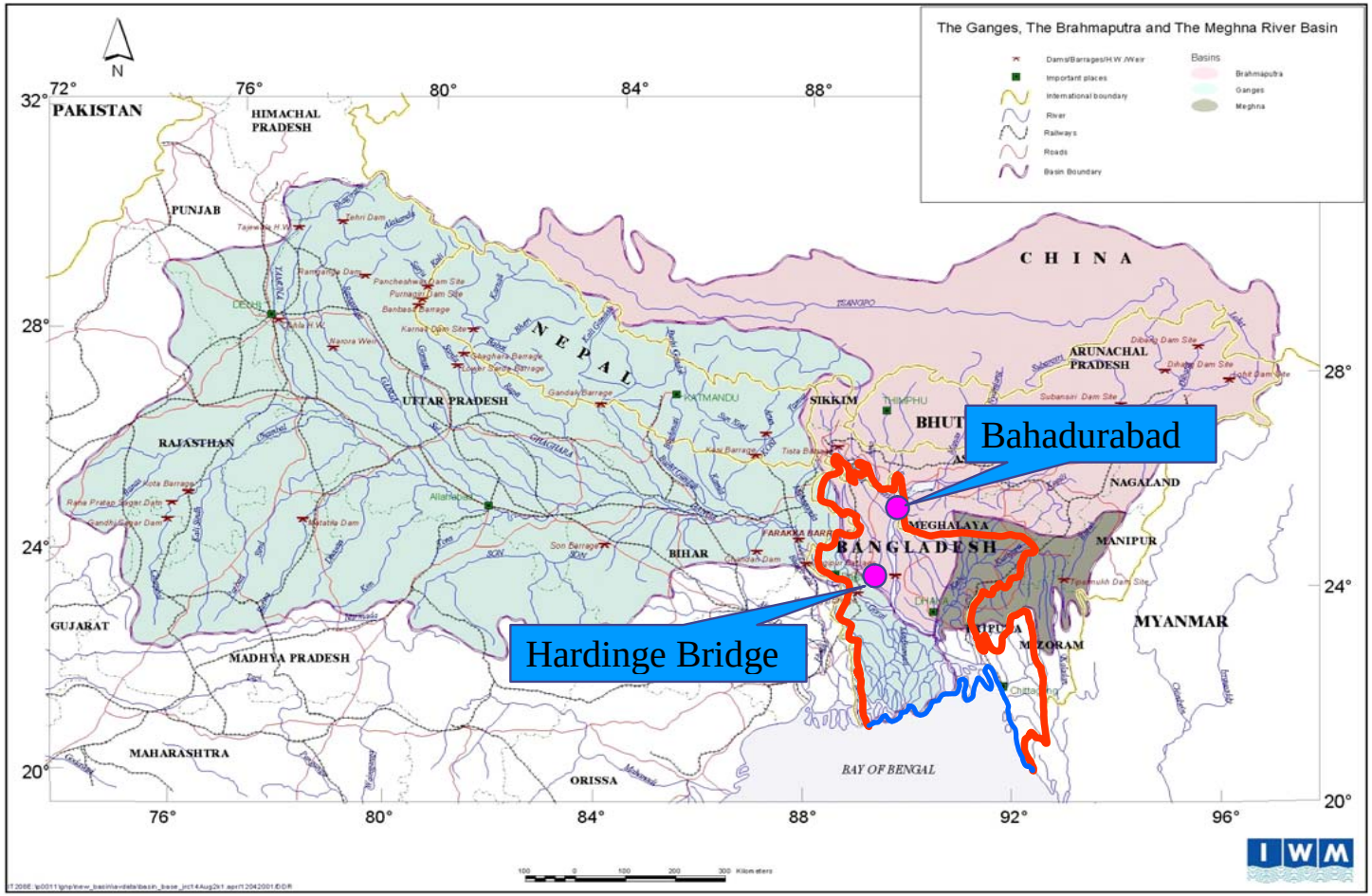
  a) make use of the forecasts -- *establish pilot projects at selected sites, showing measurable improvements (2006)*

  b) eventually own the prediction schemes -- *facilitate a technological transfer (2008)*

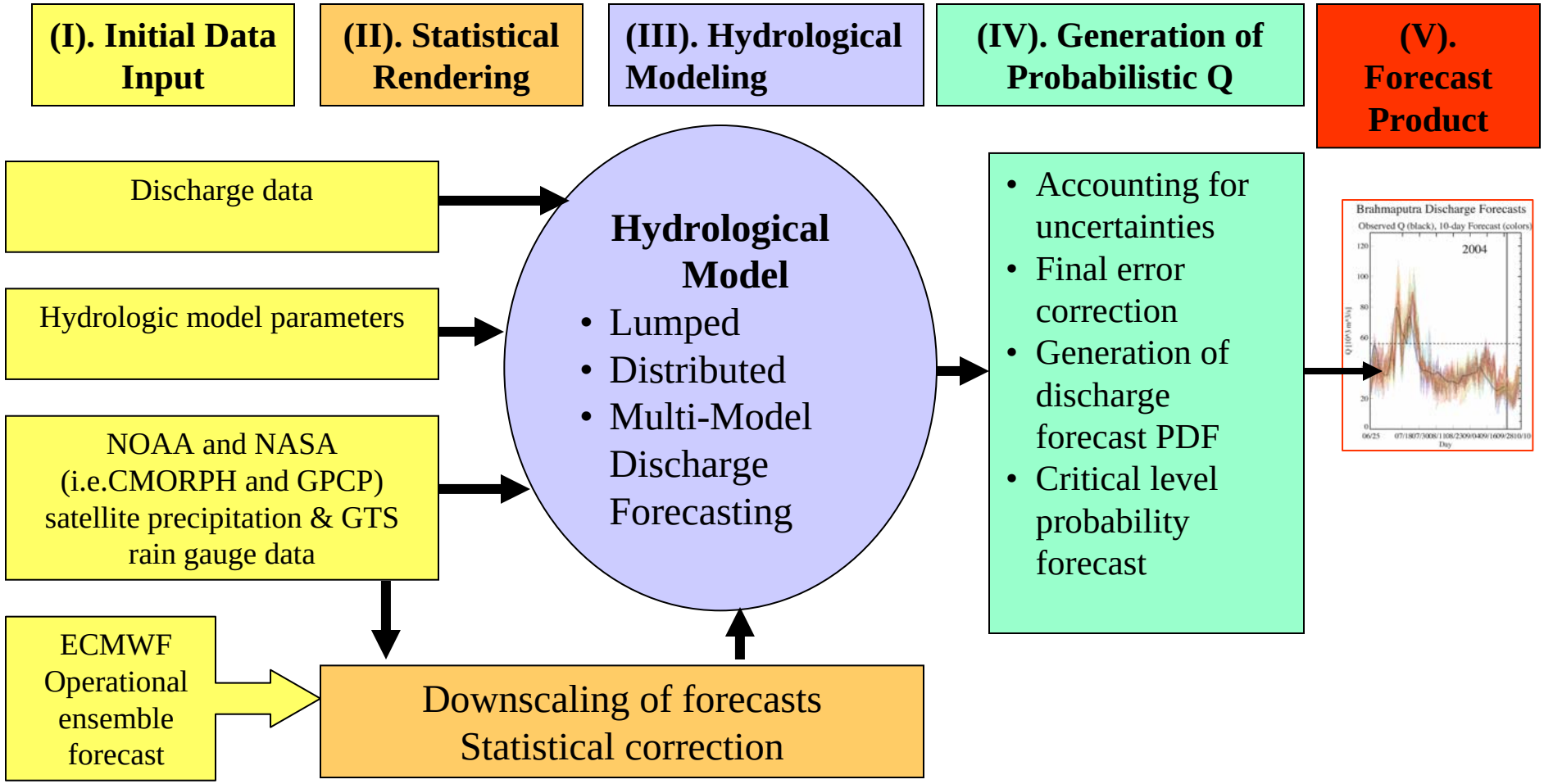
Institutional Collaboration For Sustainable End-to-end Generation and Application of Flood Forecasts



