

**The 5th International Coordination Group (ICG) Meeting  
GEOSS Asian Water Cycle Initiative (AWCI)  
Tokyo, Japan, 15-18, December 2009**

## **Country Report: Bangladesh**



**Monitoring and forecasting of cyclones SIDR and  
AILA**

**Colonel Mohammad Ashfakul Islam**  
Engineer Adviser  
Ministry of Defence

Government of the People's Republic of Bangladesh  
**Dhaka, Bangladesh**

# Introduction

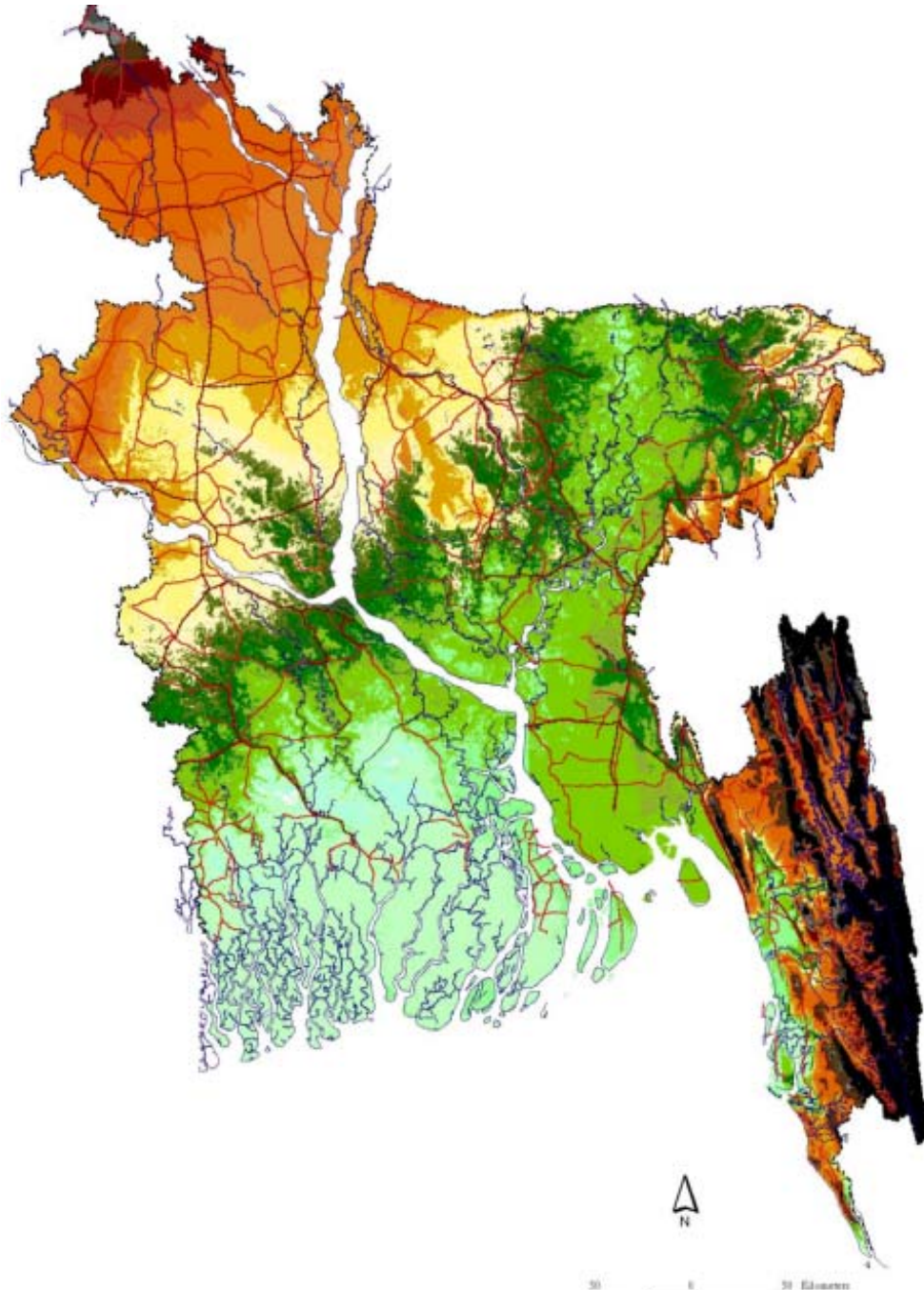
- Bangladesh is a deltaic land of about 144,000 sq. km area having great Himalayas to the north and the vast Bay of Bengal on the south.
- It is a South Asian country extending from 20° 45' N to 26° 40' N and from 88° 05' E to 92° 40' E belonging to the South Asian Association for Regional Cooperation (SAARC).
- It has a complex coast line of about 710 kms and long continental shelf with shallow bathymetry.
- The Bay of Bengal forms a funneling shape towards the Meghna estuary and for that the storm surge is the highest here in the world.
- Bangladesh Meteorological Department (BMD) is the national meteorological service in Bangladesh under the Ministry of Defence of the Government of the People's Republic of Bangladesh is mandated for cyclone forecasting.
- Cyclone Preparedness Programme (CPP) under Bangladesh Red Crescent Society (BDRCS) forwards cyclone warning bulletins to 42,675 coastal volunteers for saving coastal vulnerable people.

# Position of Bangladesh in the World Map and in the Asia Map



Bangladesh

# Topography of Bangladesh



- Land elevation of 50% of the country is within 5 m of MSL
- About 68% of the country is vulnerable to flood
- 20-25% of the area is inundated during normal flood



■ Bangladesh is the most disaster prone area in the world. Most of these disasters are meteorological and hydrological in nature. Such as-

