

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 1619
TO BE ANSWERED ON WEDNESDAY, 8TH DECEMBER, 2021**

DAMAGE DUE TO CYCLONES

1619. DR. JAYANTA KUMAR ROY:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Ministry is aware that West Bengal is most vulnerable to climate risk and the Bay of Bengal region was struck by innumerable severe cyclonic storms, due to which people living in the State faced immense hardship and if so, the details thereof
- (b) whether West Bengal coast witnessed landfalls of two extremely severe cyclones 'Bulbul' and 'Amphan' causing severe damage and if so, the details thereof;
- (c) whether any steps have been taken by the Government to find a lasting solution for the people living in vulnerable areas; and
- (d) if so, the details thereof?

**ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)**

- (a)-(b) Yes, Sir. The Ministry is well aware of the hazards posed by landfalling cyclones along the east & west coasts of India, including West Bengal and the hardship faced by the people dwelling in these regions.

India Meteorological Department (IMD) under the Ministry of Earth Sciences (MoES) has prepared a map of the cyclone hazard proneness of the coastal districts of India based on the frequency of cyclones, their intensity, actual/estimated maximum wind strength, Probable Maximum Storm Surge (PMSS) associated with the cyclones and Probable Maximum Precipitation (PMP) for all the districts along the coastline as presented in Fig. 1. Ninety-six districts including 72 districts touching the coast and 24 districts not touching the coast, but lying within 100 km from the coast have been classified based on their cyclone hazard proneness. Out of 96 districts, 12 are very highly prone, 41 are highly prone, 30 are moderately prone and the remaining 13 are less prone. Twelve very highly prone districts include South and North 24 Praganas, Medinipur, and Kolkata of **West Bengal**, Balasore, Bhadrak, Kendrapara, and Jagatsinghpur districts of **Odisha**, Nellore, Krishna, and east Godavari districts of **Andhra Pradesh** and Yanam of **Puducherry**.

- (b) Yes. In recent years West Bengal witnessed landfall of two cyclonic storms viz. (1) Very Severe Cyclonic Storm Bulbul (Crossed West Bengal Coast as a Severe Cyclonic Storm close to SunderbanDhanchi forest near 21.55°N/88.5°E during 2030 to 2330 IST of 9th November, 2019 with maximum sustained wind speed of 110-120 kmph gusting to 135 kmph) and (2) Super Cyclonic Storm Amphan (Crossed West Bengal-Bangladesh coasts as a Very Severe Cyclonic Storm across Sundarbans, near lat.21.65°N/long. 88.30°E during 1530-1730 IST, of 20th May, 2020 with maximum sustained wind speed of 155-165 gusting to 185 kmph).

The losses & death toll due to the Very Severe Cyclonic Storm **Bulbul** and Super Cyclonic Storm **Amphan** (as per available media reports and the reports from various State Government agencies) are given in **Table-1**

Table-1			
Year	Cyclonic Storm	Damage / Losses	Death toll
2019	Very Severe Cyclonic Storm BUL BUL over the Bay of Bengal, 5 th – 11 th November 2019; crossed west Bengal – Bangladesh coasts.	In West Bengal damages to about 1 lakh houses and standing crops. In Odisha, there has been extensive damage to standing crops in over 2 lakhs hectares.	41
2020	Super cyclone AMPHAN over the Bay of Bengal, 16 th – 21 st May 2020; crossed West Bengal – Bangladesh coasts.	Extensive damage in Gangetic West Bengal including Kolkata city.	98

- (c)-(d) IMD under MoES is responsible for providing early warnings w.r.t. cyclonic disturbances developing over the north Indian Ocean region and crossing Indian coasts. IMD has developed a well defined mechanisms/technology for early warning on cyclones so as to enable disaster managers to minimise loss of life and damage to property. IMD has one of the best forecasting systems for predicting tropical cyclones using high resolution advanced mathematical models (including global, regional and cyclone specific models) and a suite of quality observations. MoES has introduced ensemble prediction systems viz. Global Ensemble Forecasting System (GEFS) and NCMRWF Ensemble Prediction System (NEPS) for forecasting of cyclones. IMD utilizes an array of various models including global, regional and cyclone specific models for forecasting genesis, track, intensity, landfall and associated adverse weather like heavy rainfall, gale wind and storm surge.. IMD also has rich experience of more than 100 years in tropical cyclone prediction and has many trained and experienced scientists specialized in forecasting. IMD also has a very effective Decision Support System for analysing various observations at a single platform and predicting track and intensity of cyclones as well as the adverse weather like heavy rain and wind.

