



India Meteorological Department
(Ministry of Earth Sciences)

BULLETIN NO. 60 (ARB/01/2023)

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FROM: INDIA METEOROLOGICAL DEPARTMENT (FAX NO. 24643965/24699216/24623220)

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**Sub: Very Severe Cyclonic Storm “Biparjoy” (pronounced as “Biporjoy”) over
Northeast Arabian Sea: Cyclone Warning for Saurashtra & Kutch Coasts
(Orange Message)**

The Very Severe Cyclonic Storm “Biparjoy” (pronounced as “Biporjoy”) over Northeast Arabian Sea moved nearly north-northwestwards with a speed of 7 kmph during past 6-hours and lay centered at 1730 hours IST of today, the 13th June, 2023 over the same region near latitude 21.3°N and longitude 66.5°E, about 290 km west-southwest of Devbhumi Dwarka, 310 km west of Porbandar, 310 km southwest of Jakhau Port (Gujarat), 330 km southwest of Naliya and 410 km south of Karachi (Pakistan).

It is very likely to move nearly northwards till 13th midnight, then move north-northeastwards and cross Saurashtra & Kutch and adjoining Pakistan coasts between Mandvi (Gujarat) and Karachi (Pakistan) near Jakhau Port (Gujarat) by evening of 15th June as a very severe cyclonic storm with maximum sustained wind speed of 125-135 kmph gusting to 150 kmph.

Forecast track and intensity are given below:

| Date/Time(IST) | Position (Lat. °N/ long. °E) | Maximum sustained surface wind speed (Kmph) | Category of cyclonic disturbance |
|-----------------------|-----------------------------------------|--------------------------------------------------------|---------------------------------------------|
| 13.06.23/1730 | 21.3/66.5 | 150-160 Gusting To 180 | Very Severe Cyclonic Storm |
| 13.06.23/2330 | 21.6/66.5 | 150-160 Gusting To 180 | Very Severe Cyclonic Storm |
| 14.06.23/0530 | 21.9/66.7 | 145-155 Gusting To 170 | Very Severe Cyclonic Storm |
| 14.06.23/1130 | 22.2/66.9 | 140-150 Gusting To 165 | Very Severe Cyclonic Storm |
| 14.06.23/1730 | 22.5/67.2 | 135-145 Gusting To 160 | Very Severe Cyclonic Storm |
| 15.06.23/0530 | 23.1/67.9 | 130-140 Gusting To 155 | Very Severe Cyclonic Storm |
| 15.06.23/1730 | 23.6/68.7 | 120-130 Gusting To 145 | Very Severe Cyclonic Storm |
| 16.06.23/0530 | 24.2/69.8 | 90-100 Gusting To 110 | Severe Cyclonic Storm |
| 16.06.23/1730 | 24.8/71.0 | 50-60 Gusting To 70 | Deep Depression |
| 17.06.23/0530 | 25.3/72.3 | 30-40 Gusting To 50 | Well Marked Low Pressure Area |

(i) Heavy Rainfall warning:

- Light to moderate rainfall at many places in Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Junagarh and Rajkot districts of Saurashtra & Kutch with isolated heavy to very heavy rainfall on 13th June.
- Light to moderate rainfall at most places with heavy to very heavy rainfall and extremely heavy falls at isolated places very likely over Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Rajkot, Junagarh and Morbi districts of Saurashtra & Kutch on 14th June.
- The intensity of rainfall would increase with heavy to very heavy rainfall at a few places and extremely heavy falls at isolated places very likely over Kachchh, Devbhumi Dwarka & Jamnagar and heavy to very heavy rainfall at a few places over Porbandar, Rajkot, Morbi & Junagarh districts of Gujarat and Isolated heavy to very heavy rainfall is very likely over remaining districts of Saurashtra and north Gujarat region on 15th June.
- Light to moderate rainfall at most places with heavy to extremely heavy rainfall at isolated places very likely over north Gujarat and adjoining south Rajasthan on 16th June.

(ii) Wind warning:

Northeast Arabian Sea: Gale wind speed reaching 150-160 kmph gusting to 180 kmph prevailing over the region likely to decrease becoming 125-135 kmph gusting 150 kmph during 15th morning to evening. It would weaken gradually further more thereafter becoming 45-55 kmph gusting to 65 kmph by 16th morning.

Eastcentral Arabian Sea: Gale wind speed reaching 130-150 kmph gusting to 165 kmph prevailing over the region likely to decrease becoming 90-100 kmph gusting to 110 kmph on 14th morning and 40-50 kmph gusting to 60 kmph on 16th morning.

Wind warning along & off Saurashtra & Kutch coasts (Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Rajkot, Junagarh and Morbi districts) including Gulf of Kutch:

- Squally wind speed reaching 50-60 kmph gusting to 70 kmph prevailing over these regions and likely to continue till 13th midnight.
- It would increase becoming Gale wind speed reaching 65-75 kmph gusting to 85 kmph from 14th June morning along & off Porbandar & Devbhoomi Dwarka district coasts.
- It would become 125-135 kmph gusting to 150 kmph from 15th morning for subsequent 12 hours along & off Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Rajkot, Junagarh and Morbi districts. Thereafter it would decrease gradually becoming 85-95 kmph gusting to 105 kmph over Kachchh and adjoining districts of Saurashtra & Kutch by 16th morning and 45-55 kmph gusting to 65 kmph by 16th noon.
- Squally wind speed reaching 55-65 kmph gusting to 75 kmph very likely to prevail along & off remaining districts of Saurashtra coast on 14th & 15th June and 30-40 kmph gusting to 50 kmph during 16th morning to evening.

Wind Warning for South Rajasthan

- Squally wind speed reaching 45-55 kmph gusting to 65 kmph is likely over South Rajasthan during 16th noon to evening.

(iii) Sea condition

Sea condition will be phenomenal over northeast and adjoining eastcentral Arabian Sea till 15th evening and rough to very rough over adjoining northwest Arabian Sea and rest parts of eastcentral Arabian Sea during the same period.

Along & off Saurashtra & Kutch coasts:

Sea condition is likely to be rough to very rough till 14th morning and high to phenomenal thereafter till 15th June evening and would improve thereafter.

(iv) Storm Surge Warning (Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar and Morbi districts)

Storm surge of about 2 -3 m above the astronomical tide is likely to inundate the low lying areas of above districts during the time of landfall. The astronomical tides along these districts could be upto 3-6 meters in different places.