➤ Cyclone & associated Storm Surge

➤ Nor'westers/Tornadoes

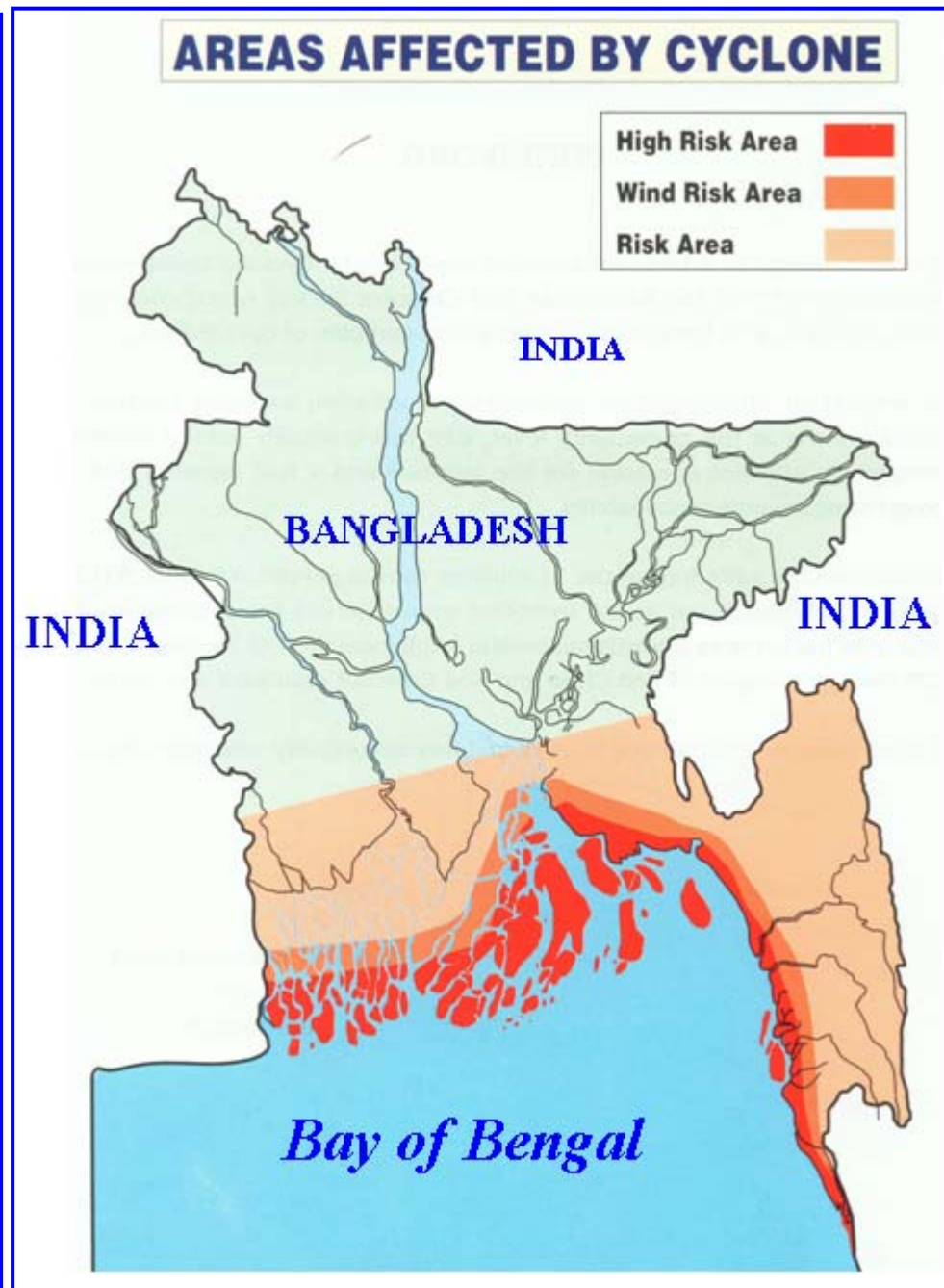
➤ Drought

➤ Floods and River Erosion

➤ Heat Waves and Cold Waves

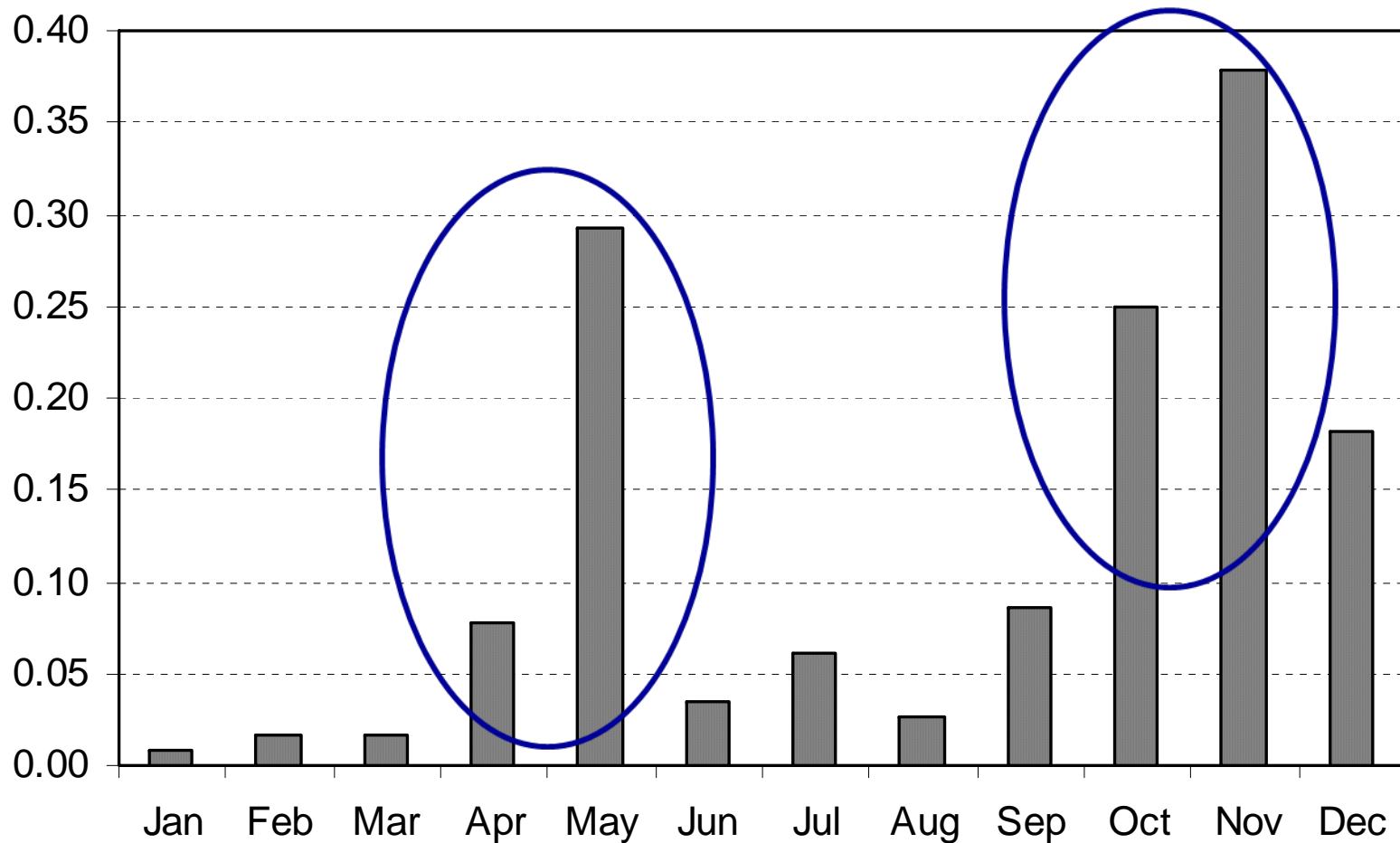
➤ Earthquakes

➤ Land slide

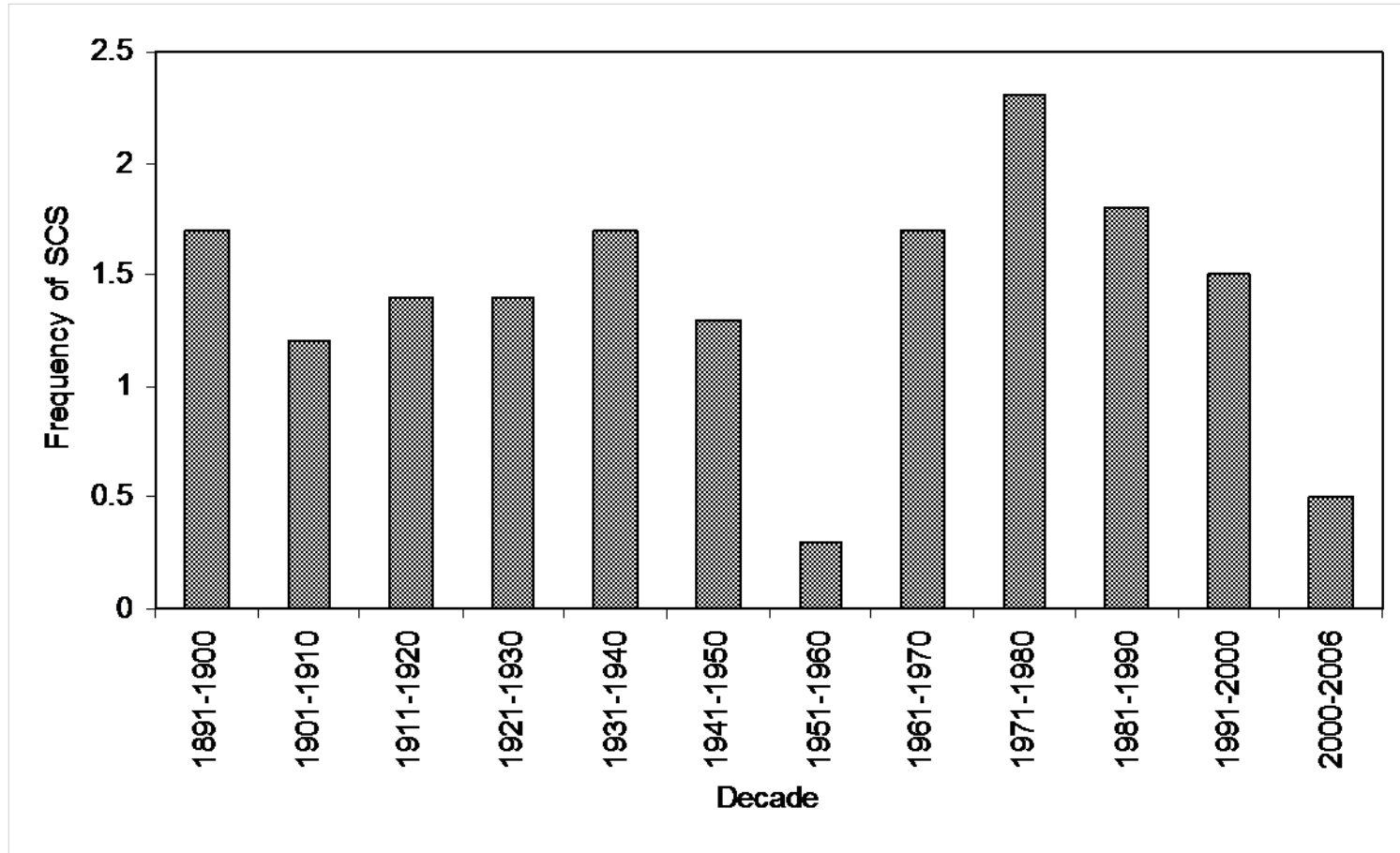


## **Some *Catastrophic Cyclone* that affected Bangladesh**

- **The great Bakerganj Cyclone of 1876**
- **The worst killer Cyclone of November 1970**
- **The Urrirchar Cyclone of May 1985**
- **The Severe Cyclone of November 1988**
- **The killer cyclone of April 1991**
- **The Severe cyclone of May 1997**
- **The Severe Cyclone of September 1997**



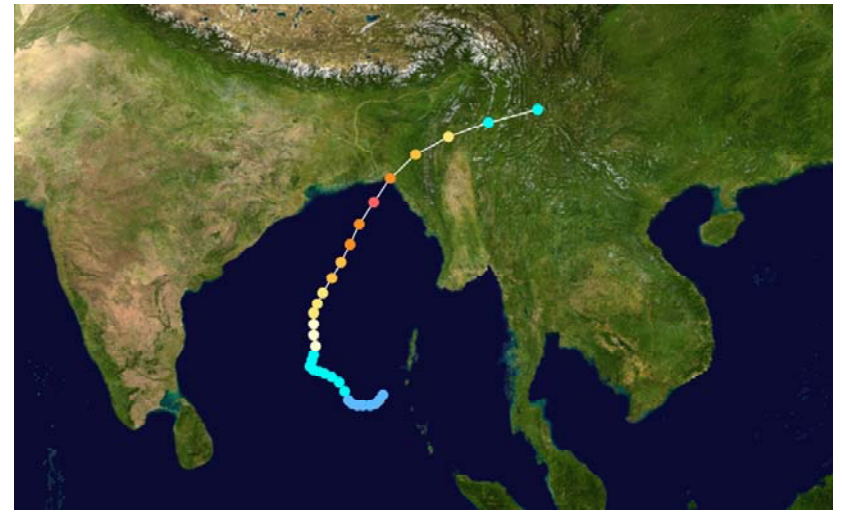
**Monthly distribution of Severe Cyclonic Storm (SCS) formed in the Bay of Bengal during 1891-2008**



**Decadal variation of SCS formed in the Bay of Bengal during 1891-2006**



**Bhola cyclone Track, 1970**



**April 29, 1991 Track**

### **Bhola Cyclone, 1970**

- **Formed: November 7, 1970**
- **Dissipated: November 13, 1970**
- **Highest Winds (10 min sustained): 185 KPH**
- **Highest winds (1 min sustained): 222 KPH**
- **Lowest Pressure: 966 hPa**
- **Fatalities: 300,000-500,000**
- **Damage: 86.4 Million USD**
- **Affected areas: India & East Pakistan**

### **Bangladesh Cyclone, 1991**

- **Formed: April 22, 1991**
- **Dissipated: April 30, 1991**
- **Highest winds (1 min sustained): 225 KPH**
- **Lowest Pressure: 898 hPa**
- **Fatalities: 138, 000**
- **Damage: 1.5 billion USD**
- **Affected areas: Bangladesh**

**Historical cyclones with high casualties**



## Recent Cyclones

<b>Cyclone Name</b>	<b>Date of Formation</b>	<b>Area of Formation</b>	<b>Area of land fall</b>	<b>Date of land fall</b>
<b>Cyclone “SIDR”</b>	<b>11.11.2007 at 12 Noon</b>	<b>SE Bay and adjoining area</b>	<b>Khulna-Barisal coast (near Baleshwar river)</b>	<b>15.11.07 at Evening</b>
<b>Cyclone “Nargis”</b>	<b>27.04.2008 at 06 PM</b>	<b>SE Bay and Adjoining SW Bay</b>	<b>Southern coast of Myanmar (near Bassein)</b>	<b>02.05.2008 at afternoon</b>
<b>Cyclone “Rashmi”</b>	<b>25.10.2008 at 06 PM</b>	<b>WC Bay and Adjoining NE Bay</b>	<b>Khulna-Barisal coast (near Patharghata)</b>	<b>27.10.2008 Morning</b>
<b>Cyclone “Bijli”</b>	<b>14.04.2009 at 06 PM</b>	<b>SE Bay and adjoining Central Bay</b>	<b>Chittagong Cox’s Bazar coast (near Chittagong)</b>	<b>18.04.2009 at 03 PM</b>
<b>Cyclone “Aila”</b>	<b>23.05.2009 at 03 PM</b>	<b>WC Bay and adjoining area</b>	<b>West Bengal-Khulna coast (near Sagar Island)</b>	<b>25.05.2009 afternoon to evening</b>

# Cyclone Warning Systems in Bangladesh

- **BMD is responsible for providing tropical cyclone warnings. Warnings and forecasts are issued under the authority of the Director, BMD.**
- **The tropical storm warnings are provided from the Storm Warning Centre (SWC) of BMD which is located at Dhaka.**
- **The tropical cyclones are tracked with the help of conventional observations, radar and satellite observations and model derived products.**
- **After issuing the tropical cyclone warnings are provided to:**
  - **The Hon'ble President**
  - **The Hon'ble Prime Minister**
  - **Control room, Ministry of Food and Disaster Management (MoFDM)**
  - **All ministries**
  - **Sea Port Authorities at Chittagong, Mongla and Cox's Bazar**
  - **Cyclone Preparedness Programme (CPP), Bangladesh Red Crescent Society**
  - **Armed Forces division, Bangladesh Navy, Bangladesh Air Force**
  - **Inland river ports authorities, Airport authorities**
  - **Concerned government officials**
  - **The general public (through Betar (Radio) Television, electronic media and mass-media)**
  - **Fishing boats and trawlers in the sea, Coast Guard**
  - **Non-Government Organizations**

# Stages of warnings

Warnings are issued in four stages for the government officials. The first stage called "Alert" is issued to all concerned whenever a disturbance is detected in the Bay as per SOD of Bangladesh. In the second stage, cyclone warnings are issued in four steps as detailed below:

- a. **Distant Cautionary Signal** is issued if a ship might run into danger during its voyage after leaving the harbour. **Distant Warning Signal** issued when there is no immediate danger of the port but a ship might run into the storm after leaving the port.
- b. **Local Cautionary Signal** is issued when the port is threatened by squally weather from tropical disturbances.
- c. **Local Warning Signal** is issued when the port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution. It is issued minimum 24 hours before the landfall.
- d. **Danger Signal** is issued when the port is likely to experience severe weather from a storm of slight or moderate intensity. The Signal is issued minimum 18 hours before the landfall.
- e. **Great Danger Signal** is issued when the port is likely to experience severe weather from a storm of great intensity. The signal is issued minimum 10 hours before the landfall.

## **Format of the cyclone warning bulletin**

**Cyclone forecast or warnings are issued as header of 'Special Weather Bulletin'. The bulletin contains the following information:**

- **Name of the storm**
- **Position of the storm centre**
- **Direction and speed of movement in knots (international use) and km/h (national use).**
- **Distance of the storm centre from the ports.**
- **Maximum sustained wind within the radius of maximum wind.**
- **Signals for the maritime ports.**
- **Areas are likely to be affected specifying Upazila (subdivision) as far as possible.**
- **Approximate time of commencement of gale winds (speed more than 51 km/ h).**
- **Storm surge height in meter and areas likely to be inundated.**
- **Advisory for fishing boats and trawlers over North Bay and Deep Sea.**

## **Dissemination of cyclone bulletin**

- **Warnings are disseminated through high priority landline telegrams, telefax, telephone, teleprinter and e-mail.**
- **In addition, warnings are also transmitted to Betar (Radio) Bangladesh, Dhaka, Chittagong, Khulna, Rangpur, Rajshahi and Sylhet for broadcast.**
- **Alert messages are broadcast four to five times a day.**
- **"Warnings" are broadcast every hour and**
- **"Danger" and "Great Danger" messages are broadcast frequently.**
- **Warnings are made available in the BMD web page immediately after issuing from SWC.**



# **Some hazardous scenario in Bangladesh**



**Heat wave**

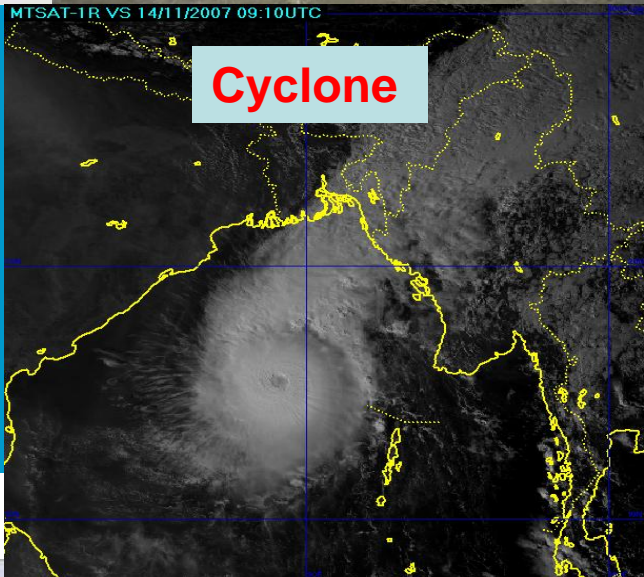


**Flood**



**River Erosion**

**Disasters in Bangladesh**



**Cyclone**



**Thunderstorm**



**Cold wave**

মৃতদেহ নৌকায় করে তীরে নিচ্ছেন উদ্ধারকর্মীরা। পাড়ে স্বজন ও স্থানীয় লোকজনের উদ্বিগ্ন অপেক্ষা —জিয়া ইসলাম

গুড়ি গুড়ি বৃষ্টি। তার ওপর তীব্র শীত। বৃষ্টি ও শীতে জনজীবনে বাড়তি দুর্ভোগ। রাজধানীর মহাখালী ফ্লাইওভার থেকে গতকাল ছবিটি তোলেন জাহিদুল করিম



# Manmade Disasters



**Land Slide**

চট্টগ্রাম নগরীর মতিঝর্ণা এলাকায় পাহাড়ের পাদদেশে জীবনের ঝুঁকি নিয়ে আবারও বসবাস শুরু করেছে হিম্মতুল মানুশ —প্রথম আলো



**Blockage Drain**

বাল দখল করে তৈরি অন্যদের স্থাপনা উচ্ছেদ করলেও চট্টগ্রাম সিটি করপোরেশন নিজেই নগরীর বহুভাগে চাকরাই খালের ওপর তৈরি করেছে চারতলা বাণিজ্যিক ভবন —ছবি : রাশেদ মাহমুদ



**Deforestation**

মধুপুরে প্রাকৃতিকভাবে গড়ে ওঠা শালবন কেটে কলাবাগান ও আনারসের চাষ করা হচ্ছে। গলুই এলাকা থেকে গতকাল ছবিটি তুলছেন সাইফুল ইসলাম কলোদ



**Deforestation**

গাজীপুরের ভাওয়াল গজারি বনের হাতিয়াব মৌজায় নির্মাণ হচ্ছে ইউনিভার্সেল এন্ড্রেসরিজ নামে একটি শিল্পপ্রতিষ্ঠান। এই প্রতিষ্ঠান ঘেঁষে তিন পাশেই রয়েছে ঘন বন