CFAB Model Area

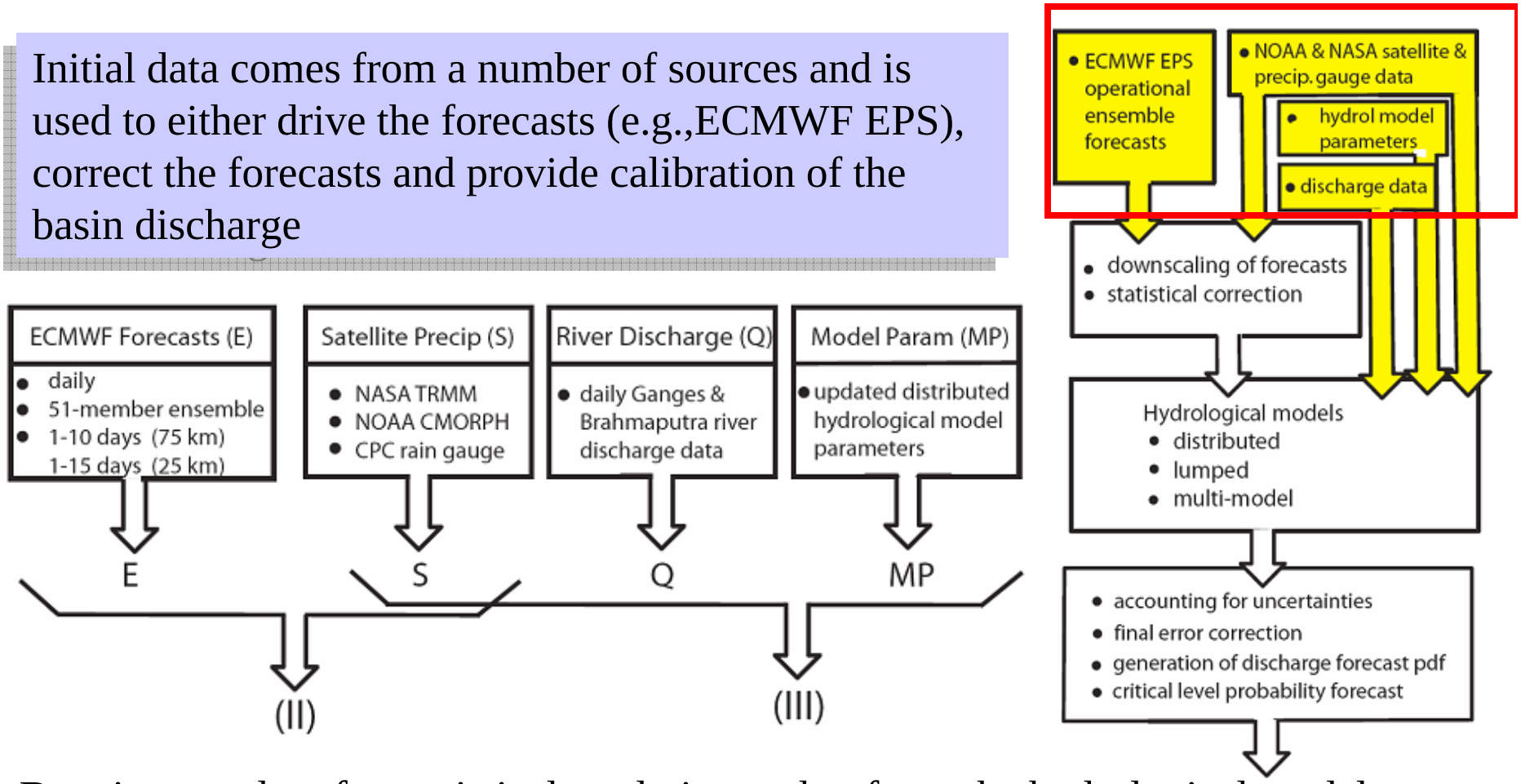


Discharge Forecast Schemes



Initial Data Input

Initial data comes from a number of sources and is used to either drive the forecasts (e.g.,ECMWF EPS), correct the forecasts and provide calibration of the basin discharge