(v) Damage expected over Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Morbi & Junagarh & Rajkot districts of Gujarat on 15th June:

- Total destruction of thatched houses/ extensive damage to kutcha houses. Some damage to Pucca houses.
- Potential threat from flying objects.
- Bending/ uprooting of power and communication poles.
- Major damage to Kutcha and Pucca roads. Flooding of escape routes. Disruption of railways, overhead power lines and signalling systems.
- Widespread damage to standing crops, plantations, orchards, falling of green coconuts and tearing of palm fronds. Blowing down of bushy trees like mango.
- Small boats, country crafts may get detached from moorings.
- Visibility severely affected due to salt spray.

(vi) Fishermen Warning & Action Suggested (Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Rajkot, Junagarh and Morbi districts) and for Offshore & Onshore Industries (Graphics Attached):

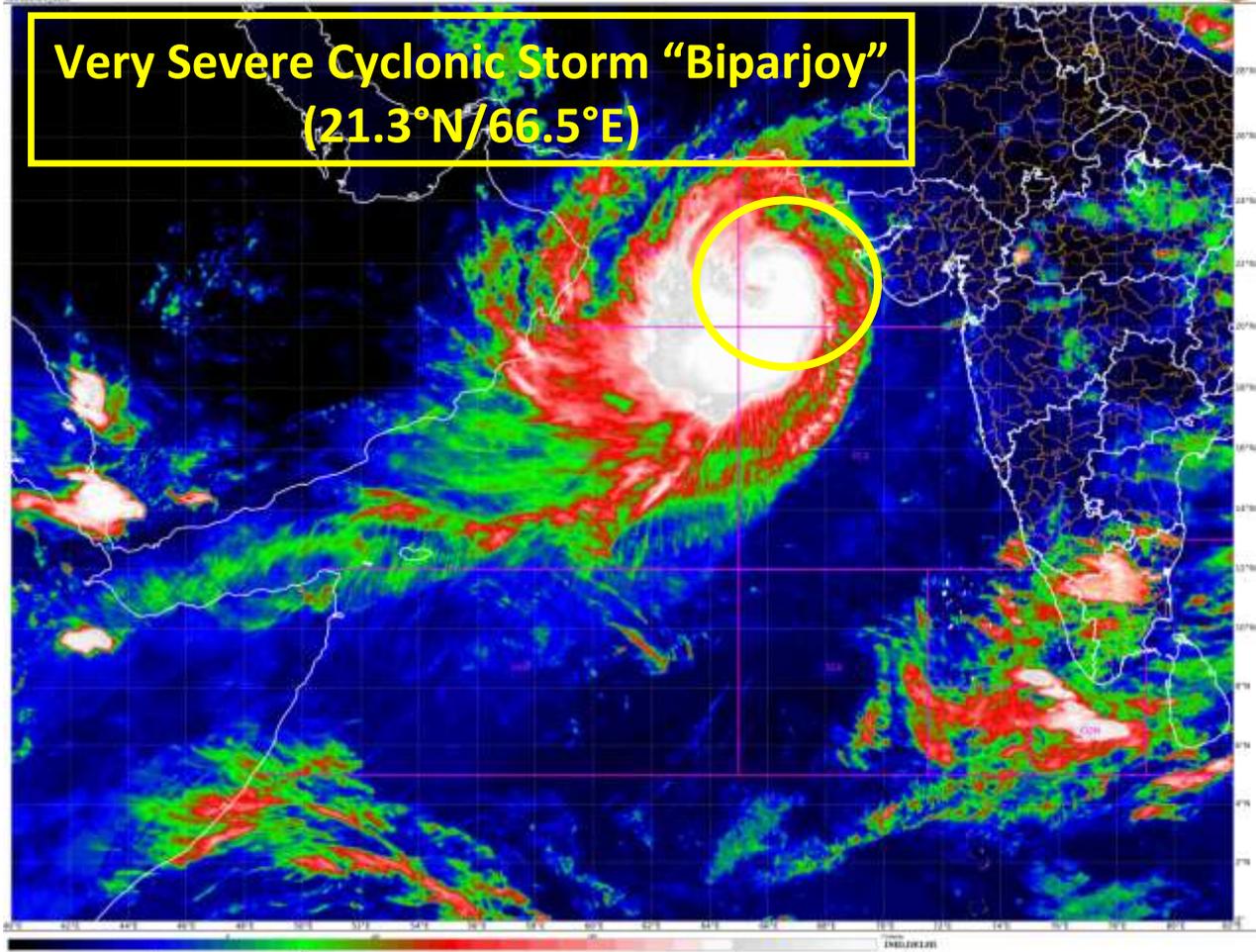
- Total suspension of fishing operations over eastcentral and adjoining Westcentral Arabian Sea till 15th June and over northeast Arabian Sea during 13th -15th June
- Those out at sea are advised to return to coast.
- Judicious regulation of offshore and onshore activities.
- Ports along the west coast of India may take necessary precautions.
- Naval base operations may maintain necessary precautions.
- Movement in motor boats and small ships all & off these coasts to be avoided.
- Mobilise evacuation from coastal areas of Saurashtra and Kutch (Kachchh, Devbhumi Dwarka, Porbandar, Jamnagar, Rajkot, Junagarh and Morbi districts).
- Judicious regulation of rail and road traffic.
- People in affected areas to remain indoors.
- Tourism activities may be restricted over these areas.
- Preparatory actions before the cyclones.

The system is under continuous surveillance and the next message will be issued at 2330 hours IST of today, the 13th June, 2023.

(Ananda Kumar Das)
Scientist F, Cyclone Warning Division, New Delhi

Copy to: ACWC Kolkata/ ACWC Chennai/ CWC Bhubaneswar/CWC Visakhapatnam/CWC Ahmedabad/ MO Port Blair/MC Raipur/MC Bhopal/MC Hyderabad/RMC Nagpur
LEGEND: Heavy Rainfall: 64.5 to 115.5mm, **Very Heavy Rainfall:** 115.6 to 204.4mm **Most Places:** more than 76% of total stations, **Isolated Places:** Less than 25% of total