# Environmental Degradation Due to Climate Change



**Mangrove forest under threat**



**Drainage congestion**

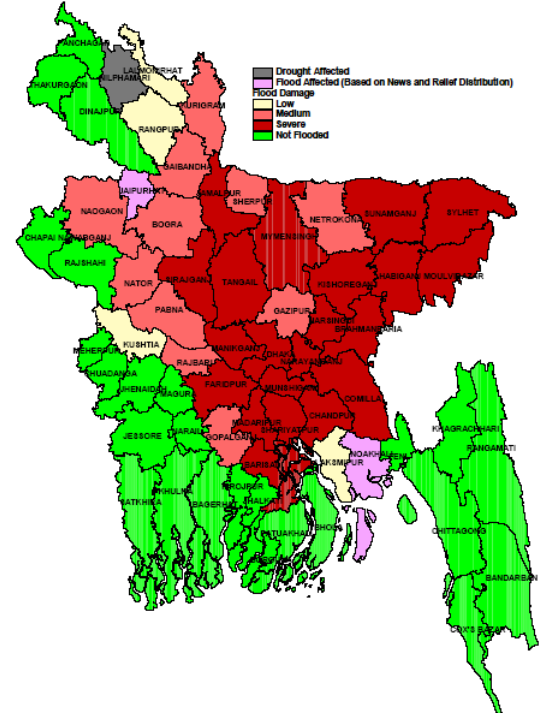
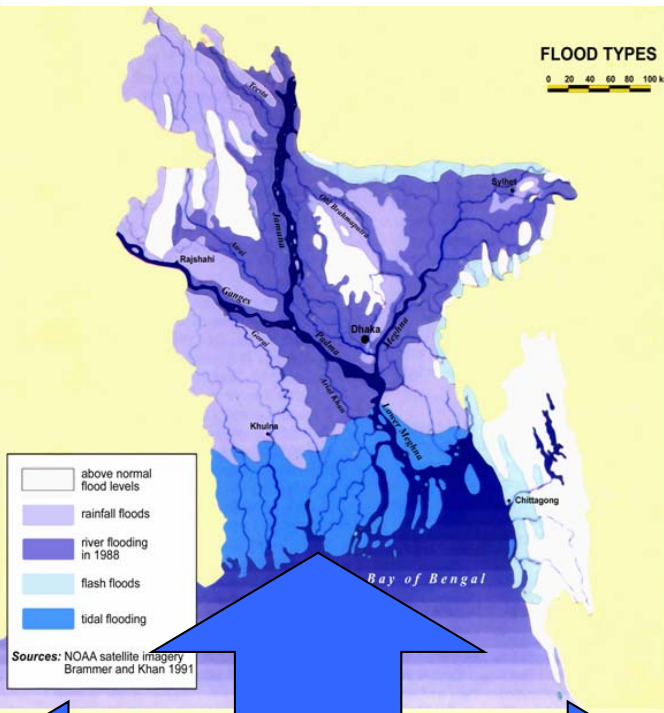
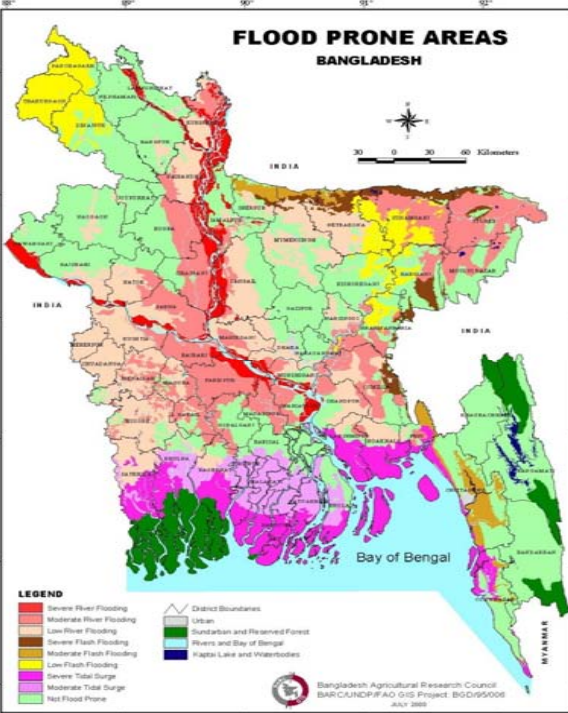


**Typical erosion in small and medium rivers**

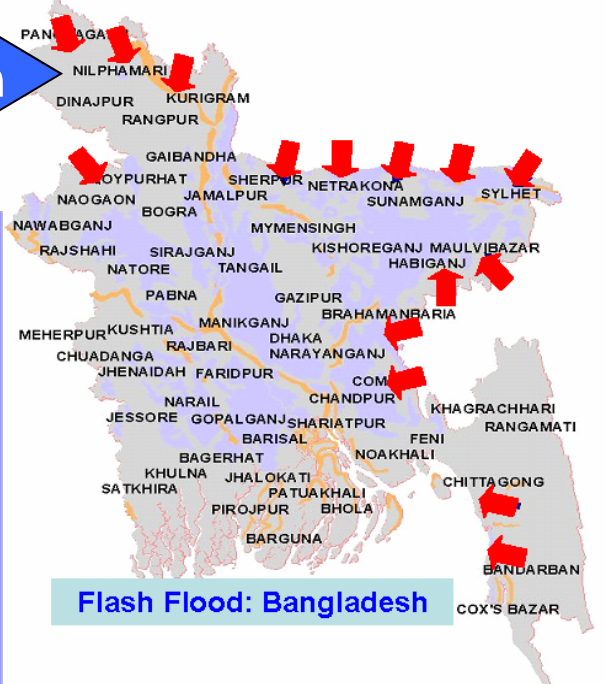
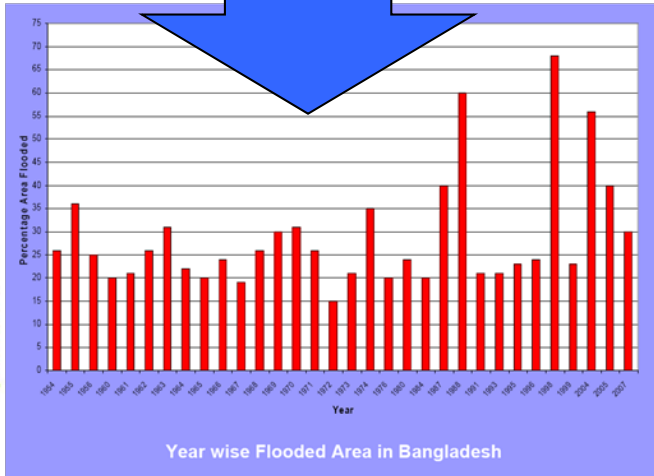
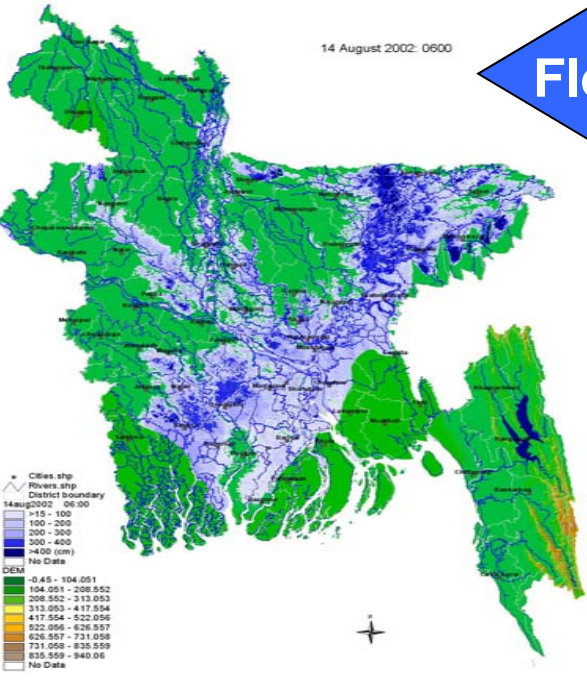




# FLOOD PRONE AREAS BANGLADESH



# Flood Situation: Bangladesh





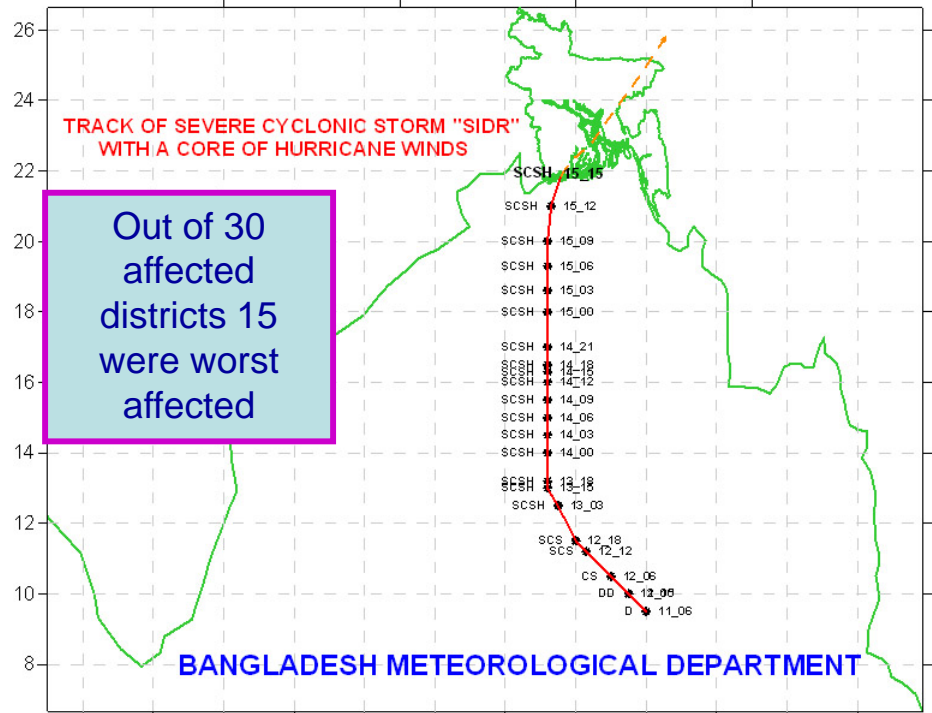
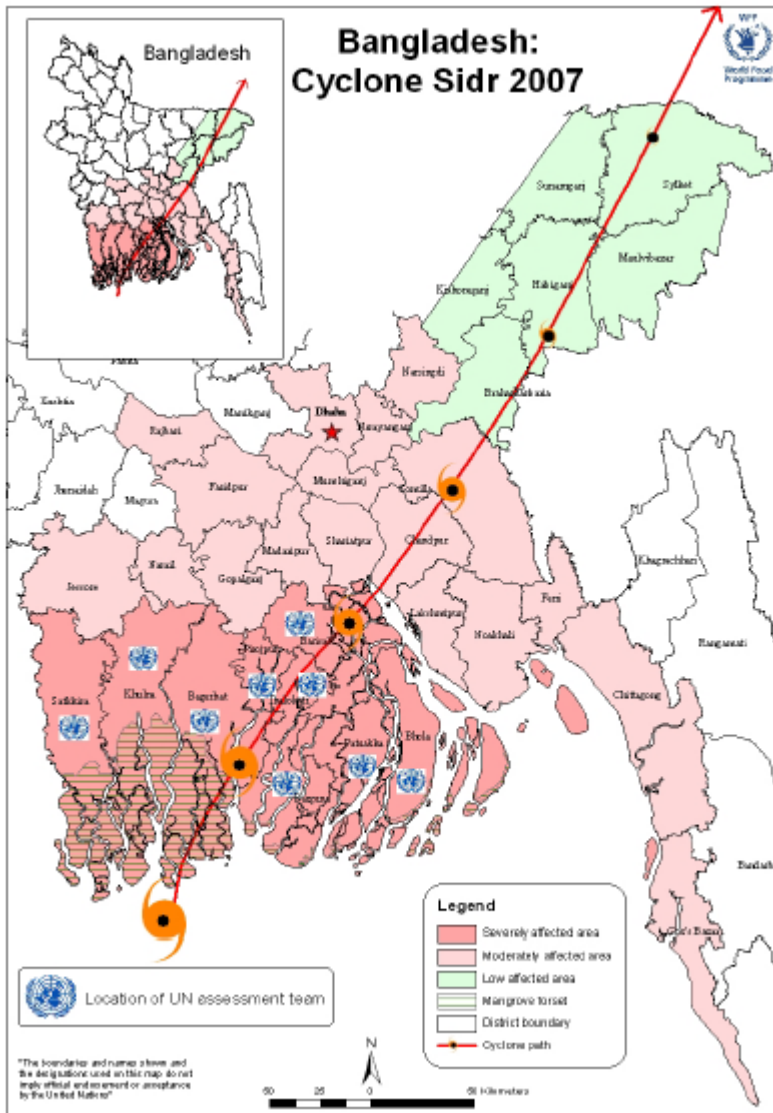


# **Monitoring cyclone SIDR**

## Severe Cyclonic Storm (H) “SIDR” during 10-15 November 2007

<b>Date &amp; Time (UTC)</b>	<b>Position</b>	<b>Status</b>	<b>Signal for maritime ports</b>	<b>Distance</b>
10, 0000	South Andaman Sea	Low	-----	-----
10, 1200	SE Bay	WML	DC-I	-----
11, 0600	SE Bay (9.5 <sup>0</sup> N & 92.0 <sup>0</sup> E)	Depression	DC-I	Chittagong-1415 Cox's Bazar-1325 Mongla-1450
12, 0000	SE Bay (10.0 <sup>0</sup> N & 91.5 <sup>0</sup> E)	Deep Depression	DC-I	Chittagong-1360 Cox's Bazar-1270 Mongla-1385
12, 0600	SE Bay (10.5 <sup>0</sup> N & 91.0 <sup>0</sup> E)	CS “SIDR”	DW-II	Chittagong-1310 Cox's Bazar-1220 Mongla-1325
13, 0300	SE Bay (12.5 <sup>0</sup> N & 89.5 <sup>0</sup> E)	SCSH “SIDR”	LW-IV	Chittagong-1115 Cox's Bazar-1030 Mongla-1090
14, 1200	SE Bay (16.0 <sup>0</sup> N & 89.2 <sup>0</sup> E)	SCSH “SIDR”	Mongla port-X, Chittagong-IX Cox's Bazar-IX	Chittagong-755 Cox's Bazar-675 Mongla-705
15, 1500	Centre of the Cyclone crossed the coast	SCSH “SIDR”	do	-----
15, 2100	SIDR completed crossing the coast	SCSH “SIDR”	do	-----