IMD uses a suite of quality observations from Satellites, RADARs and conventional & automatic weather stations for monitoring of cyclones developing over the Bay of Bengal and Arabian Sea. It includes INSAT 3D, 3DR satellites, Doppler Weather Radars (DWRs) along the coast and coastal automated weather stations (AWS), automatic rain gauges (ARGs), meteorological buoys and ships.

The Cyclone Warning Division (CWD) at India Meteorological Department (IMD), New Delhi acts as a Regional Specialised Meteorological Centre for monitoring, predicting and issuing warning for tropical cyclones developing over North Indian Ocean. It also carries out research on track, intensity, landfall and adverse weather associated with cyclones. IMD has three Area Cyclone Warning Centres at Chennai, Kolkata & Mumbai and four Cyclone Warning Centres at Ahmedabad, Bhubaneswar, Thiruvananthapuram and Visakhapatnam for carrying out operational forecasting and warning activities at state level and to carry out related research & development activities.

During recent years, IMD has consistently accurately predicted cyclones like Phailin (2013), Hudhud (2014), Vardha (2016), Mekunu (2018), Sagar (2018), Titli (2018), Luban (2018), Fani (2019), Hikaa (2019), Bulbul (2019), Amphan, Nisarga&Nivaar (2020), Tauktae, YAAS, Gulab&Shaheen (2021) thereby helping disaster managers to minimise loss of lives to less than 100 due to any landfalling tropical cyclone in recent years. IMD has also earned worldwide accolades in the field of cyclone forecasting including appreciations from United Nations, World Meteorological Organisation, Hon'ble President and Prime Ministers of India, Parliamentary Standing Committee, etc. IMD is at par with the leading centres of the world for tropical cyclone monitoring and forecasting.

National Disaster Management Authority (NDMA) prepared revised National Disaster Management Plan (NDMP) in November, 2019. This Plan covers all aspects of disaster risk reduction and management. The NDMP provides a framework and direction to the government agencies for all phases of the disaster management cycle in a time-bound manner. The Plan inter-alia, addresses mitigation, risk reduction, preparedness and response aspects for various disasters including Cyclones under six thematic areas (i) Understanding Risk, (ii) Inter-Agency Coordination, (iii) Investing in Disaster Risk Reduction (DRR) – Structural Measures, (iv) Investing in DRR – Non-Structural Measures, (v) Capacity Development and (vi) Climate Change Risk Management.

Also to inform, educate and to make the people aware about preparedness before, precautions and safeguards during a disaster and post disaster scenarios, NDMA runs awareness generation campaigns on various disasters including on flood and cyclones from time to time throughout the country, including in coastal states through print and electronic media, including social media. These campaigns aim at saving lives, livestock and livelihood to the maximum extent.

Towards vulnerability assessment & resilience building, the Government of India (GoI) has initiated the National Cyclone Risk Mitigation Project (NCRMP) across eight coastal states, with a view to address cyclone risks in the country. The overall objective of the Project is to undertake suitable structural and non-structural measures to mitigate the effects of cyclones in the coastal states and UTs of India. National Disaster Management Authority (NDMA) under the aegis of Ministry of Home Affairs (MHA) is implementing the Project in coordination with participating State Governments and the National Institute for Disaster Management (NIDM). The Project has identified 13 cyclone prone States and Union Territories (UTs), with varying levels of vulnerability. The main objective of the NCRMP is to reduce vulnerability of coastal communities to cyclone and other hydro meteorological hazards through;

- (i) Improved early warning dissemination systems.
- (ii) Enhanced capacity of local communities to respond to disasters.
- (iii) Improved access to emergency shelter, evacuation, and protection against wind storms, flooding and storm surge in high areas.
- (iv) Strengthening DRM capacity at central, state and local levels in order to enable mainstreaming of risk mitigation measures into the overall development agenda.