**Very Severe Cyclonic Storm "Biparjoy"
(21.3°N/66.5°E)**



Radar Imagery of Doppler Weather Radar at Bhuj

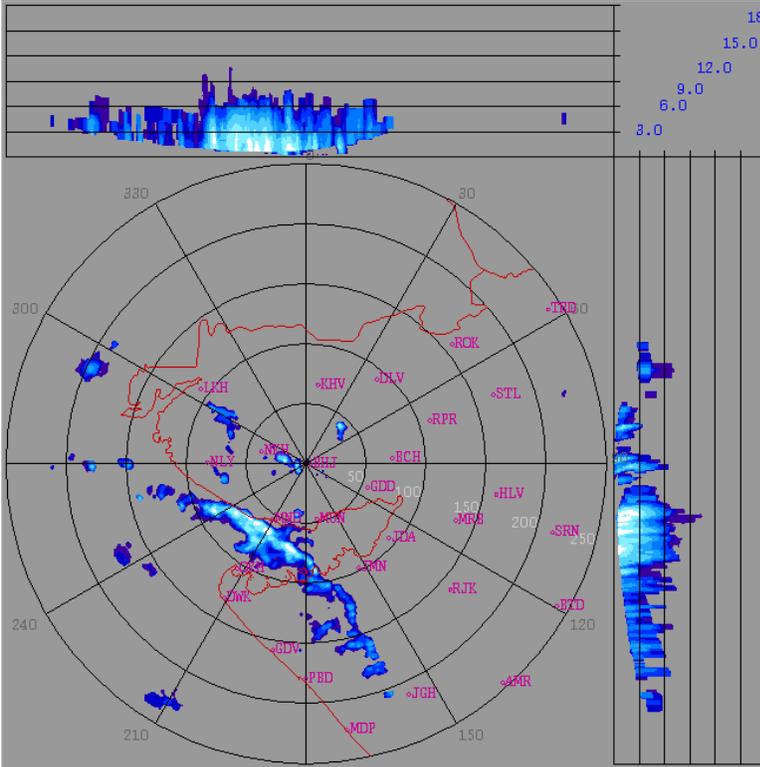
bhuj_weather_2023_06_13_14_51_36_hsfimd-b-bel.dwr

2023/06/13

14:51:36 (UTC)

MAX(Z)

DWR BHUJ
(23.2416N , 69.6458E , 100.00 mts)

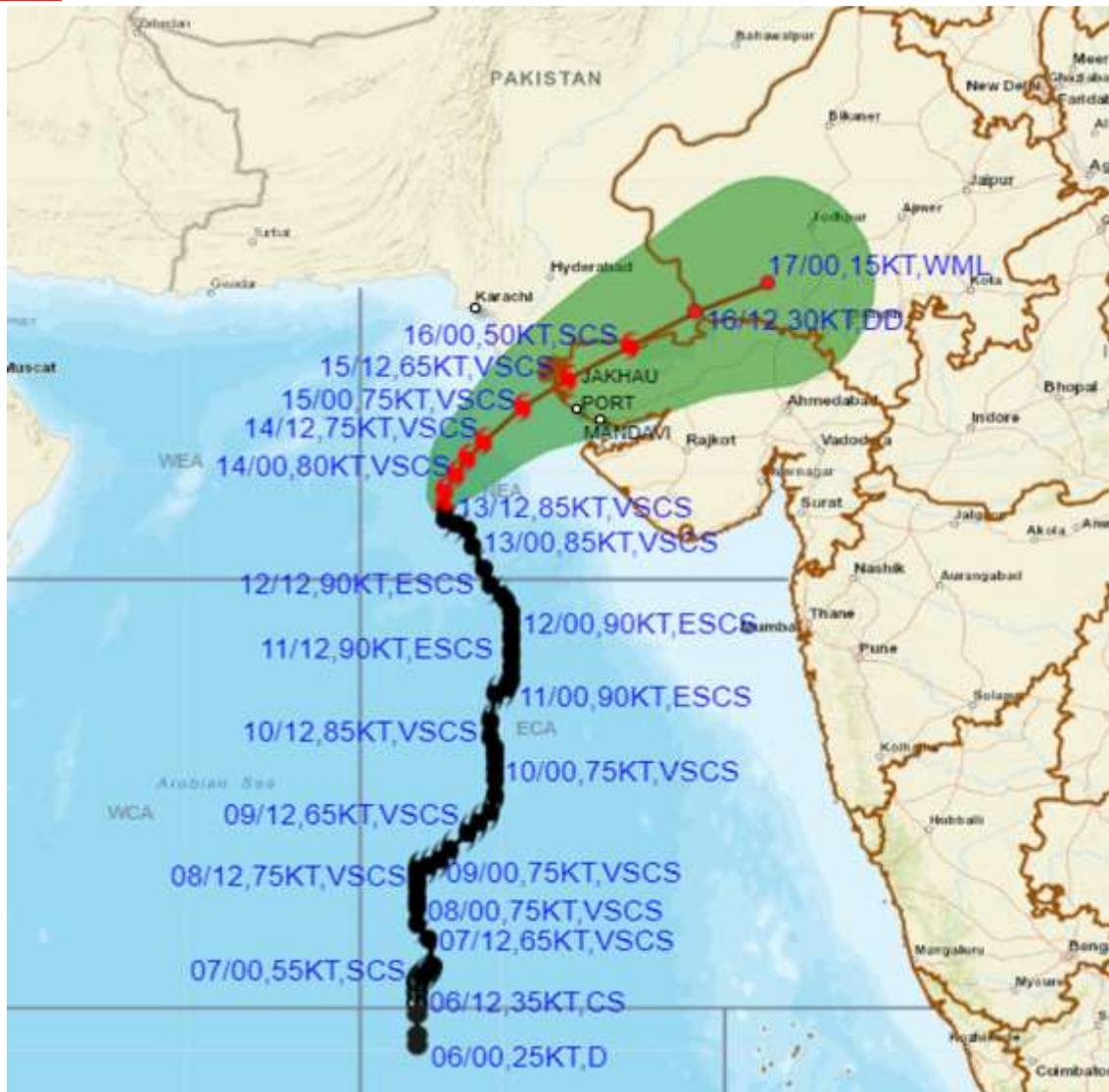


Height : 18.0 Km
 Layer Spacing : 0.100 Km
 Z (Lo, Hi) : -32.0, 95.0 dBZ
 Grid size : 1 Km
 Display Range : 250 Km
 Display Res : 1.0 Km/Pix
 DDR Enable : Yes
 Scan Elev (Lo, Hi) : 0.2, 21.0 Deg
 PRF (Lo, Hi) : 450, 600 Hz
 Scan Res : 150 mts
 Scan RPM : 2.0
 Log Threshold : 4 dB
 DTP : 42
 Pulse Width : 1.0
 Notch Width : 54.0 Hz
 SOI : 0.25
 CSR : 20
 Scan Range : 240 Km
 Preprocessings : NONE

| dBZ | |
|---------------|--|
| No Data | |
| 61.3 : > 65.0 | |
| 57.7 : 61.3 | |
| 54.0 : 57.7 | |
| 50.3 : 54.0 | |
| 46.7 : 50.3 | |
| 43.0 : 46.7 | |
| 39.3 : 43.0 | |
| 35.7 : 39.3 | |
| 32.0 : 35.7 | |
| 28.3 : 32.0 | |
| 24.7 : 28.3 | |
| 21.0 : 24.7 | |
| 17.3 : 21.0 | |
| 13.7 : 17.3 | |
| 10.0 : 13.7 | |



OBSERVED AND FORECAST TRACK ALONGWITH CONE OF UNCERTAINTY OF VERY SEVERE CYCLONIC STORM "BIPARJOY" OVER NORTHEAST ARABIAN SEA BASED ON 1200 UTC (1730 IST) OF 13TH JUNE 2023.