Data is passed on for statistical rendering and to force the hydrological models

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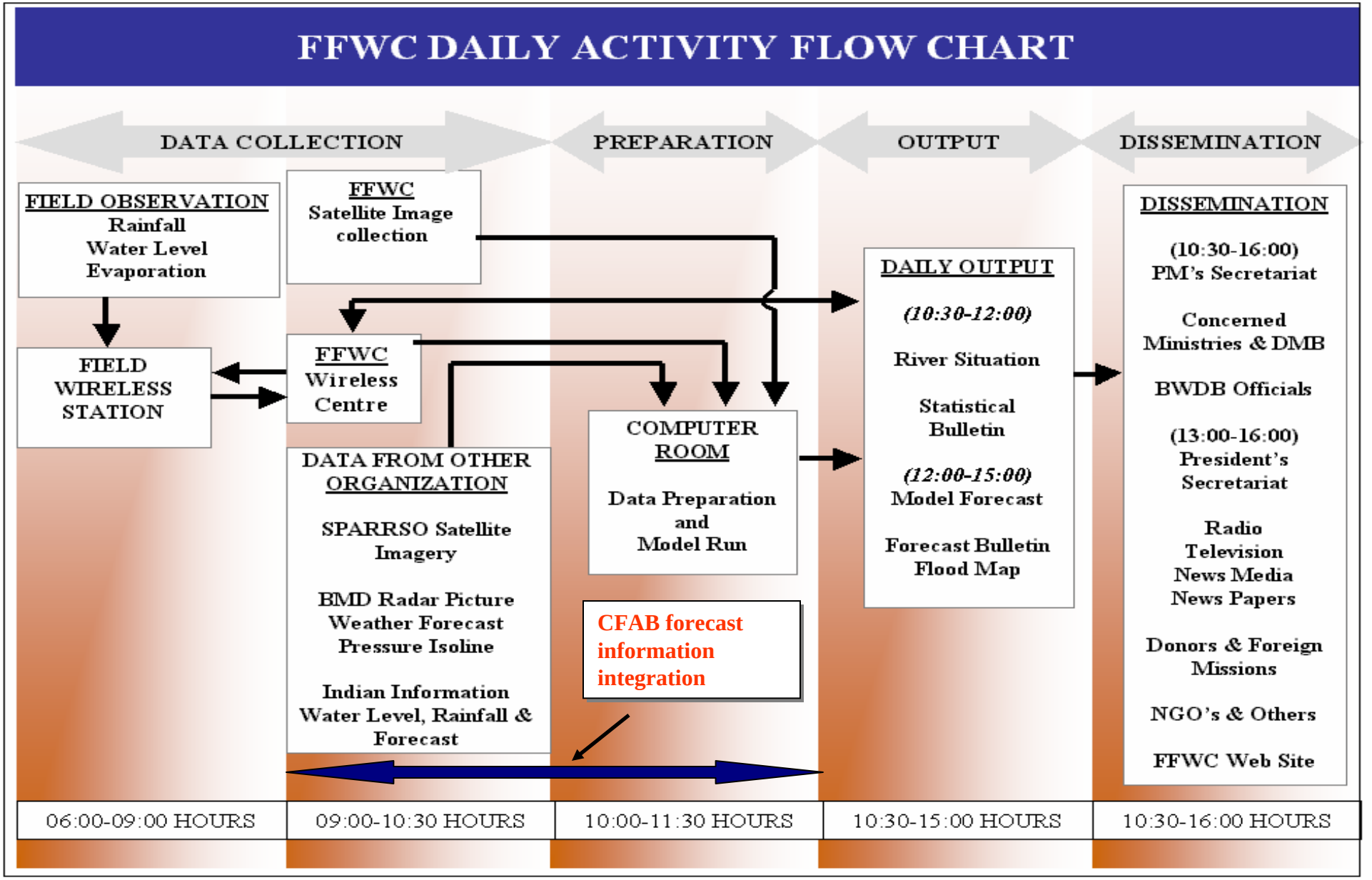
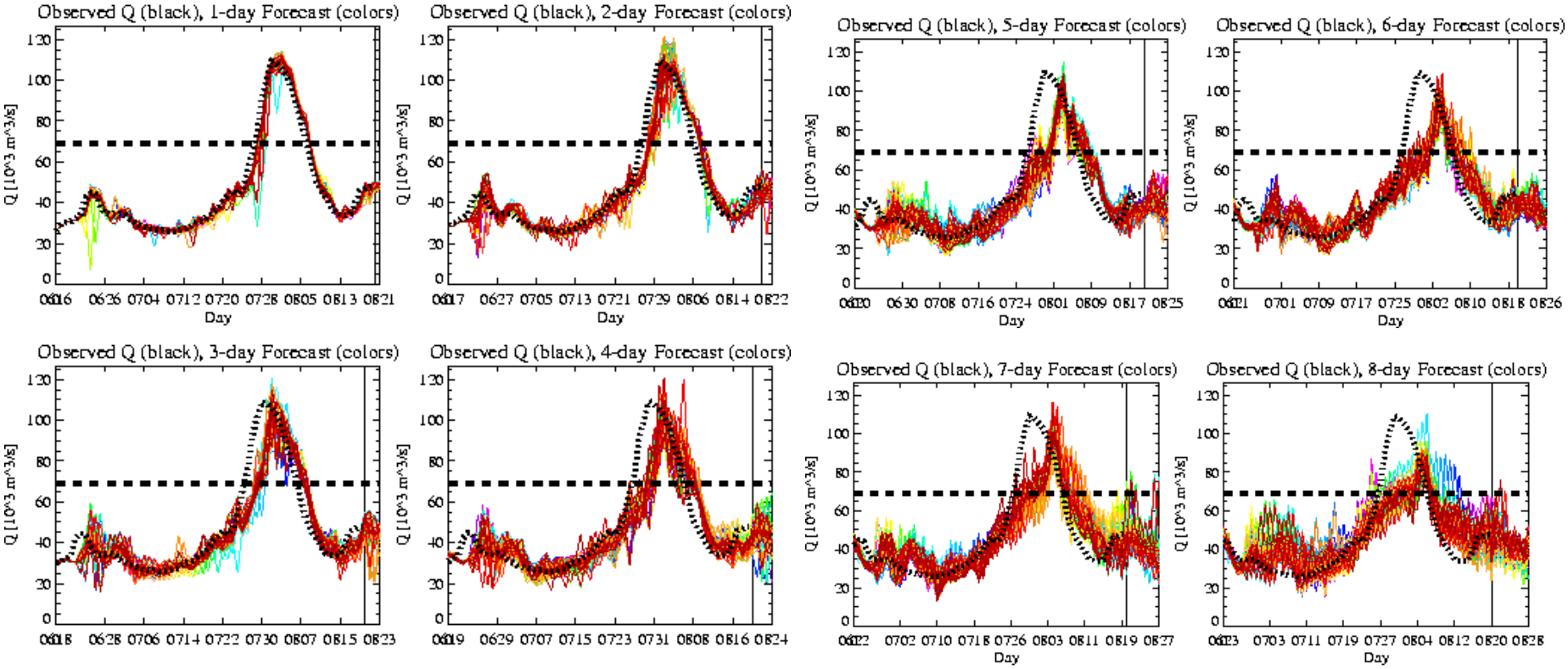
FFWC DAILY ACTIVITY FLOW CHART