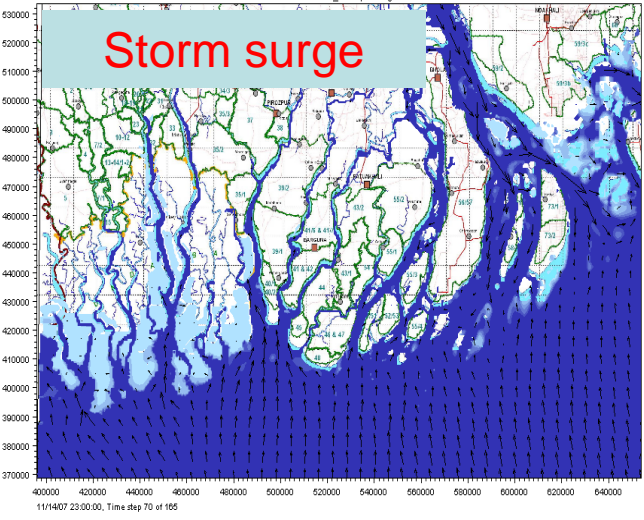
# Cyclone SIDR Storm surge flooding



1.	<b>Total Death</b>	<b>3,363</b>
2.	<b>People missed</b>	<b>871</b>
3.	<b>Family affected</b>	<b>1,928,265</b>
4.	<b>People affected</b>	<b>8,545,470</b>
5.	<b>Houses damaged</b>	<b>1,449,157</b>
6.	<b>Crop damaged</b>	<b>2,077,226</b>
7.	<b>Trees destroyed</b>	<b>4,065,316</b>



# Storm surge



chool children foreground, a flattened school building in the backdrop.



Small shops, businesses, market areas, damaged along the road side.









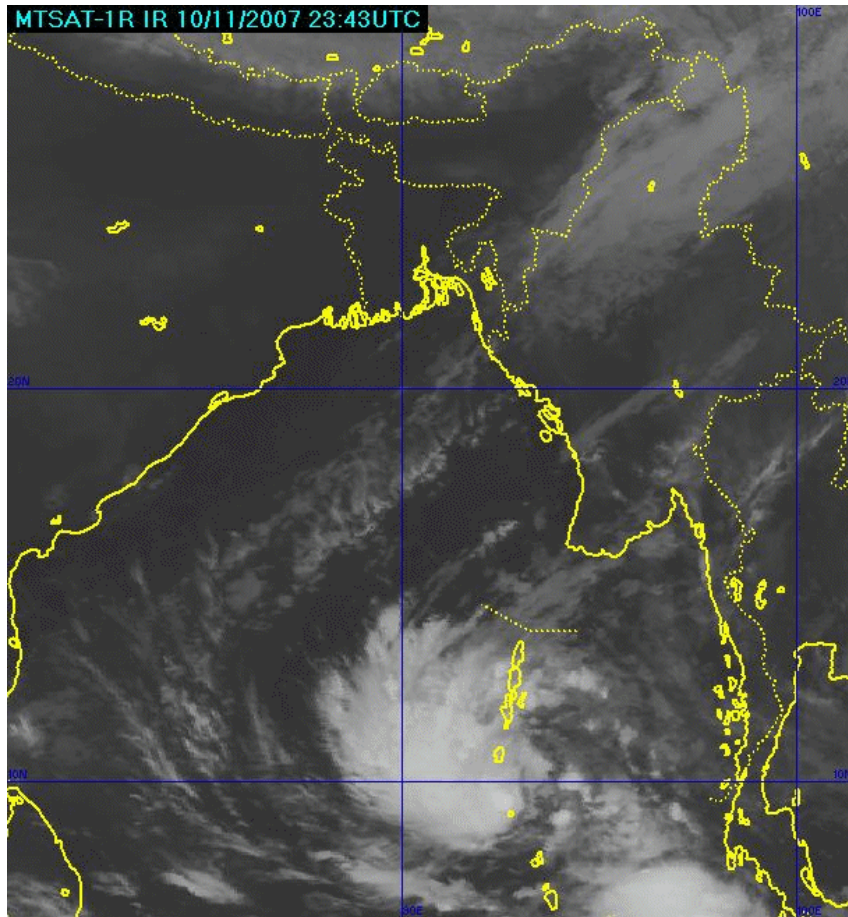




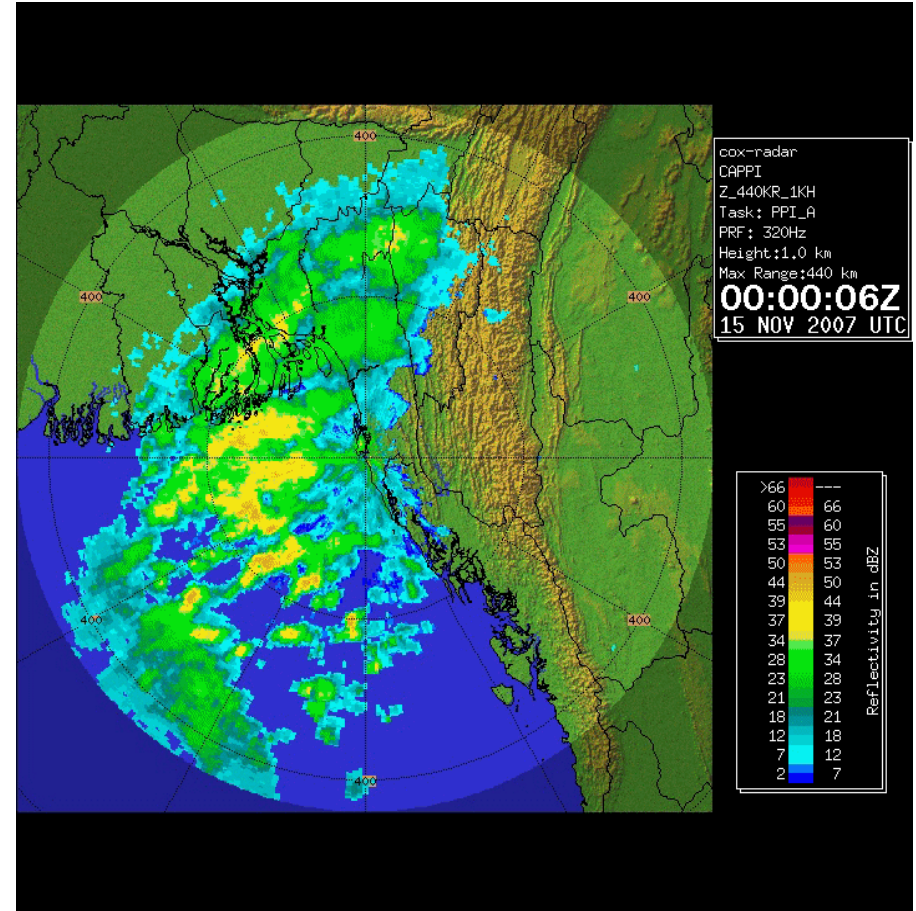




# MTSAT IR1 Image animation of Severe Cyclonic Storm “SIDR” crossed Bangladesh



# BMD Radar Image animation of Severe Cyclonic Storm “SIDR” crossed Bangladesh



## Intensity and movement of cyclone SIDR

➤ The intensity of cyclone SIDR increased rapidly upto its cyclonic stage after its formation when it was in deep sea and then increased slowly by maintaining its energy and reached maximum state when it was little away from the coast of Bangladesh.

➤ But after making landfall it was losing its energy rapidly by giving high wind in the coastal belt of Bangladesh (shown in Fig. 3).

➤ It is found that the movement of the cyclone SIDR was low (~ 5 knots) but after 1200 UTC of 14 November its movement increased very rapidly towards north (Bangladesh coast) and reached as high as about 30 knots (shown in Fig. 4).

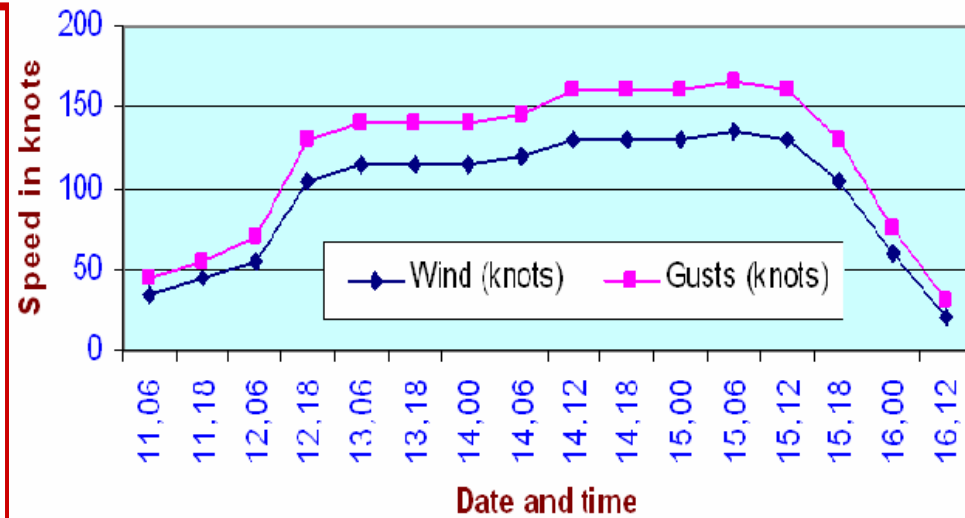


Fig. 3: Variation of intensity of cyclone SIDR

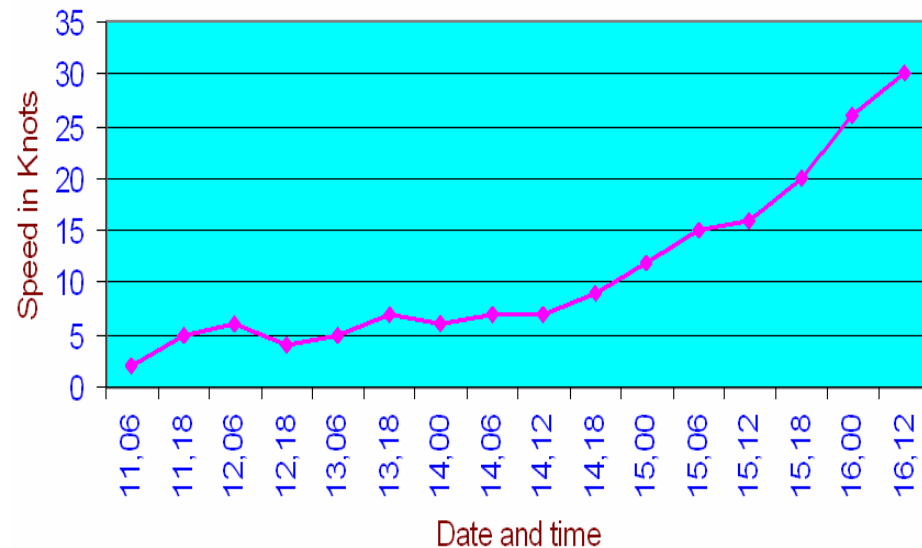


Fig. 4: Variation of horizontal SIDR speed

## Recorded rainfall due to cyclone SIDR

- The higher rainfall were recorded in the areas of passage of cyclone SIDR but the amounts of rainfall were low compared with the previous cyclones crossed Bangladesh coast.
- This may be due to higher intensity of SIDR.
- The weak cloud band was also observed from the Cox's Bazar Radar (located at  $21.43^{\circ}$  N and long.  $91.93^{\circ}$  E) and is given in Fig. 5.

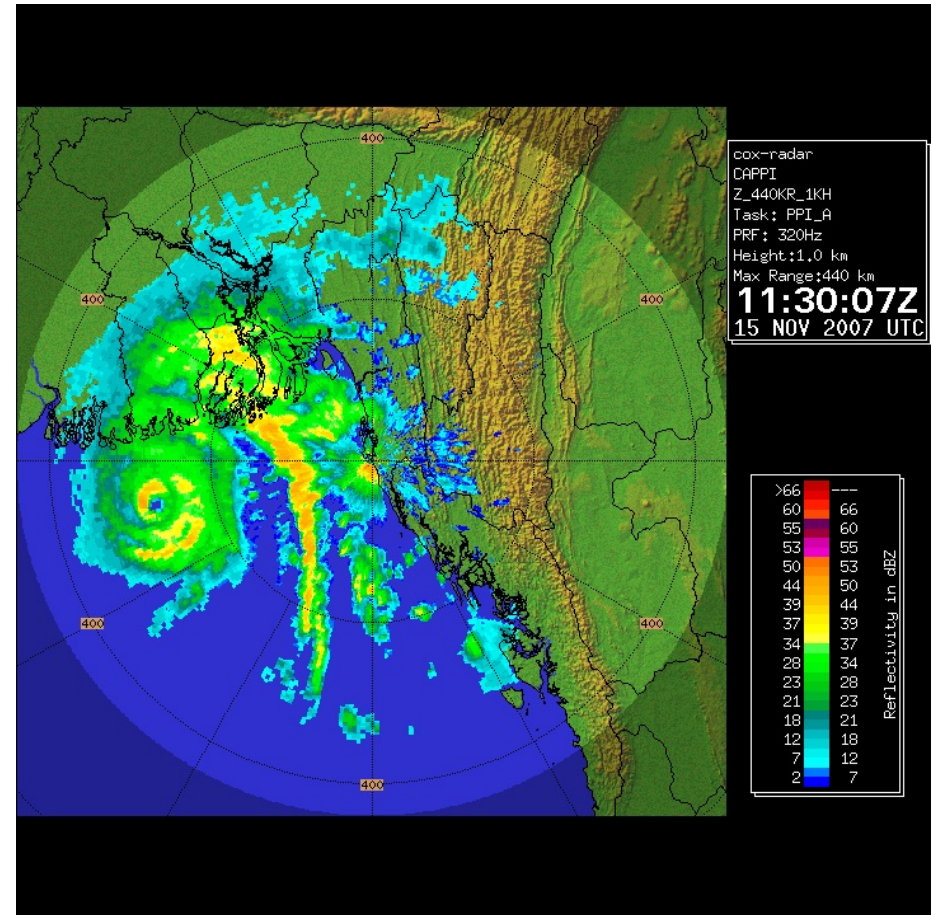


Fig. 5: Radar image of cyclone SIDR



## Recorded rainfall due to cyclone SIDR

- The highest rainfall of 144 mm is recorded at Sylhet (lat.  $24.9^{\circ}$  N and long.  $91.88^{\circ}$  E)
- 143 mm at Chittagong (lat.  $22.27^{\circ}$  N and long.  $91.82^{\circ}$  E), Hatiya (lat.  $22.43^{\circ}$  N and long.  $91.10^{\circ}$  E) and
- Srimongal (lat.  $24.3^{\circ}$  N and long.  $91.73^{\circ}$  E) respectively.
- The distribution of rainfall associated with SIDR is given in Fig. 6.