DATE/TIME IN UTC

IST=UTC + 0530

L: LOW PRESSURE AREA

WML: WELL MARKED LOW PRESSURE AREA

D: DEPRESSION (17-27 KT)

DD: DEEP DEPRESSION (28-33 KT)

CS: CYCLONIC STORM (34-47 KT)

SCS: SEVERE CYCLONIC STORM (48-63KT)

VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)

ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)

SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

● LESS THAN 34 KT

○ 34-47 KT

○ ≥ 48 KT

— OBSERVED TRACK

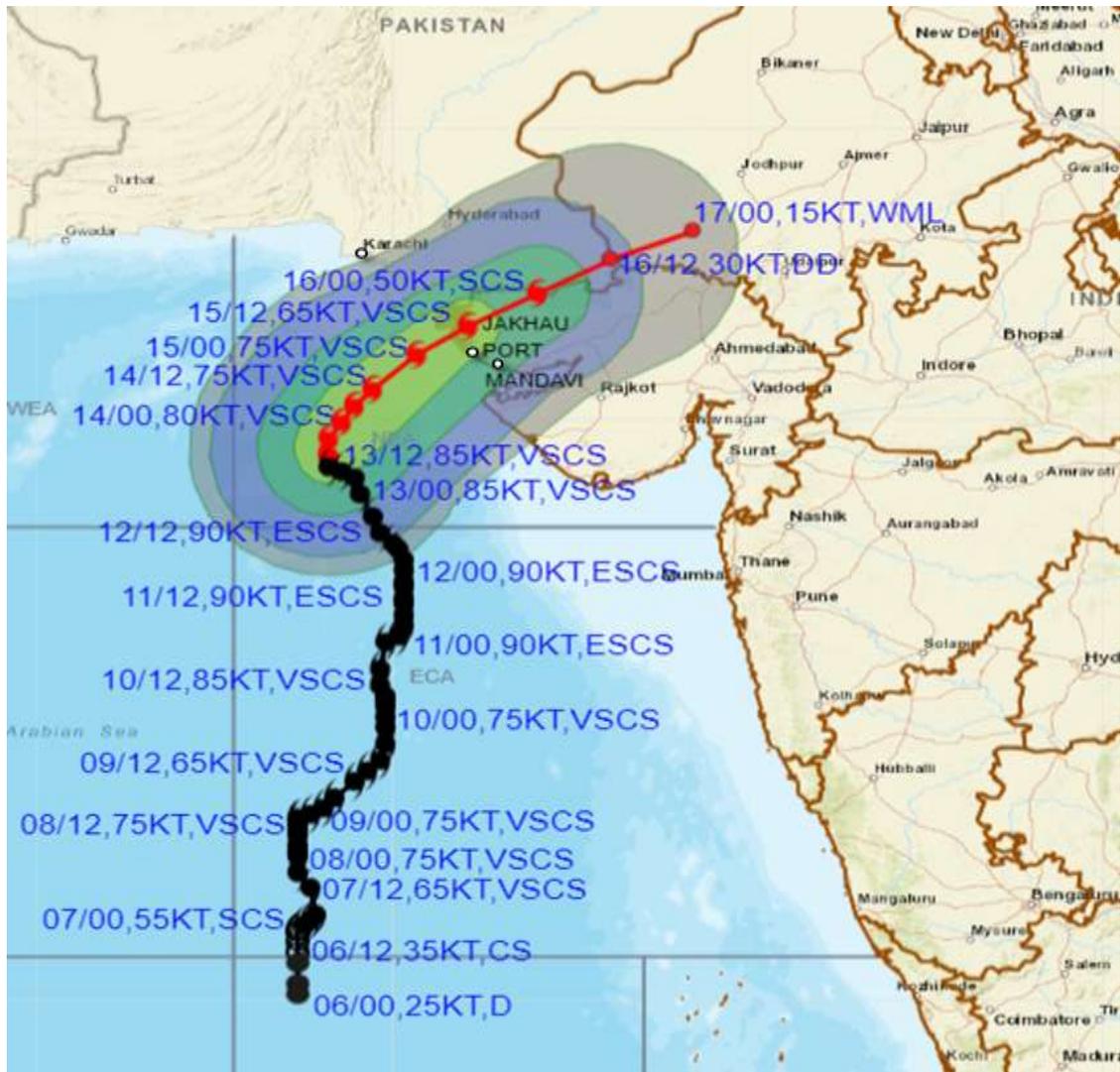
— FORECAST TRACK

▲ CONE OF UNCERTAINTY

| Forecast | DISTANCE(KM) AND DIRECTION FROM STATIONS | | | | | |
|----------|------------------------------------------|-----------|----------|-------------|----------|-----------------|
| | Date and Time | PORBANDAR | DWARKA | JAKHAU PORT | NALIYA | KARACHI AIRPORT |
| | 14.06.23/1200 | 270, WNW | 190, W | 160, WSW | 180, WSW | 260, S |
| | 15.06.23/1200 | 240, NNW | 150, NNW | 50, NNE | 50, NNW | 220, SE |
| | 16.06.23/1200 | 380, NNE | 330, NE | 300, NE | 280, NE | 390, E |



OBSERVED AND FORECAST TRACK ALONGWITH QUADRANT WIND DISTRIBUTION OF VERY SEVERE CYCLONIC STORM "BIPARJOY" OVER NORTHEAST ARABIAN SEA BASED ON 1200 UTC (1730 IST) OF 13TH JUNE 2023.