Brahmaputra Discharge Forecasts 2007

1-10 day flood forecasts using ECMWF precipitation forecasts



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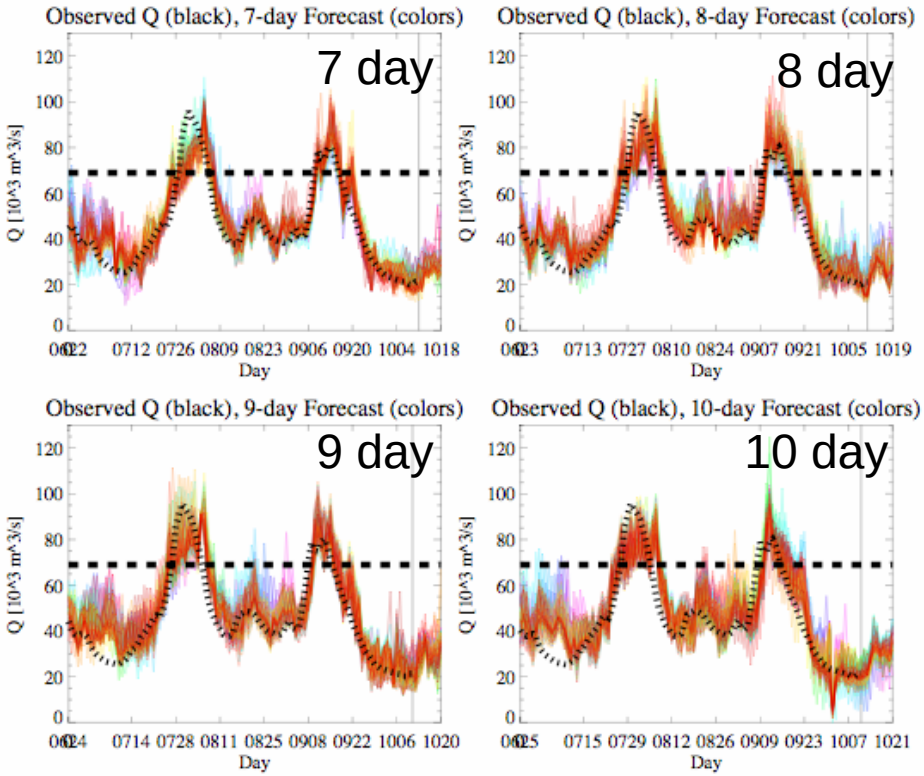
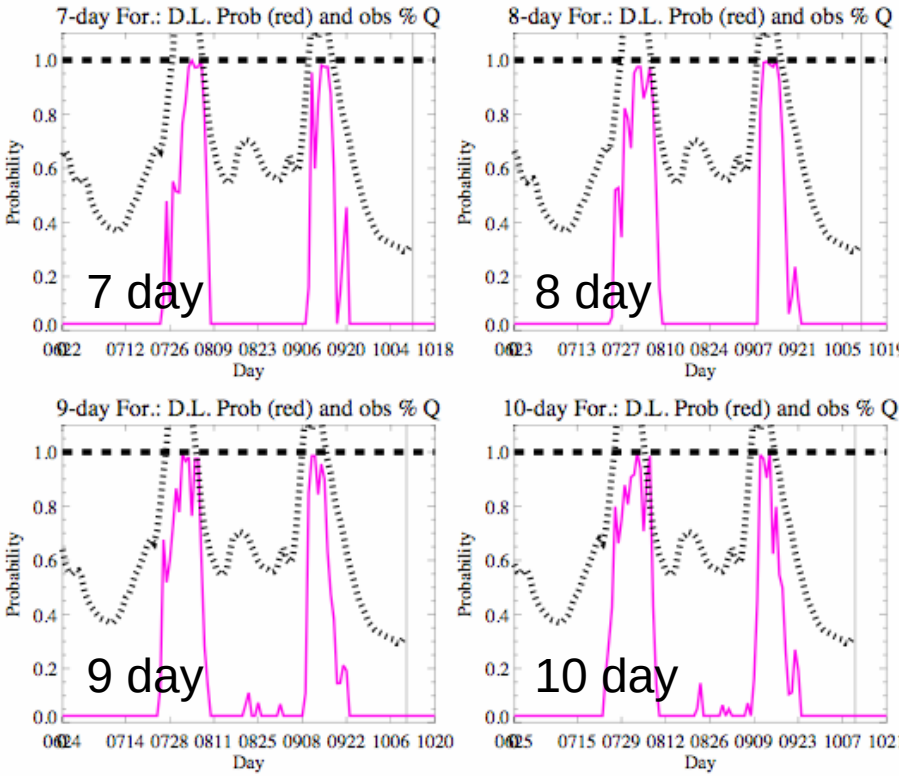
2007 Brahmaputra Ensemble Forecasts and Danger Level Probabilities

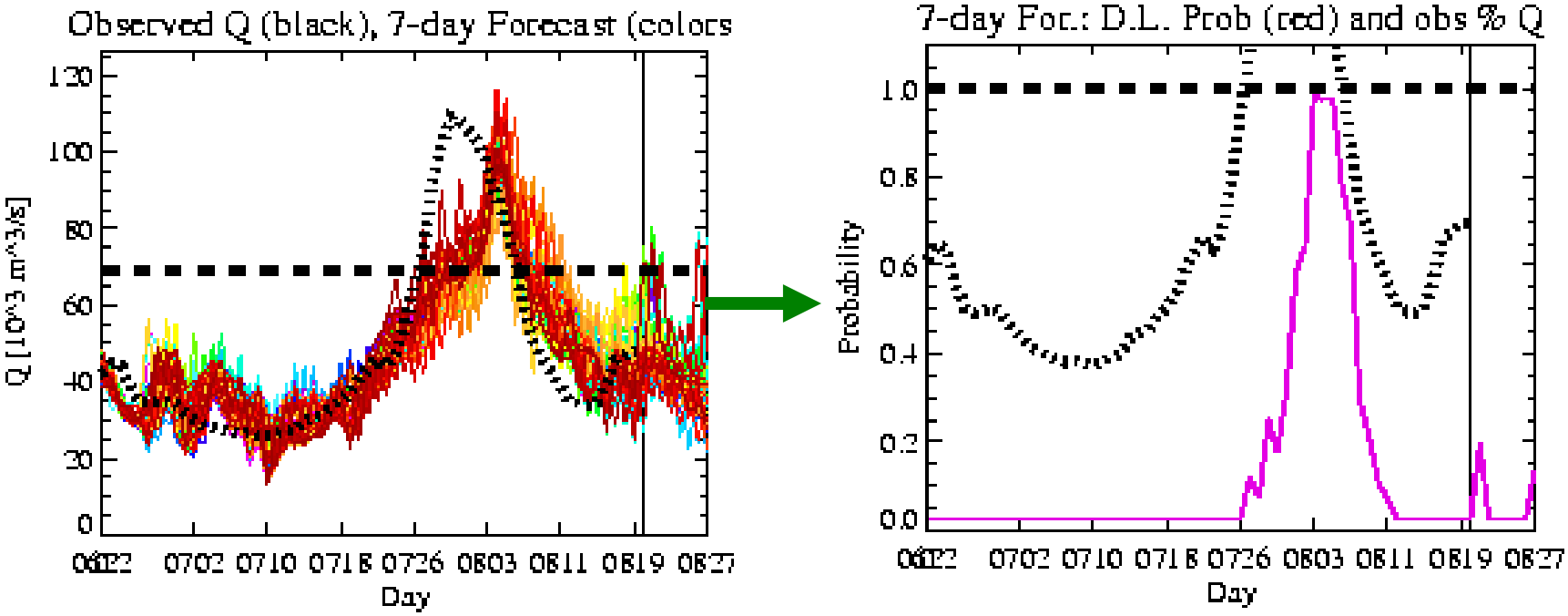
7-10 day Ensemble Forecasts



7-10 day Danger Levels



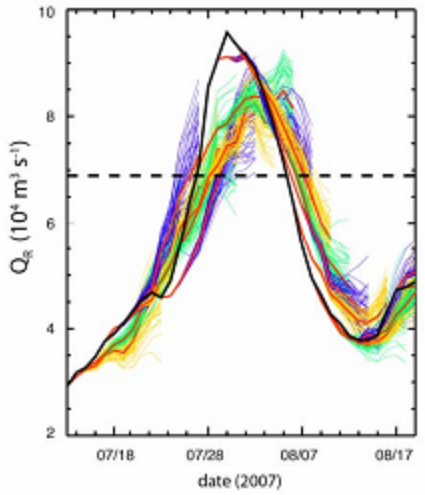
Short-term 7-days Flood Forecasts for Brahmaputra and Threshold Probabilities