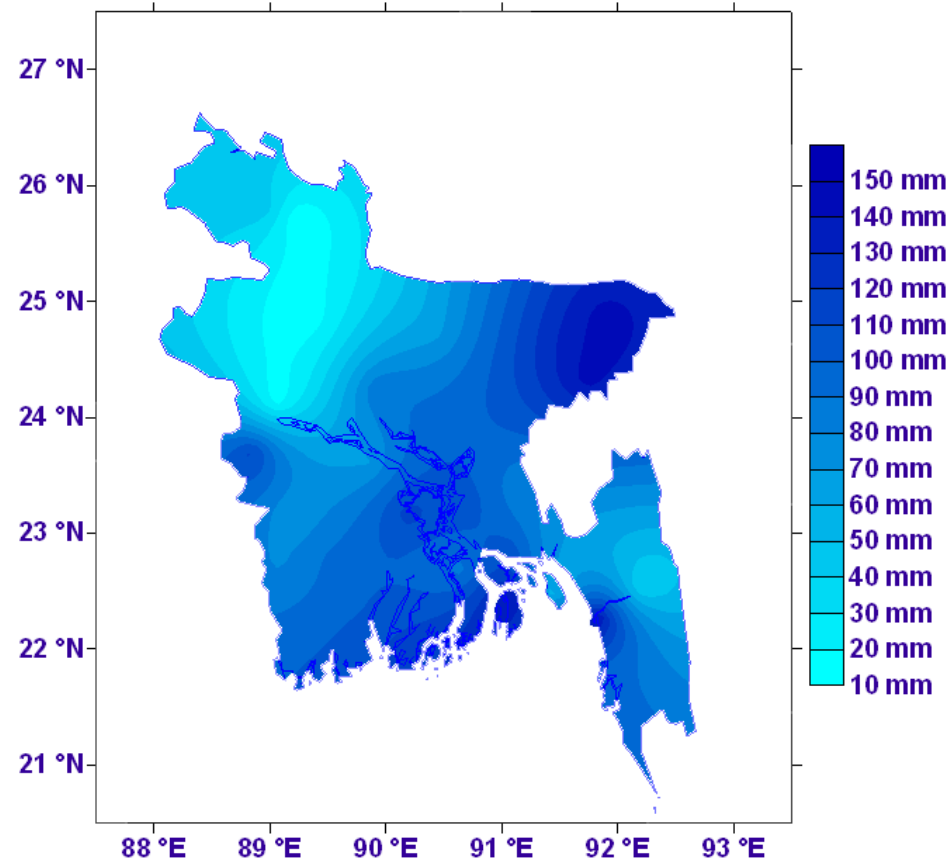


Fig. 6: Spatial distribution of cyclone SIDR related rainfall

## Recorded wind due to cyclone SIDR

- The higher wind was recorded in the southwestern part of Bangladesh where SIDR made its landfall and followed by the right side of SIDR in the southern coastal districts of Bangladesh (shown in Fig. 7).
- The highest maximum wind of 223 km/hr is recorded at Patuakhali (lat. 22.33° N and long. 90.33° E).
- Though SIDR made its landfall in the eastern side of Sundarban (a large forest) but the passage of it was long over the central flat land and its associated wind speed was higher as a result it had a good wind impact on Bangladesh.
- This behaviour was not observed in earlier cases.

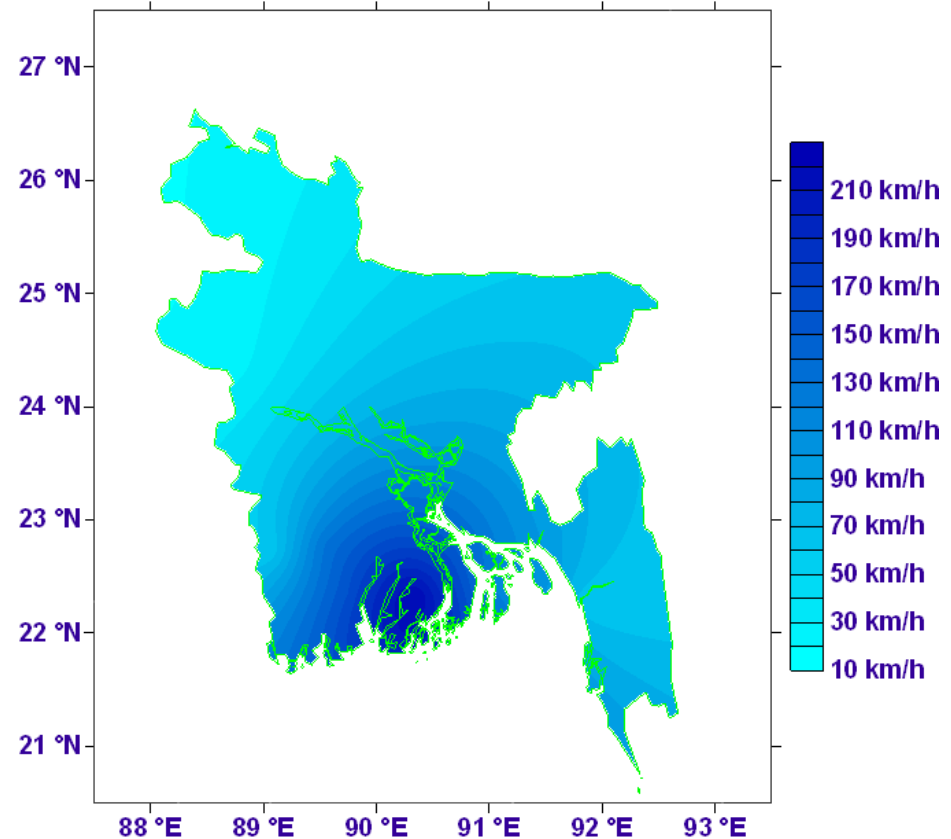


Fig. 7: Spatial distribution of cyclone SIDR related wind

## Storm surge related to cyclone SIDR

- When SIDR was approaching towards Bangladesh coast, its intensity was becoming higher and higher.
- Accordingly its associated storm surge should be higher compared to the previous cyclones crossed Bangladesh coast.
- But during the landfall there were low tide time over the North Bay and the adjoining rivers of Bangladesh.
- As a result recorded storm surge was lower (the maximum recorded storm surge about 18 ft) ( Fig. 8).

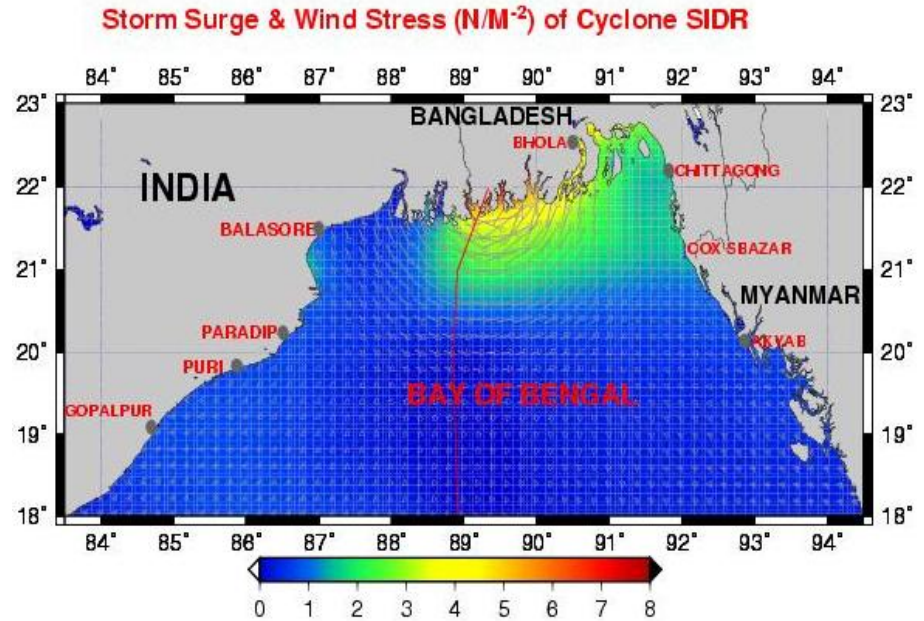


Fig. 8: Variation of intensity of cyclone SIDR

## **Damage aspect of Cyclone SIDR**

- **BMD advised the concerned authorities about SIDR by issuing Great Danger Signals nearly 27 hours before its landfall.**
- **The lead time enabled the disaster mitigation agencies to control the loss of lives by providing shelters to the people at risk in the coastal areas.**
- **BMD issued timely and accurate warnings and disseminated them to the concerned authorities to handle the SIDR situation efficiently.**
- **Hence the loss of lives and damage to properties were less than the past.**

## **Brief damage list of cyclone SIDR**

- **Total Death: 3363**
- **People missed: 871**
- **Family affected: 1,928,265**
- **People affected: 8,545,470**
- **Houses damaged: 1,449,157**
- **Crop damaged: 2,007,226**
- **Trees destroyed: 4,065,316**
- **Total damage cost: about 450 million USD**

## **Method of disaster management aspect related to cyclone SIDR**

- ❑ On 13 November, when the System turned into a SCS (H) maritime ports were advised to hoist Warning Signal Number Four and all fishing boats and trawlers over North Bay were advised to take shelter immediately.**
- ❑ A meeting of NDMC was held immediately after hoisting Signal Number Four. In that meeting all the concerned authorities were instructed to take the necessary steps according to SOD**
- ❑ The Armed Forces Division (AFD) and government officials were also placed on standby.**
- ❑ Several central control rooms were activated by various agencies at national, district and upazila levels while the DMIC was opened.**
- ❑ A series of meetings and arrangements were in place to quickly mobilize staff and resources.**
- ❑ At 9 PM on 14 November 2007, SIDR was centered about 725 km South-southwest of Chittagong port, 645 km South-southwest of Cox's Bazar port and 670 km South of Mongla port.**

## **Method of disaster management aspect related to cyclone SIDR continue ....**

- **In this situation BMD advised the maritime port of Mongla to hoist Great Danger Signal Number Ten. BMD also included the coastal districts of Bhola, Barisal, Patuakhali, Barguna, Pirojpur, Jhalakhathi, Bagerhat, Khlna, Satkhira and their offshore islands and chars under Great Danger Signal Number Ten.**
- **The ports of Chittagong and Cox's Bazar were advised to hoist Great Danger Signal Number Nine and all other coastal districts were included under Great Danger Signal Number Nine.**
- **BMD predicted that SIDR would likely to cross Khulna-Barisal coast by afternoon of 15 November 2007.**
- **BMD estimated about SIDR's maximum wind about 210 -230 kph and associated storm surge of height 15-20 feet above normal astronomical tide.**
- **Government as well as National and International NGOs mobilizes their staff and volunteers with a number of pre-positioning staff and relief materials closer to the forecasted impact areas.**

## **Method of disaster management aspect related to cyclone SIDR continue ....**

- This action proved to be extremely beneficial given the access problems that arose later on in the post impact phase of the operation.**
- Over 1.5m people were moved to shelters in the lead up to Cyclone SIDR with the help of Local Administration, CPP, Community leader & NGO workers.**
- Some did not seek shelter because there were limited facilities for the cattle and livestock in the cyclone shelter.**
- Cyclone SIDR hit offshore islands of Bangladesh at approximately 18.30 hours on the evening of 15 November and made landfall across the Barisal-Patuakhali coast near Baleshwar river at 2100 BST during the low tide time.**
- Wind speeds reached up to 220-240 km per hour and affected 15 districts fully and 15 districts partly .**



# **Monitoring cyclone AILA**

## Cyclonic Storm "AILA" during 23-25 May 2009

<b>Date &amp; Time (UTC)</b>	<b>Position</b>	<b>Status</b>	<b>Signal for maritime ports</b>	<b>Advice</b>
23, 0300	Southwest Bay and adjoining West Central Bay	Well Marked Low (WML)	LC-III	The port is threatened by squally weather (wind speed of 40-50 kms/hr)
23, 0900	West Central Bay and adjoining area	Depression	LC-III	Fishing boats and trawlers are advised to come close to the coast and proceed with caution and not to venture in to the deep Sea.
24, 0600	West Central adjoining East-Central Bay	Deep Depression	LC-III	do
24, 1200	West Central adjoining East-Central Bay	Cyclonic Storm "AILA"	LW-IV	Fishing boats and trawlers are advised to remain in shelter.
24, 2100	North Bay and adjoining West Central Bay	Cyclonic Storm "AILA"	Mongla: DS-VII Chittagong: DS-V Cox's Bazar: DS-VI	do
25, 0600	Near West Bengal (India) Khulna (Bangladesh coast)	Cyclonic Storm "AILA"	Mongla: DS-VII Chittagong: DS-V Cox's Bazar: DS-VI	Do
25, 1200	Crossing West Bengal-Khulna (Bangladesh) coast near Sagar Island of India	Cyclonic Storm "AILA"	Mongla: DS-VII Chittagong: DS-V Cox's Bazar: DS-VI	Do