DATE/TIME IN UTC

IST=UTC + 0530

L: LOW PRESSURE AREA

WML: WELL MARKED LOW PRESSURE AREA

D: DEPRESSION (17-27 KT)

DD: DEEP DEPRESSION (28-33 KT)

CS: CYCLONIC STORM (34-47 KT)

SCS: SEVERE CYCLONIC STORM (48-63KT)

VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)

ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)

SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

● LESS THAN 34 KT

○ 34-47 KT

● ≥ 48 KT

— OBSERVED TRACK

— FORECAST TRACK

● CONE OF UNCERTAINTY

AREA OF MAXIMUM SUSTAINED WIND SPEED:

■ 28-33 KT (52-61 KMPH)

■ 34-49 KT (62-91 KMPH)

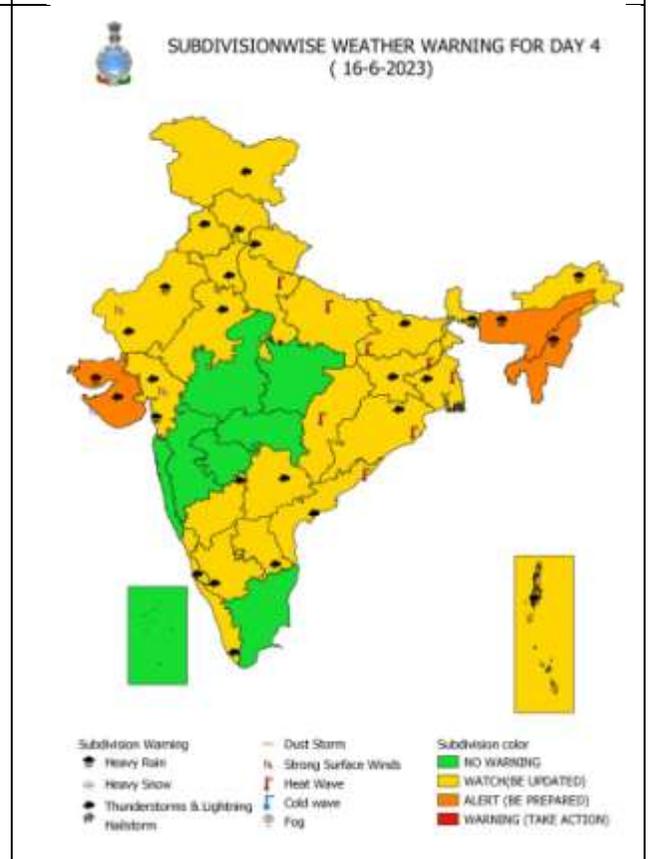
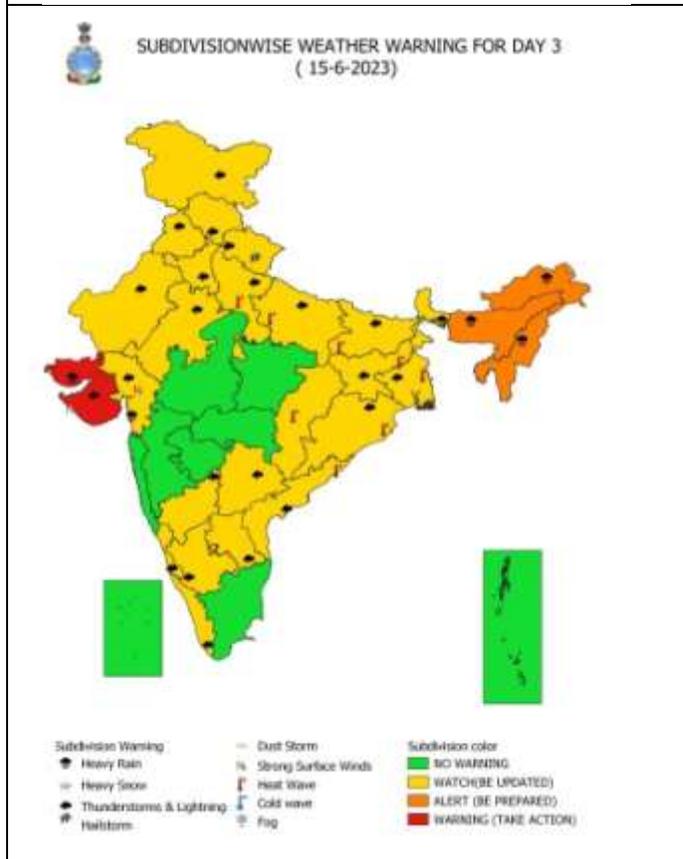
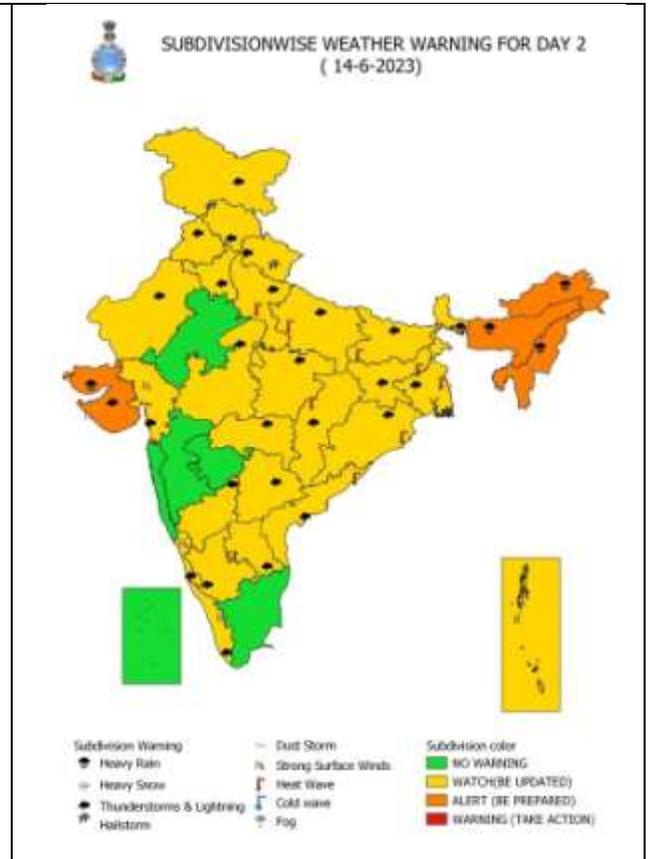
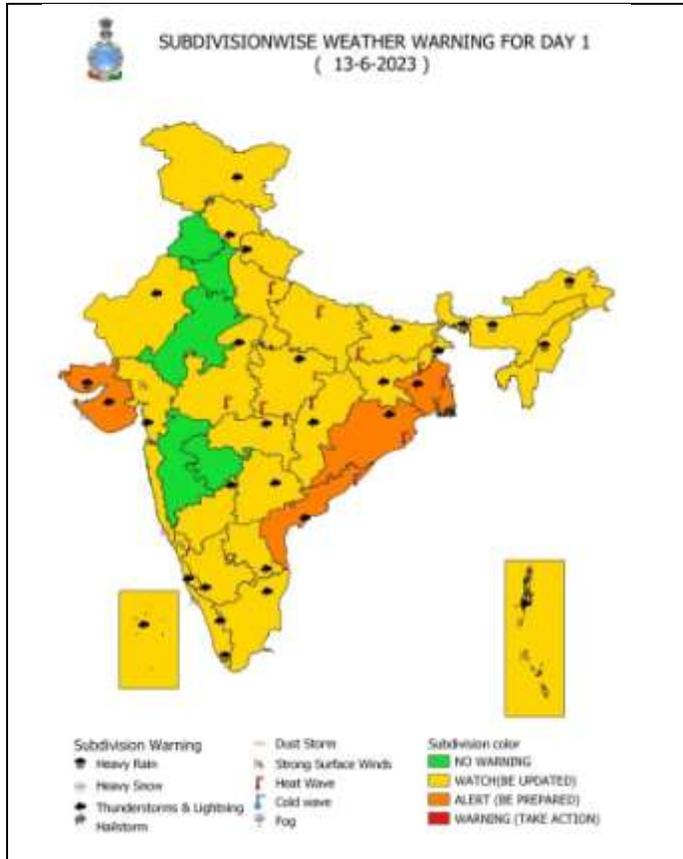
■ 50-63 KT (92-117 KMPH)