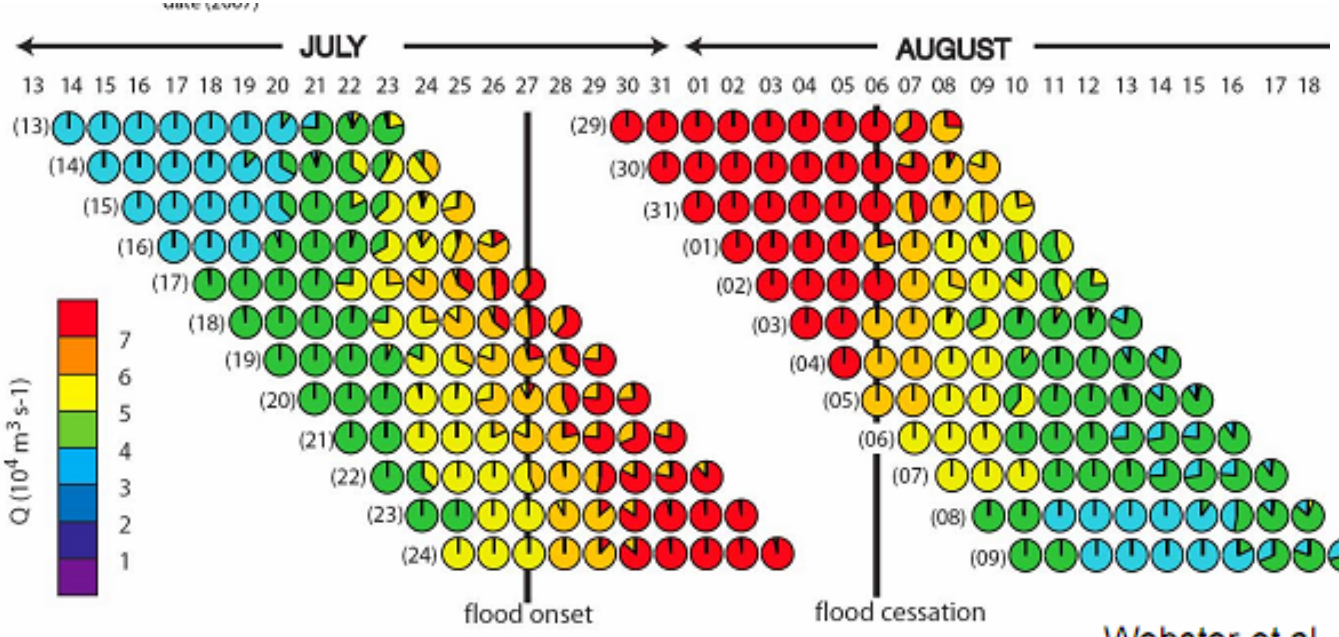


Summary of forecasts and exceeding of danger level

Plumes and probability pies for the first Brahmaputra flood July 28-August 6, 2007

High probabilities of exceedance of the danger level by the Brahmaputra at the India-Bangladesh border

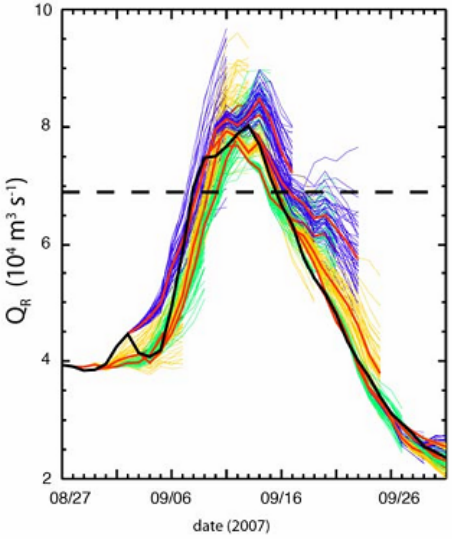


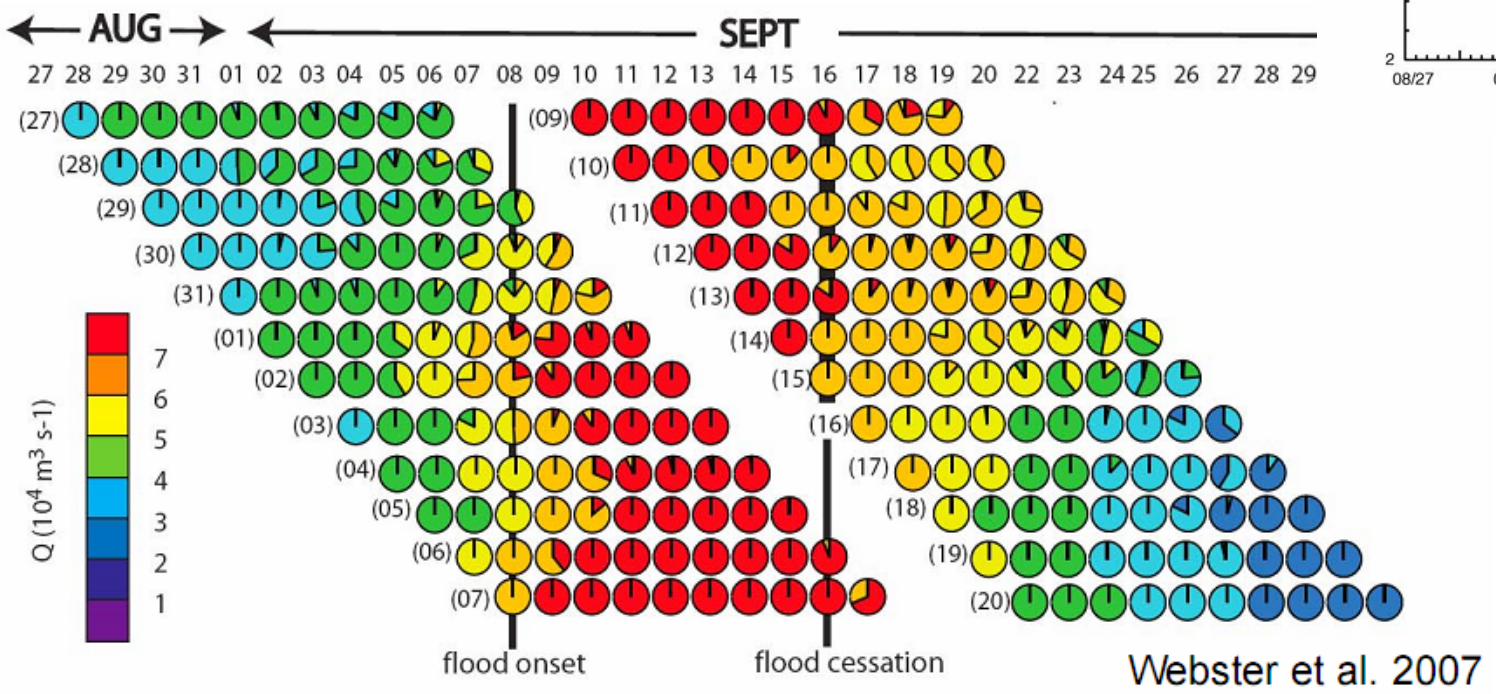


Webster et al. 2007

Plumes and probability pies for the first Brahmaputra flood September 8-16, 2007

For the second flooding, short-term forecasting, successful in providing high probabilities of exceedance of the danger level by the Brahmaputra