**23.05.2009: 09AM**

**Situation:** The low intensified into a Well Marked Low (WML) over Southwest Bay and adjoining West Central Bay

**Signals:**

Chittagong Port: LC-III

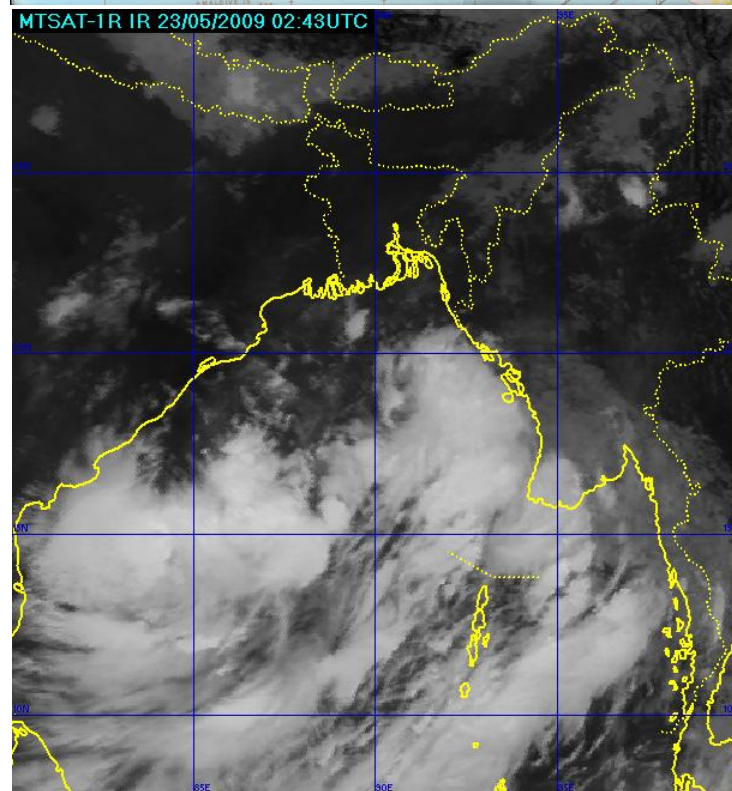
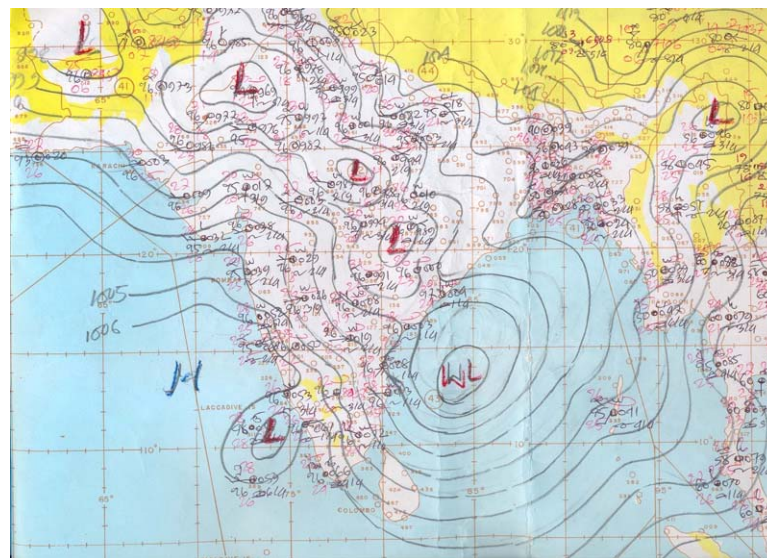
Cox's Bazar Port: LC-III

Mongla: LC-III

**Forecast:** It is likely to intensify and move in a northwest/northerly direction.

**Local Cautionary Signal No. III**

**Explanation:** The port is threatened by squally weather (wind speed of 40-50 kms/hour).



# 23.05.2009: 03PM: Special weather Bulletin SL.No.-1

**Situation:** The Well Marked Low over Southwest Bay and adjoining West Central Bay moved slightly northwards, intensified into a Depression over West Central Bay and adjoining area.

**Distance:**

**Chittagong Port:** 815 km

**Cox's Bazar Port:** 745 km

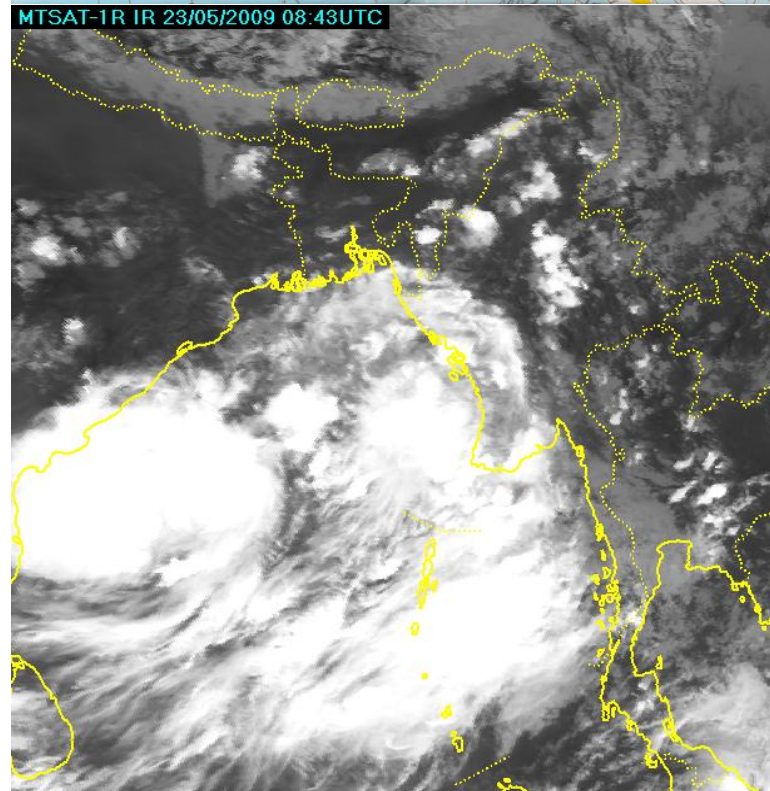
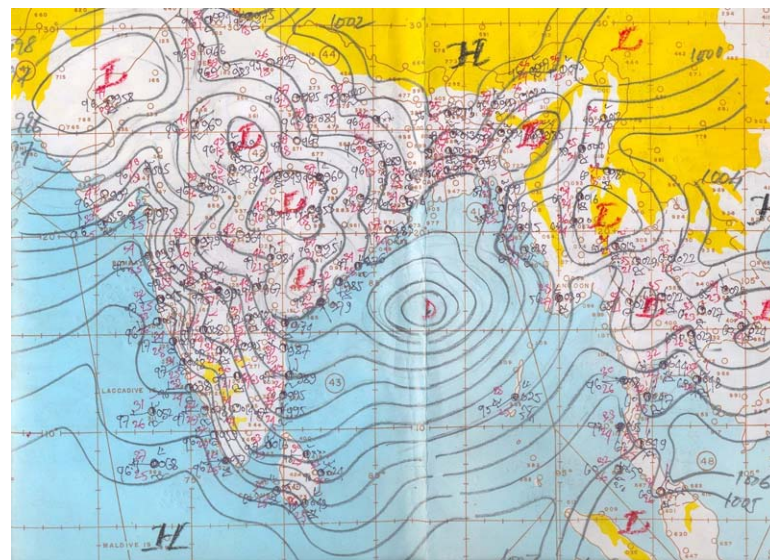
**Mongla:** 725 km

**Position**

**Latitude:** 16.0° N

**Longitude:** 88.0° E

**Forecast:** It is likely to intensify and move in a northwest/northerly direction.



# 23.05.2009: 03PM: Special weather Bulletin SL.No.-1 Continue

**Wind Condition:** Maximum wind within 44 km radius of the Depression centre is about 40 Kph rising 50 Kph in gust/Squalls.

**Sea Condition:** Moderate around the Depression centre

**Signals:**

Chittagong Port: LC-III

Cox's Bazar Port: LC-III

Mongla: LC-III

**Advice for fishing boats and trawlers:** Come close to the coast and proceed with caution and not to venture in to the deep Sea.

**Local Cautionary Signal No. III**  
**Explanation:** The port is threatened by squally weather (wind speed of 40-50 kms/hour).



# 24.05.2009: 12 Noon: Special weather Bulletin SL.No.-5

**Situation:** The Depression over West Central adjoining East-Central Bay moved slightly northwards, intensified into a Deep Depression over the same area.

**Distance:**

**Chittagong Port: 610 km**

**Cox's Bazar Port: 545 km**

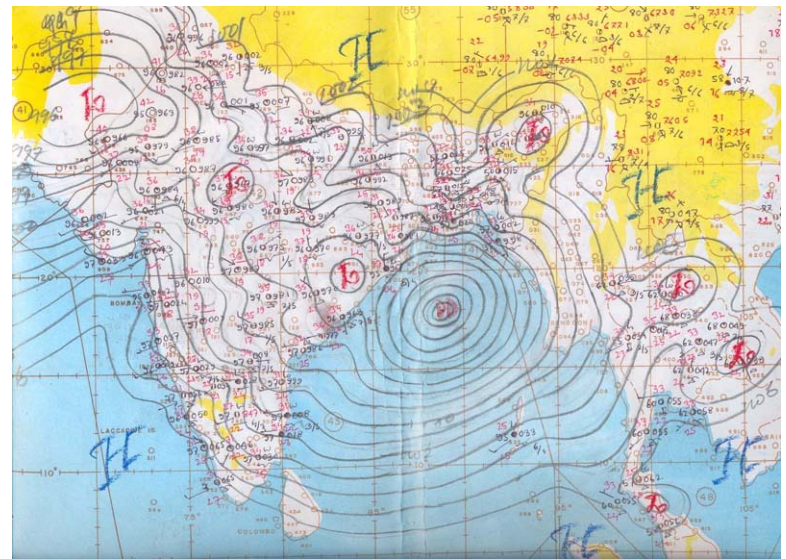
**Mongla: 515 km**

**Position**

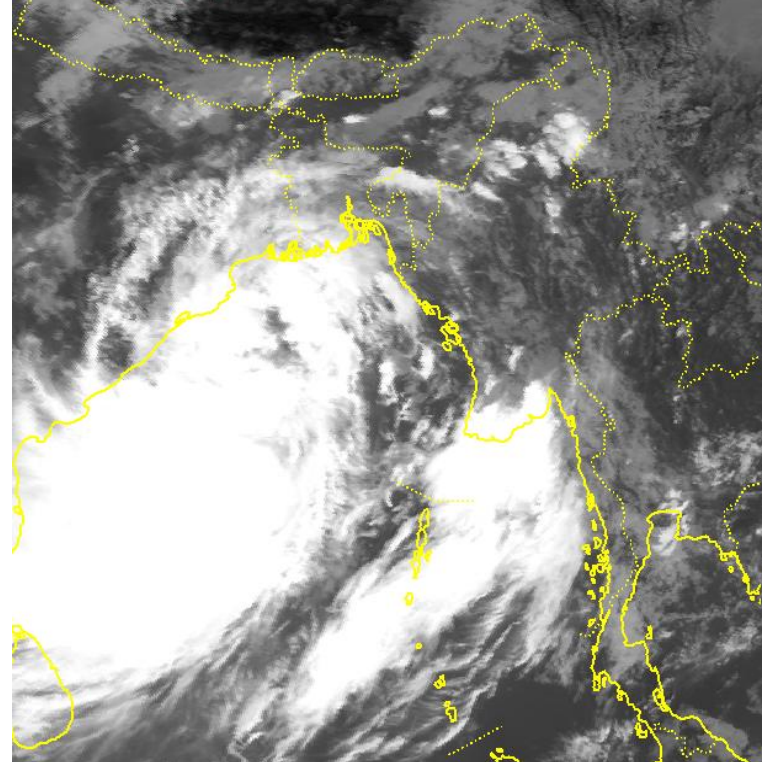
**Latitude: 17.8° N**

**Longitude: 88.6° E**

**Forecast:** It is likely to intensify and move in a north/northeasterly direction.



MTSAT-1R IR 24/05/2009 05:43UTC



# 24.05.2009: 12 Noon: Special weather Bulletin SL.No.-5 Continue

**Wind Condition:** Maximum wind within 48 km radius of the Depression centre is about 50 Kph rising 60 Kph in gust/Squalls.

**Sea Condition:** Rough around the Deep Depression centre.

**Signals:**

**Chittagong Port: LC-III**

**Cox's Bazar Port: LC-III**

**Mongla: LC-III**

**Advice for fishing boats and trawlers:** Come close to the coast and proceed with caution and not to venture in to the deep Sea.

**Local Cautionary Signal No. III**  
**Explanation:** The port is threatened by squally weather (wind speed of 40-50 kms/hour).

# 24.05.2009: 06PM: Special weather Bulletin SL.No.-7

**Situation:** The Deep Depression over West Central Bay and adjoining West Central Bay moved northwards, intensified into a Cyclonic Storm “Aila”.