■ ≥ 64 (≥ 118 KMPH)

IMPACT OVER THE SEA

| MSW (knot/kmph) | Impact | Action |
|--------------------------|------------------------|----------------------------------------|
| 28-33 (52-61) | Very rough seas | Total suspension of fishing operations |
| 34-49 (62-91) | High to very high seas | Total suspension of fishing operations |
| 50-63 (92-117) | Very high seas | Total suspension of fishing operations |
| ≥ 64 (≥ 118) | Phenomenal | Total suspension of fishing operations |

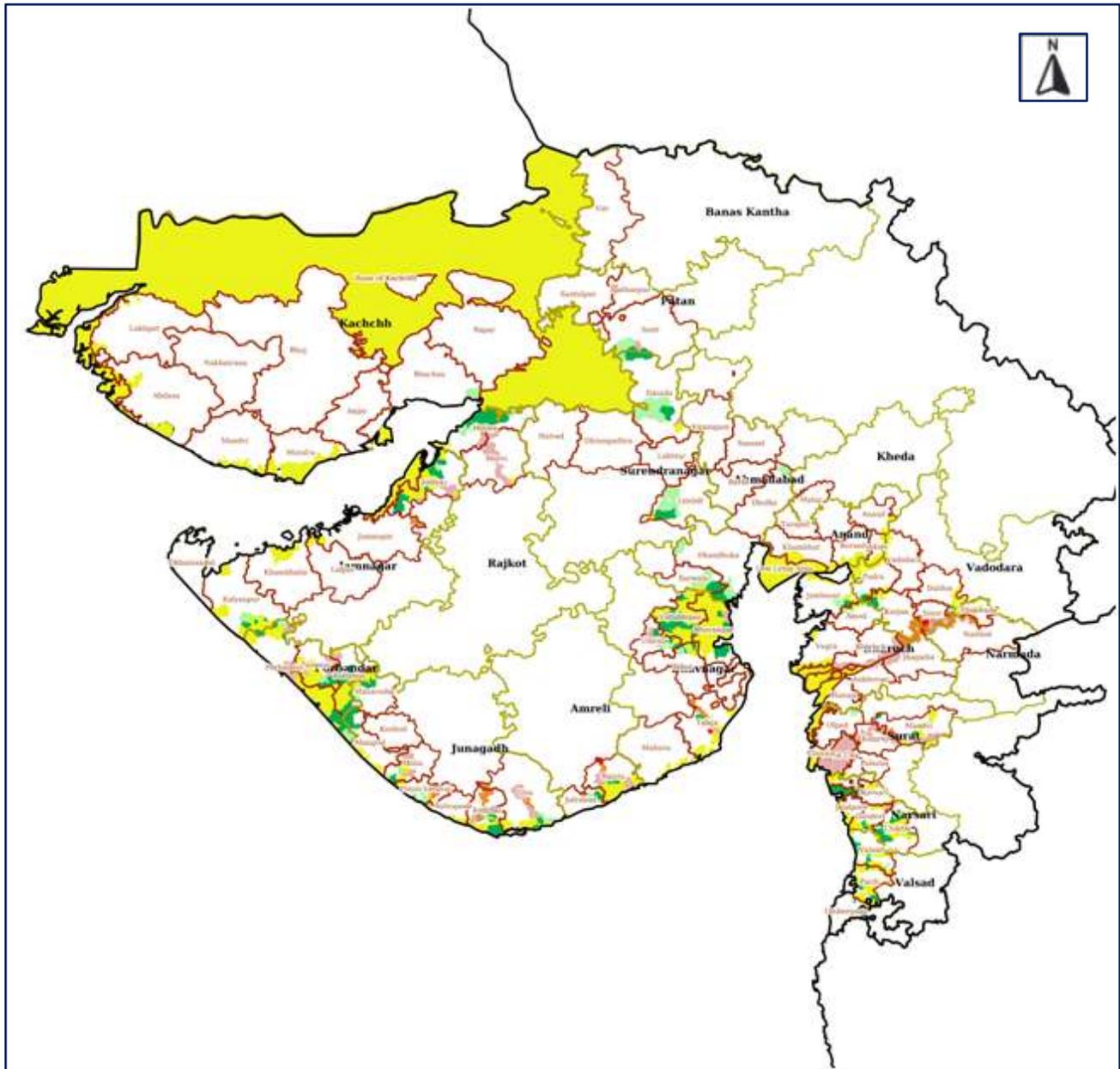
All India Heavy Rainfall Warning for 14th to 16th June 2023