Webster et al. 2007

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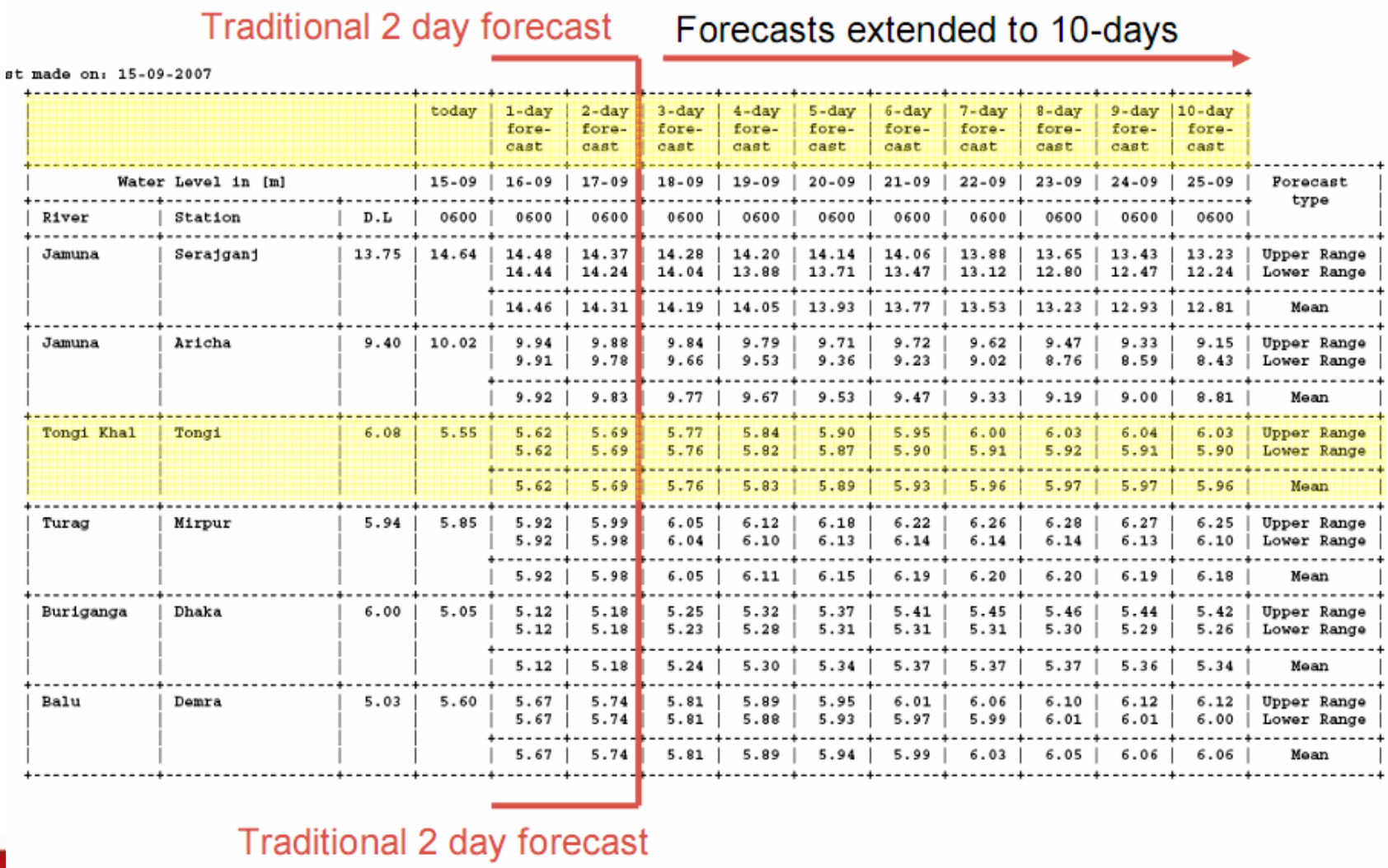
Institutionalization



st made on: 15-09-2007

			today	1-day fore-cast	2-day fore-cast	3-day fore-cast	4-day fore-cast	5-day fore-cast	6-day fore-cast	7-day fore-cast	8-day fore-cast	9-day fore-cast	10-day fore-cast	
Water Level in [m]			15-09	16-09	17-09	18-09	19-09	20-09	21-09	22-09	23-09	24-09	25-09	Forecast type
River	Station	D.L	0600	0600	0600	0600	0600	0600	0600	0600	0600	0600	0600	
Jamuna	Serajganj	13.75	14.64	14.48	14.37	14.28	14.20	14.14	14.06	13.88	13.65	13.43	13.23	Upper Range
				14.44	14.24	14.04	13.88	13.71	13.47	13.12	12.80	12.47	12.24	Lower Range
				14.46	14.31	14.19	14.05	13.93	13.77	13.53	13.23	12.93	12.81	Mean
Jamuna	Aricha	9.40	10.02	9.94	9.88	9.84	9.79	9.71	9.72	9.62	9.47	9.33	9.15	Upper Range
				9.91	9.78	9.66	9.53	9.36	9.23	9.02	8.76	8.59	8.43	Lower Range
				9.92	9.83	9.77	9.67	9.53	9.47	9.33	9.19	9.00	8.81	Mean
Tongi Khal	Tongi	6.08	5.55	5.62	5.69	5.77	5.84	5.90	5.95	6.00	6.03	6.04	6.03	Upper Range
				5.62	5.69	5.76	5.82	5.87	5.90	5.91	5.92	5.91	5.90	Lower Range
				5.62	5.69	5.76	5.83	5.89	5.93	5.96	5.97	5.97	5.96	Mean
Turag	Mirpur	5.94	5.85	5.92	5.99	6.05	6.12	6.18	6.22	6.26	6.28	6.27	6.25	Upper Range
				5.92	5.98	6.04	6.10	6.13	6.14	6.14	6.14	6.13	6.10	Lower Range
				5.92	5.98	6.05	6.11	6.15	6.19	6.20	6.20	6.19	6.18	Mean
Buriganga	Dhaka	6.00	5.05	5.12	5.18	5.25	5.32	5.37	5.41	5.45	5.46	5.44	5.42	Upper Range
				5.12	5.18	5.23	5.28	5.31	5.31	5.31	5.30	5.29	5.26	Lower Range
				5.12	5.18	5.24	5.30	5.34	5.37	5.37	5.37	5.36	5.34	Mean
Balu	Demra	5.03	5.60	5.67	5.74	5.81	5.89	5.95	6.01	6.06	6.10	6.12	6.12	Upper Range
				5.67	5.74	5.81	5.88	5.93	5.97	5.99	6.01	6.01	6.00	Lower Range
				5.67	5.74	5.81	5.89	5.94	5.99	6.03	6.05	6.06	6.06	Mean