**Distance:**

**Chittagong Port: 565 km**

**Cox’s Bazar Port: 510 km**

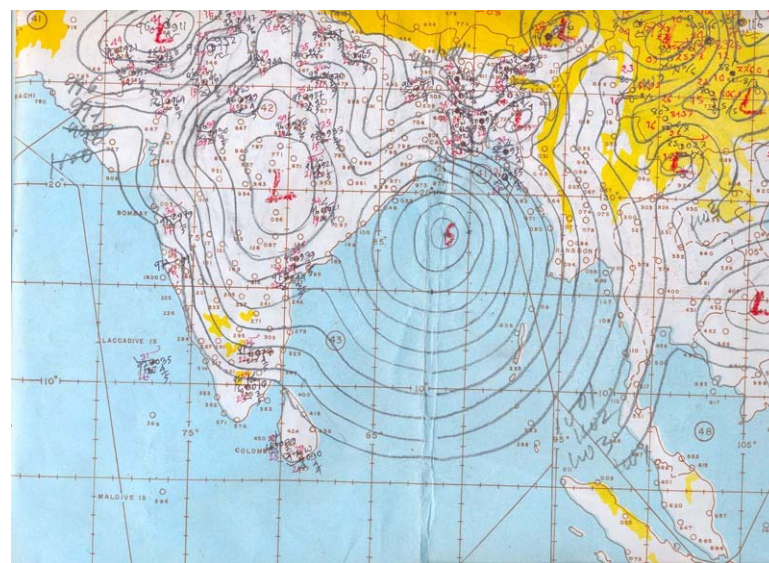
**Mongla: 460 km**

**Position**

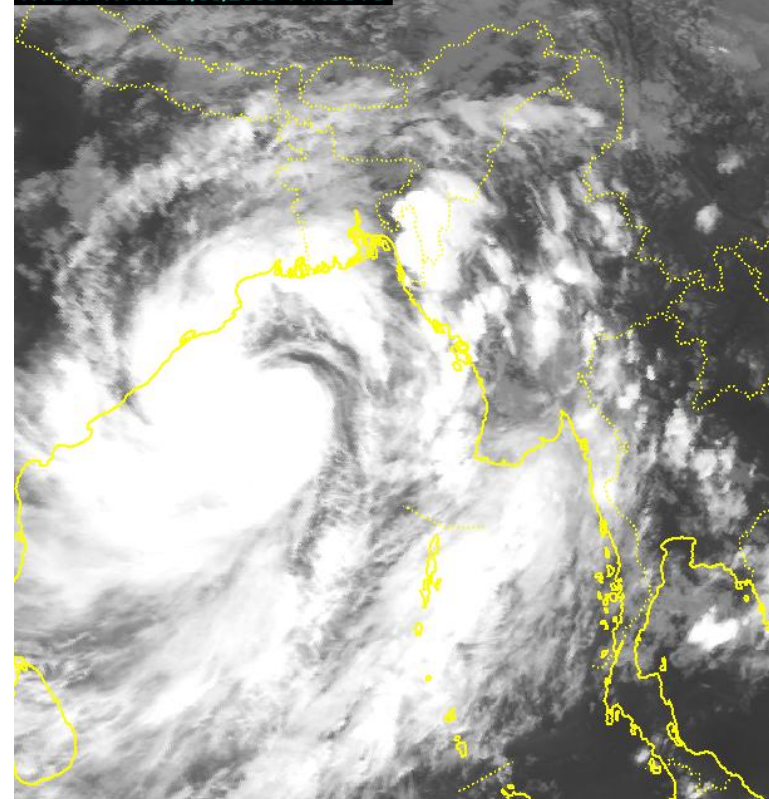
**Latitude: 18.3° N**

**Longitude: 88.6° E**

**Forecast:** It is likely to intensify and move in a northerly direction.



MTSAT-1R IR 24/05/2009 11:43UTC





# 24.05.2009: 06PM: Special weather Bulletin SL.No.-7 Continue

**Wind Condition:** Maximum wind within 54 km radius of the Depression centre is about 60 Kph rising 70 Kph in gust/Squalls.

**Sea Condition:** Very rough around the Cyclone 'Aila'.

**Signals:**

**Chittagong Port: LW-IV**

**Cox's Bazar Port: LW-IV**

**Mongla: LW-IV**

**Advice for fishing boats and trawlers: To remain in shelter.**

## **Local Warning Signal No. IV**

**Explanation:** The port is threatened by a storm (wind speed of 51-61 kms/hour) but it doesn't appear that the danger is as yet sufficiently great to justify extreme precautionary measures.

# 25.05.2009: 03AM: Special weather Bulletin SL.No.-10

**Situation:** The cyclonic storm 'Aila' over North Bay and adjoining West Central Bay moved northwards, intensified further over the same area.

**Distance:**

Chittagong Port: 495 km

Cox's Bazar Port: 445 km

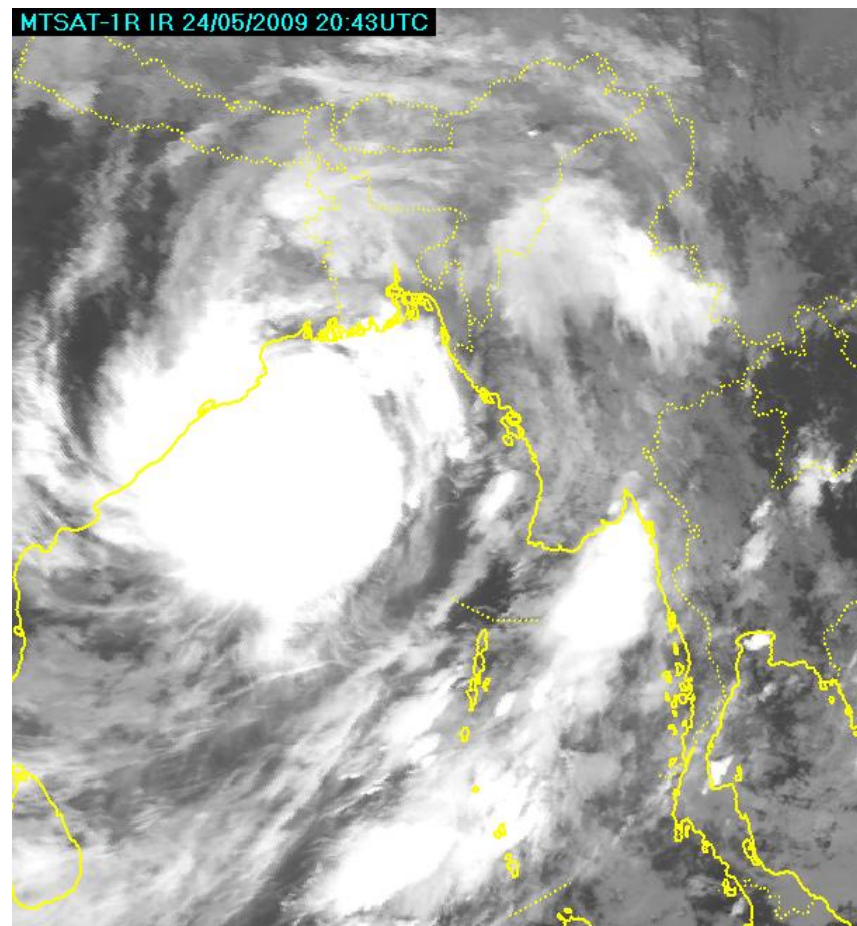
Mongla: 365 km

**Position**

Latitude: 19.2° N

Longitude: 88.6° E

**Forecast:** It is likely to intensify further and move in a northerly direction and cross West Bengal-Khulna (Bangladesh) coast by noon/afternoon today.



# 25.05.2009: 03AM: Special weather Bulletin SL.No.-10

## Continue

**Wind Condition:** Maximum wind within 54 km radius of the Depression centre is about 70 Kph rising 90 Kph in gust/Squalls.

**Sea Condition:** Very rough around the Cyclone 'Aila'.

**Tidal condition:** Storm surge of 05-07 above normal astronomical tide

**Signals:**

**Mongla:** DS-VII

**Chittagong Port:** DS -VI

**Cox's Bazar Port:** DS -VI

**Advice for fishing boats and trawlers:** To remain in shelter.

### **Danger Signal No. VII**

**Explanation:** The port will experience severe weather from a storm of light or moderate intensity (wind speed of 62-88 kms/hour) that is expected to cross over or near the port.

### **Danger Signal No. VI**

**Explanation:** The port will experience severe weather from a storm of slight or moderate intensity (wind speed of 62-88 kms/hour) that is expected to cross the coast in the left side of the port.

**25.05.2009: 12 Noon:**  
**Special weather Bulletin**  
**SL.No.-13**

**Situation:** The cyclonic storm 'Aila' over North Bay moved slightly north-northwestwards over the same area.

**Distance:**

**Chittagong Port:** 430 km

**Cox's Bazar Port:** 420 km

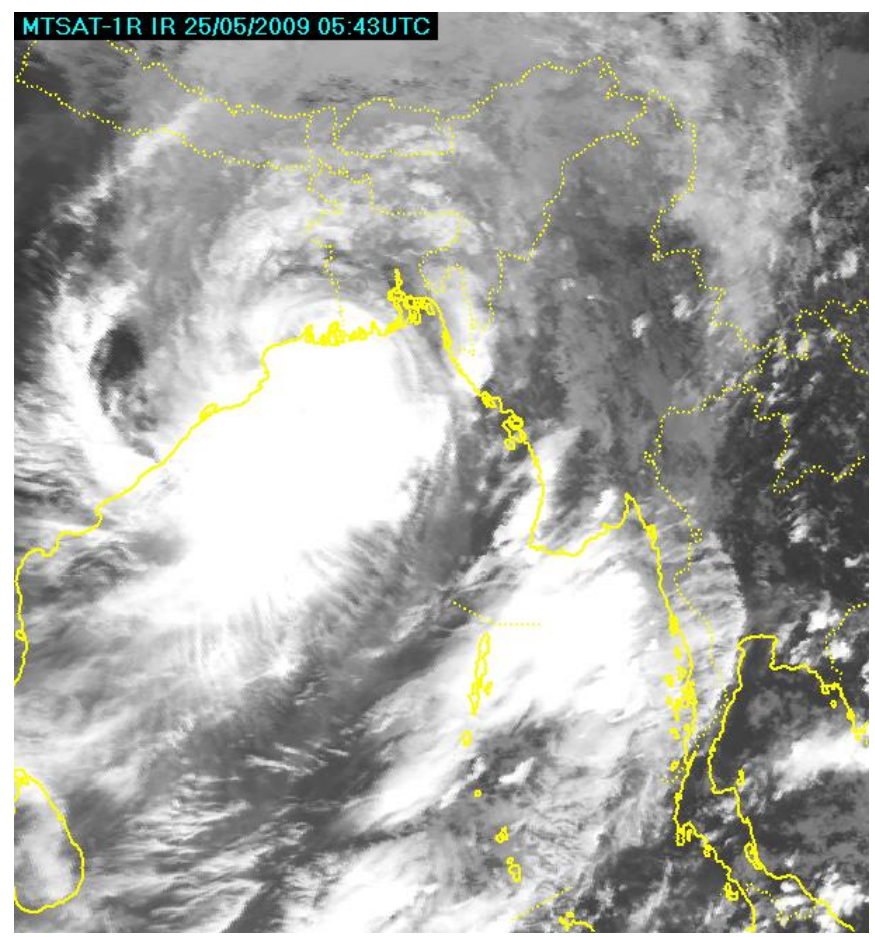
**Mongla:** 230km

**Position**

**Latitude:** 20.8° N

**Longitude:** 88.2° E

**Forecast:** The peripheral affect of cyclone 'Aila' is already affecting the coastal districts of Bangladesh. It may start crossing West Bengal-Bangladesh coast by 02 PM today.





**25.05.2009: 12 Noon: Special weather Bulletin SL.No.-13**  
**Continue**

**Wind Condition:** Maximum wind within 54 km radius of the Depression centre is about 70 Kph rising 90 Kph in gust/Squalls.

**Sea Condition:** Very rough around the Cyclone 'Aila'.

**Tidal condition:** Storm surge of 06-08 ft above normal astronomical tide

**Signals:**

**Mongla: DS-VII**

**Chittagong Port: DS -VI**

**Cox's Bazar Port: DS -VI**

**Advice for fishing boats and trawlers: To remain in shelter.**

# 25.05.2009: 06 PM: Special weather Bulletin SL.No.-15

**Situation:** The coast crossing cyclonic storm 'Aila' moved northwards, the centre of the storm crossed West Bengal- Khulna (Bangladesh) coast near Sagar Island of India and lay centred at Kolkata and adjoining area of India but the remaining part of the storm is still crossing.