District-wise Heavy Rainfall Warning Maps for 14th to 16th June



Cyclone Biparjoy Flood Hazard Map (Tehsil-wise) on 15th June – Flood Depth



L
E
G
E
N
D

State Boundary
 District Boundary
 Tehsil Boundary
 Village Boundary

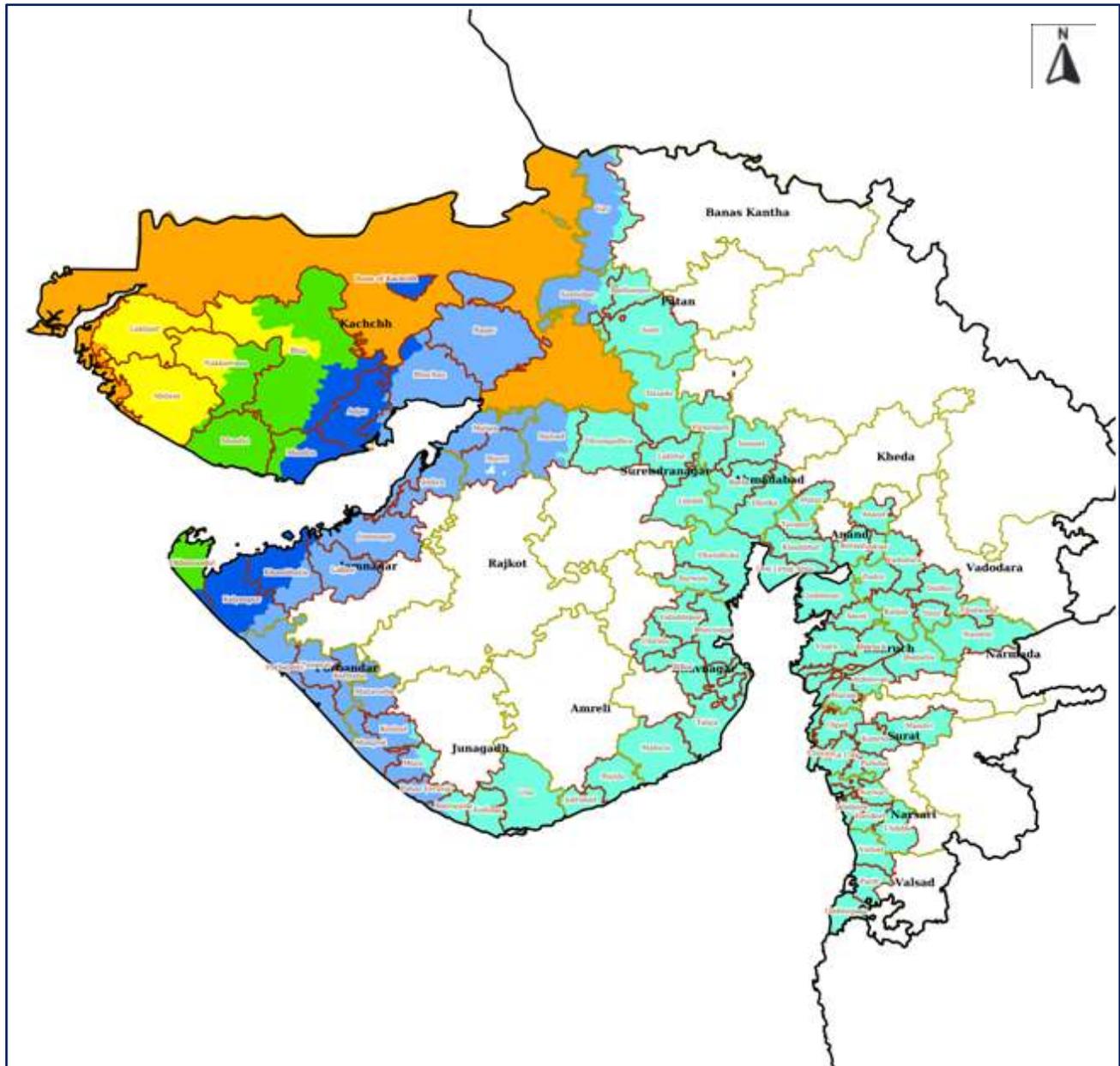
Very Low (Less than 0.25 m)
 Low (0.25 to 0.50 m)
 Moderate (0.50 to 1.0 m)

High (1.0 to 2.0 m)
 Very High (2.0 to 3.0 m)
 Extreme (Greater than 3.0 m)

District-wise Wind Warning Maps for 14th to 16th June

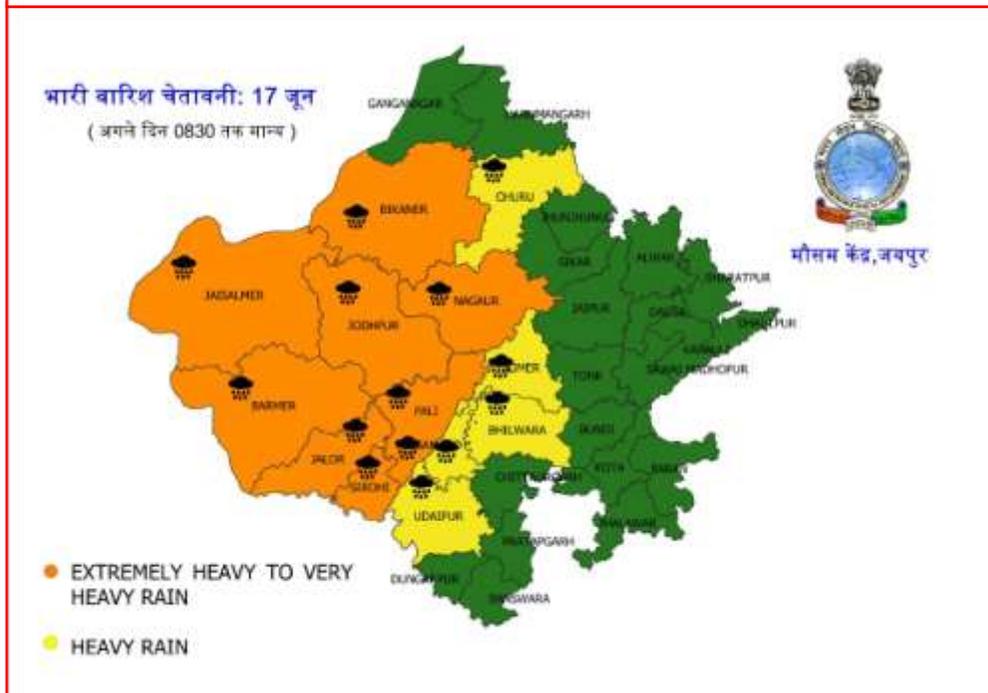
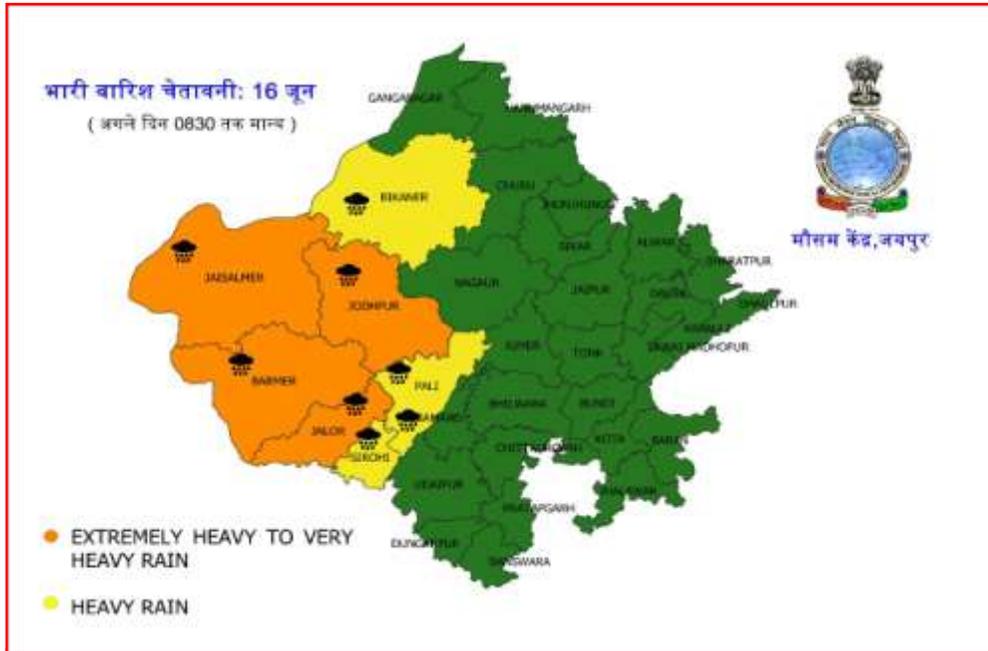