Also, under this programme, there are efforts to provide a more precise quantitative assessment of the likely impacts of cyclones over the coastal belt, via a Web-based decision support system called Web – DCRA (Dynamic composite Risk Atals). This has been developed under the joint efforts with the India Meteorological Department / MoES & the National Cyclone Risk Mitigation Project (NCRMP) of National Disaster Management Authority (NDMA), MHA, for utilization in the Cyclone prone coastal states.

Apart from NCRMP, the GoI also has set up various committees to develop processes & procedures for Hazard resilience development. For example, there is a Task Force functioning on ‘Cyclone Resilient Robust Electricity Transmission and Distribution infrastructure in the Coastal areas’ to come out with practical solutions for Cyclone Resilient Robust Electricity Transmission and Distribution (T&D) infrastructure in the Coastal areas of the country.

The Bureau of Indian Standards (BIS) is also working towards the design aspects of cyclone resilient infra-structures as well as cyclone shelters over the coastal regions.

Similarly, the recently launched Coalition for Disaster Resilient Infrastructure (CDRI) is planning to strengthen the linkages between 'Early-warning decision support and coastal Infrastructure systems for India'. The CDRI is a multi-stakeholder global partnership of national governments, UN agencies and programmes, multilateral development banks and financing mechanisms, the private sector, and academic and knowledge institutions. CDRI was launched by Hon Prime Minister at the Climate Action Summit in New York in September 2019. At present, CDRI has 24 countries and 7 international organizations as members.

Annexure-I

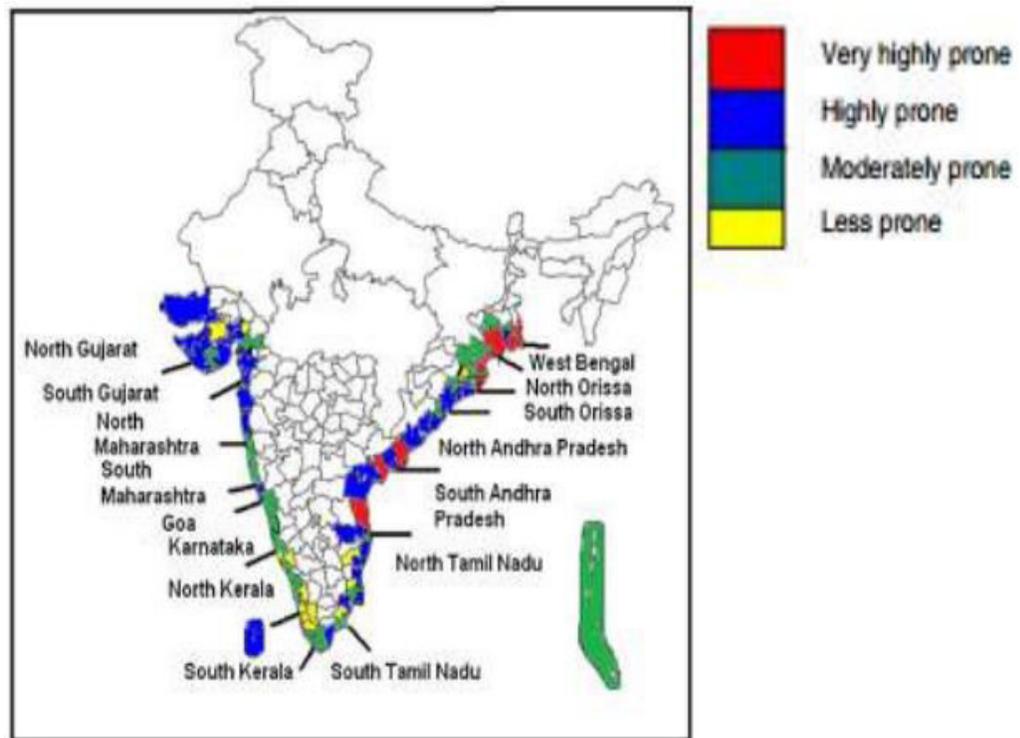


Fig.1: Cyclone hazard prone districts of India based on frequency of total cyclones, total severe cyclones, actual/estimated maximum wind strength, PMSS associated with the cyclones and PMP for all districts