**Forecast:** It is likely to move in a northerly direction further inland.

**Tidal condition:** Storm surge of 06-08 above normal astronomical tide

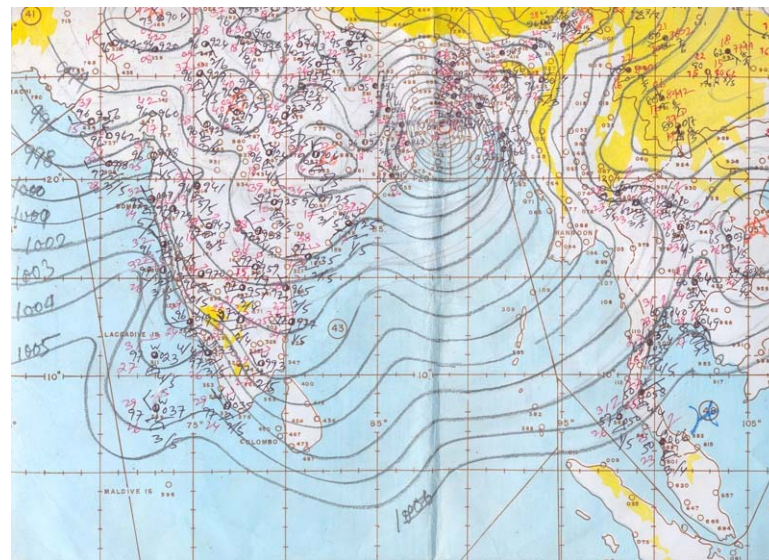
**Signals:**

**Mongla: DS-VII**

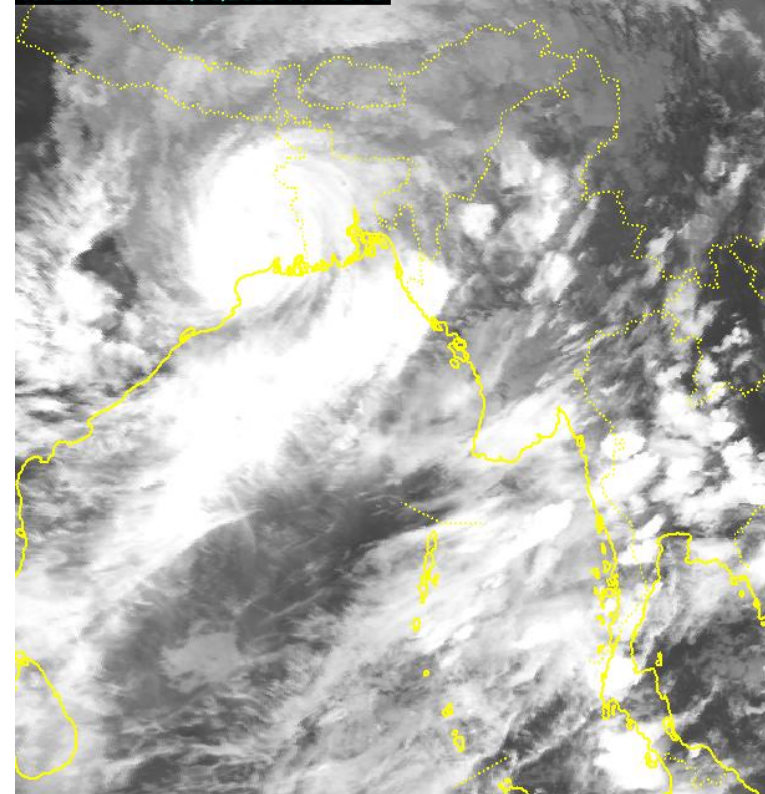
**Chittagong Port: DS -VI**

**Cox's Bazar Port: DS -VI**

**Advice for fishing boats and trawlers:**  
**To remain in shelter.**



MTSAT-1R IR 25/05/2009 11:43UTC



## 26.05.2009: 03 AM: Special weather Bulletin SL.No.-16

**Situation:** The coast crossing cyclonic storm 'Aila' moved northwards inland and completed crossing the West Bengal- Khulna (Bangladesh) coast near Sagar Island of India and lay centred at West Bengal and adjoining western part of Bangladesh. Steep pressure gradient persists over North Bay and adjoining coastal areas of Bangladesh.

**Forecast:** It is likely to move in a northerly direction further inland.

**Tidal condition:** Wind driven surge of 04-06 above normal astronomical tide.

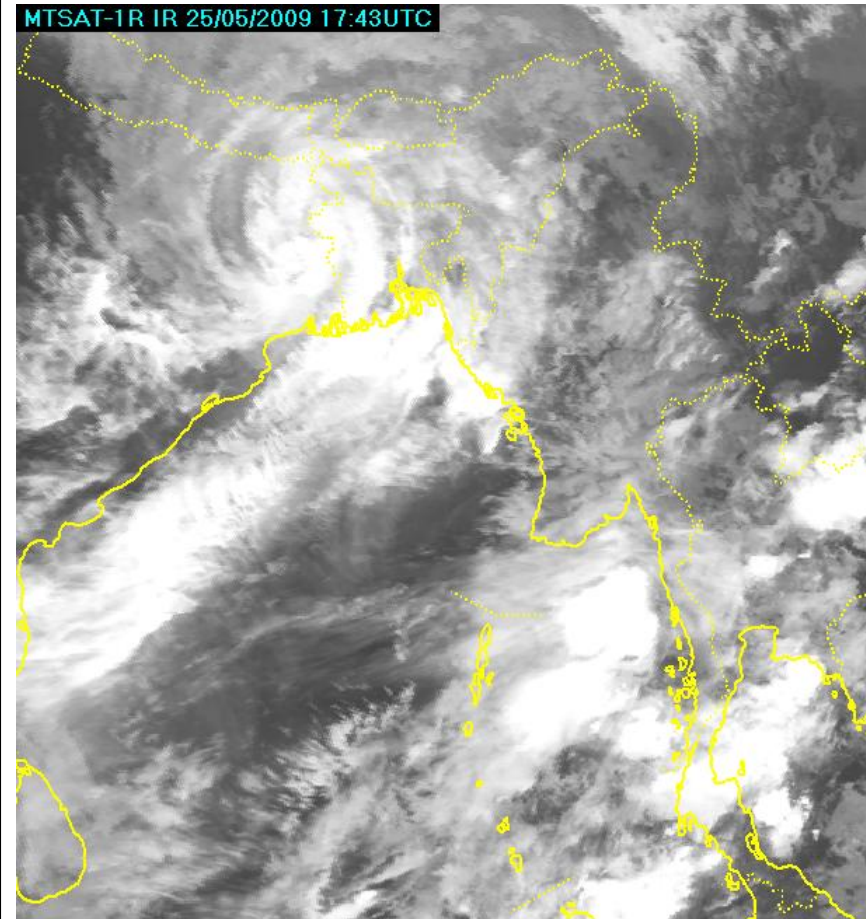
**Signals:**

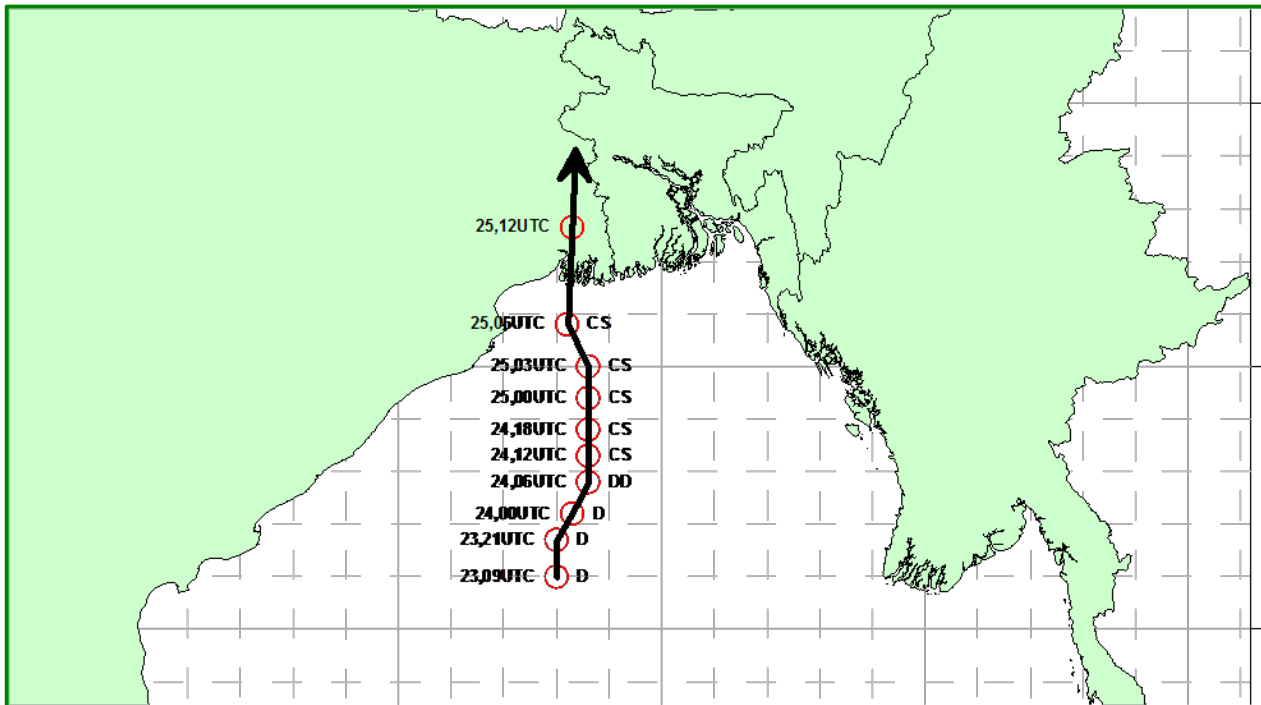
**Mongla: LC-III**

**Chittagong Port: LC -III**

**Cox's Bazar Port: LC -III**

**Advice for fishing boats and trawlers: To remain in shelter.**

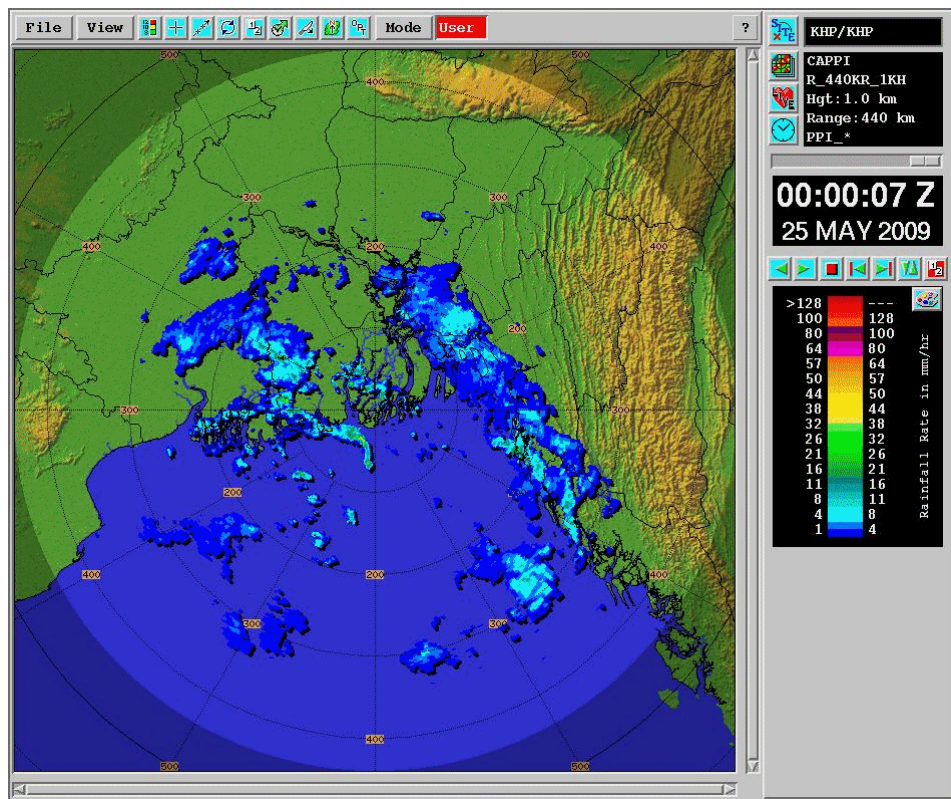
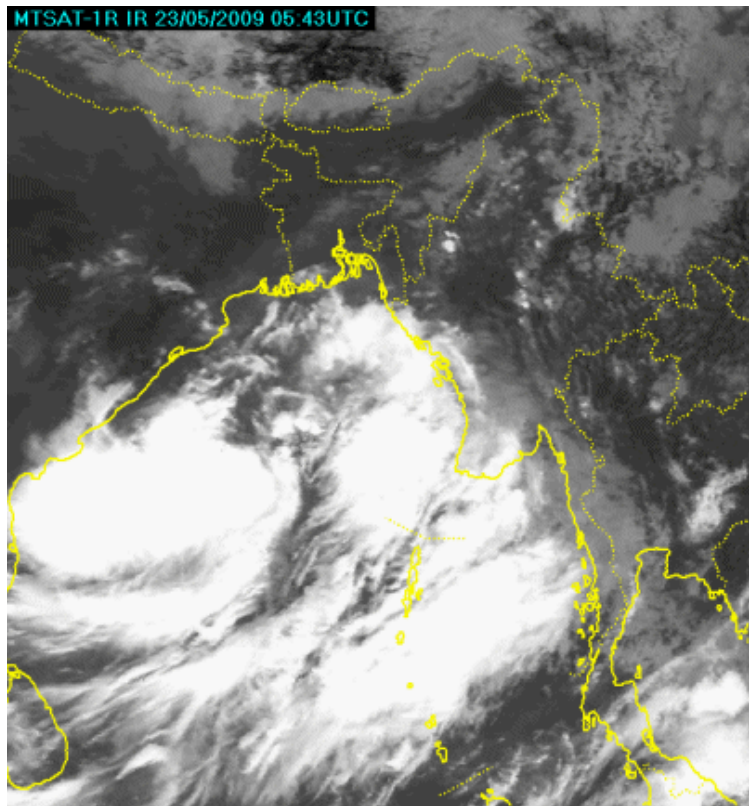




**Observed Track of Cyclonic Storm  
“AILA”\_BMD**

**Causalities: 190 People's were died (Source: control room of Ministry of Food and Disaster Management, Bangladesh)**





# **Activities for Disaster Management related to Cyclone AILA**

- ❑ Considering the vulnerability in the Bay of Bengal and coastal areas of Bangladesh BMD issued the Local Cautionary signal no. 3 for the maritime ports at 0300UTC of 23 May 2009 and advised the fishermen engaged in fishing over there to come close to the coast and proceed carefully and not to venture into the deep sea.
- ❑ **After that BMD carefully observed it and continued hoisted warning signals no. 3.**
- ❑ Prior to the hoisting of signal no. 4 BMD opined in the Inter-ministerial Disaster Management Coordination Committee held at MoFDM in the afternoon of 24 May that the system could be concentrated into a cyclonic storm at night time of the same day and explained the related hazards in the coastal areas of Bangladesh.
- ❑ **At 1200UTC of 24 May when the system intensified into a cyclonic storm “AILA”.**
- ❑ According to the forecast the wind driven surge height was also 4.5 feet above normal astronomical tide during the landfall of cyclone “AILA’.

Few damage activities by cyclone Aila















## Conclusion

- ❑ BMD monitored and forecasted the cyclones SIDR and AILA very efficiently which help to reduce casualties and economy.
- ❑ But improvement of forecasting related to cyclones will help further reduction of lives and properties.
- ❑ To reduce the vulnerability and to cope up with the cyclone related disaster, improved signal system and strategy of each organization have been incorporated in the upgraded SOD.

**Gratitude to AWCI for considering Meghna River Basin of Bangladesh as one of the demonstration Basins**



**THANK YOU**