Cyclone Biparjoy Wind Hazard Map (Tehsil-wise) on 15th June - Wind Speeds

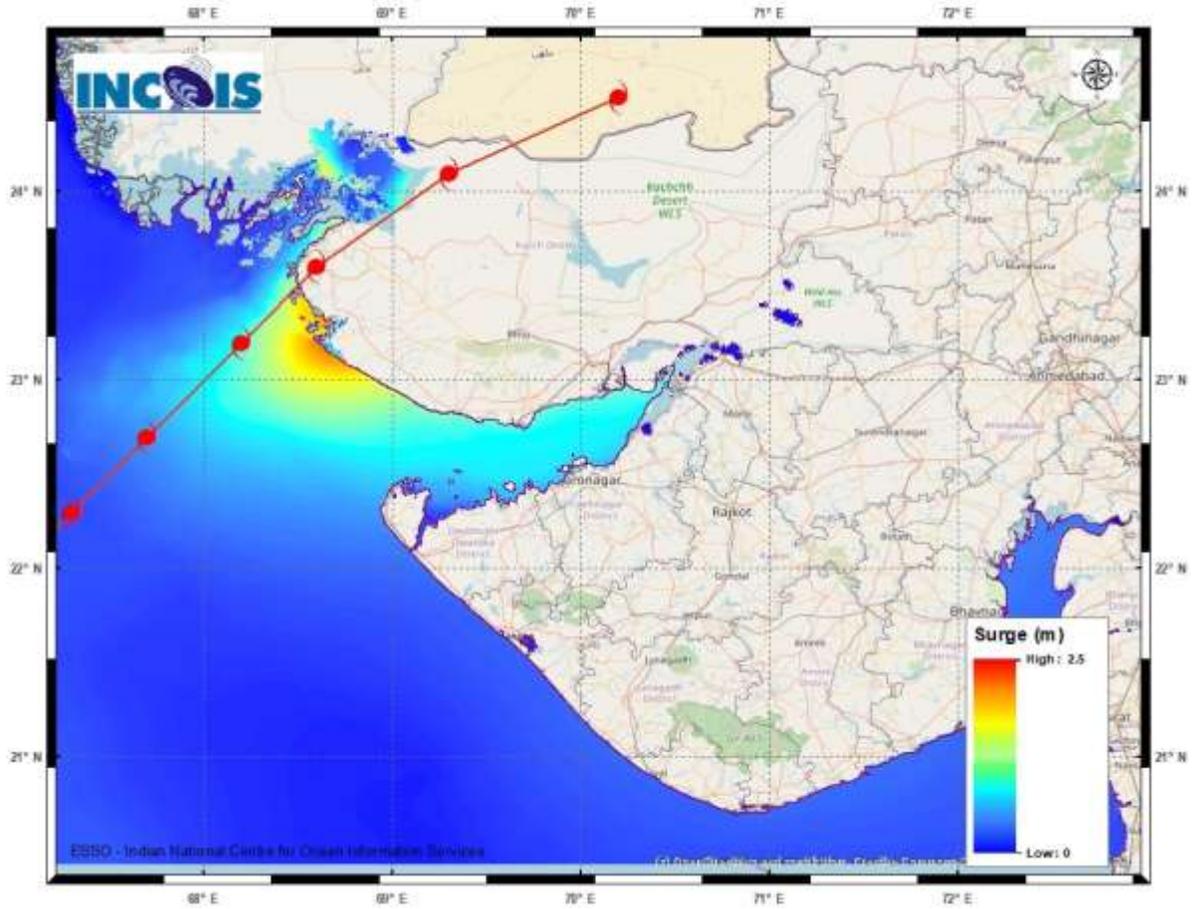


| | | | | |
|---------------|--------------------------------|------------------------------------|----------------------------|------------------|
| LEGEND | State Boundary | District Boundary | Tehsil Boundary | Village Boundary |
| | Wind Speed (Less than 31 Km/h) | Wind Speed (31 - 49 Km/h) | Wind Speed (49 - 61 Km/h) | |
| | Wind Speed (61 - 88 Km/h) | Wind Speed (88 - 117 Km/h) | Wind Speed (117- 166 Km/h) | |
| | Wind Speed (166 - 221 Km/h) | Wind Speed (Greater than 221 Km/h) | | |
| | | | | |
| | | | | |
| | | | | |

District-wise Wind Warning Maps on 16th and 17th June for Rajasthan



Storm Surge Warning Map based on Forecast Track



| Astronomical Tide on 15th June 2023 | | |
|-------------------------------------------------------|------------|------------|
| Station | Time (IST) | Height (m) |
| Porbandar | 09:37 | 2.61 |
| Navlakhi | 13:38 | 7.54 |
| OKHA | 11:36 | 3.74 |
| DEENDAYAL PORT (KANDLA) | 13:02 | 6.79 |

Fishermen warning graphics