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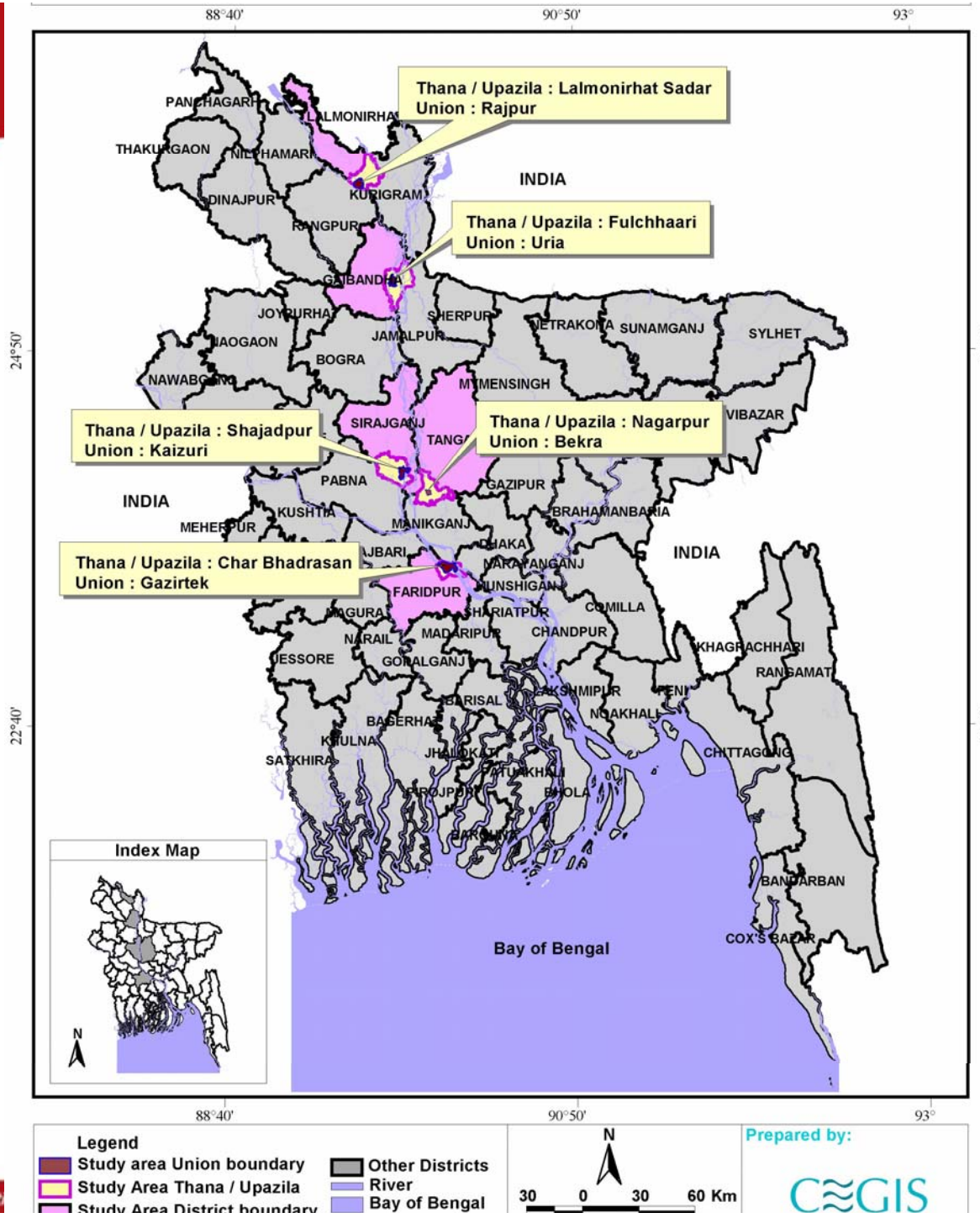
Pilot Areas



Flood risk management at community level decisions and forecast lead time requirement (Eg. Rajpur Union, Lalmunirhat district)

Target groups	Decisions	Forecast lead time requirement
Farmers	Early harvesting of B.Aman, delayed planting of T.Aman	10 days
	Crop systems selection, area of T. Aman and subsequent crops	Seasonal
	Selling cattle, goats and poultry (extreme)	Seasonal
Household	Storage of dry food, safe drinking water, food grains, fire wood	10 days
	Collecting vegetables, banana	1 week
	With draw money from micro-financing institutions	1 week
Fisherman	Protecting fishing nets	1 week
	Harvesting fresh water fish from small ponds	10 days
DMCs	Planning evacuation routs and boats	20 – 25 days
	Arrangements for women and children	20 – 25 days
	Distribution of water purification tablets	1 week
Char households	Storage of dry food, drinking water, deciding on temporary accommodation	1 week

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Disasters, impacts and management plan matrix for crop, livestock and fisheries sector (eg. Uria, Gaibandha district)

Disasters	Crop	Stages	Season/ month	Impacts	Time of flood forecast	Alternative management plans
Early flood	T.Aman	Seedling and Vegetative stage	Kharif II Jun – Jul	Damage seedlings Damage early planted T.Aman Delay planting Soil erosion	Early June	Delayed seedling raising, Gapfilling, skipping early fertilizer application
	T.Aus	Harvesting	Kharif I Jun – Jul	Damage to the matured crop	Early June	Advance harvest
	Jute	Near maturity	June-July	Yield loss Poor quality	May end	Early harvest
	S.Vegetables	Harvesting	June-July	Damage yield loss Poor quality	Mar - Apr	Pot culture (homestead) Use resistant variety
High flood	T. Aman	Tillering	Kharif - II July-Aug	Total crop damage	Early June	Late varieties Direct seeding Late planting
Late flood	T. Aman	Booting	Kharif II Aug-Sep	Yield loss and crop damage	Early July	Use of late varieties Direct seeding Early winter vegetables Mustard or pulses
Flood (early, high and late)	Cattle	-	Jun-Sep	Crisis of food and shelter. Diseases like cholera, worm infestation	Early June	Food storage, flood shelter, vaccination de-warming
Flood	Nursery table fish Brood fish	-	June to Aug	Inundation of fish farms Damage to the pond embankments Infestation of diseases Loss of standing crops	Apr - May	Pre-flood harvesting, Net fencing/bana, Fingerlings stocked in flood free pond, High stock density

Communication of flood forecasts 2007

Communication of flood forecasts 2007

Institutional and community responses on 2007 flood forecast

Discussion of options with local communities, CBOs, local working group members, networks

Flood forecast issued for two boundary locations — **21 Jul**

Incorporated into customized local model — **22 Jul**

Communicatio n to project partners — **23 Jul**

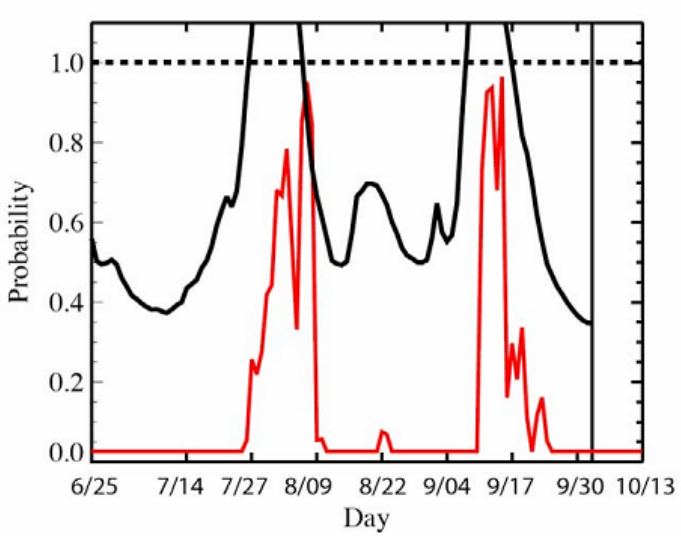
Communication to stakeholders and local DMC members — **24 Jul**

Communicatio n to Disaster Emergency Group — **25 Jul**

Information to relief agencies about the extent of flooding — **26 Jul**

30 Jul

2 Aug



Danger level probability

Local institutions prepared response and relief plans

Community in low lands reserved their food, drinking water, fodder requirements

Local Disaster Management Committee and Volunteers prepared for rescue

Flood water exceeded danger level on 28th July

Low lying areas are flooded on 29th July

Aid agencies arranged logistics and begin dialogue with district administration

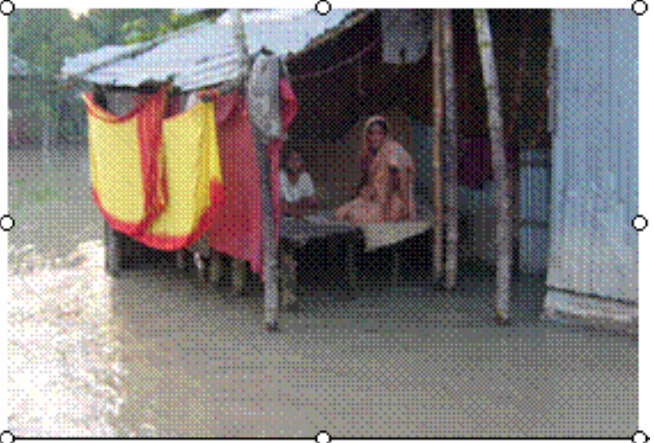
Relief distribution started in affected locations

Community responses to flood forecasts

(a) Shelter for human and livestock on road

(b) Collection of drinking water

(c) Raising net around pond to protect fish



(d) People living on *macha* (bamboo made structure) during flood

Community responses to flood forecasts

Response of National institutions:2007 flood forecasts

- Flood Forecasting and Warning Center incorporated the CFAB forecasts to produce water level forecasts for many locations along Brahmaputra and Ganges well in advance
- National level Disaster Emergency Response Group consisting of INGOs, Ministry of Food and Disaster Management and International Organisations prepared emergency response plans, logistics for preparedness and relief in advance
- National level NGO network and INGOs prepared localised warning messages and disseminated to their counterparts at local level
- National level service organisations like Department of Agriculture Extension prepared rehabilitation plans in advance

Response of local institutions for 2007 flood forecasts

- District level service organisations in partnership with NGOs communicated 1-10 days forecast in 5 days advance
- Local NGOs and implementing partners prepared evacuation and response plans to protect lives and livelihoods
- District level relief and emergency orgnisations plan to mobilise resources for relief and recovery activities
- Local NGOs, Government organisations and CBOs mobilise mechanised and manual boats to rescue people and livestock from the “char” areas
- Local NGOs and Department of agriculture extension prepared work plan for relief and rehabilitation activities

Community level decision responses for 2007 flood forecasts (Low lands)

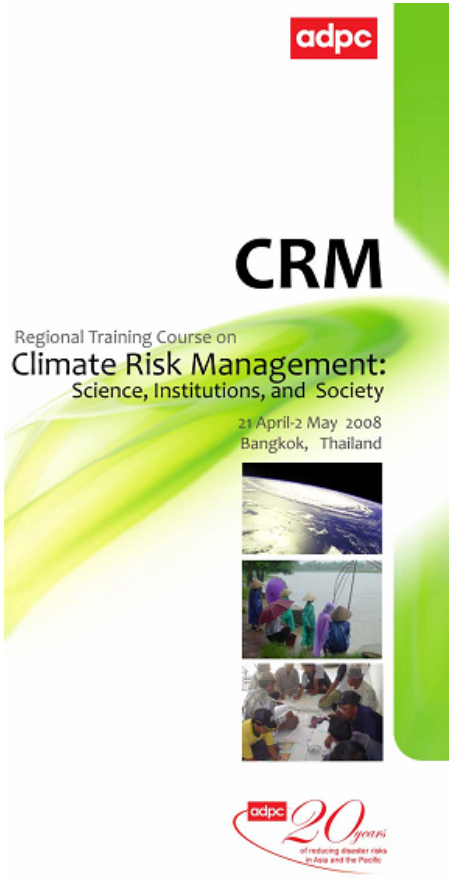
- Local people planned to store dry food and safe drinking water for about 15 days knowing that relief will start only 7 days after initial flooding.
- Secured cattle, poultry birds, homestead vegetables, protected fishery by putting nets in advance
- Secured cooking stove, small vessels, firewood and animal dry fodder
- Planed to evacuate and identified high grounds with adequate sanitation and communication
- Planed for alternative livelihood options immediately after flooding (eg. Small scale fishing, boat making)

Community level decision responses for 2007 flood forecasts (High lands)

- Abandoned *T. aman* transplanting temporarily anticipating floods
- Secured additional seedlings for double planting of rice after the floods
- Protected homestead vegetables by creating adequate drainage facilities
- Reserved seeds of flood tolerant crops
- Planned for growing seedlings in high lands
- Planed for alternative off-farm employment during floods
- Early harvesting of B.aman rice and jute anticipating floods
- Leaving livestock in high land shelters

Risk Communication- New Generation Location/ Situation Specific Risk Information

- Capacity Building of institutional learning process need to take place
- New institutional coordination arrangement (i.e. Monsoon Forum)
- Downscaling climate forecast product and long range forecasts to manage uncertainty
- Training & capacity building



THANK YOU