

GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
**RAJYA SABHA**  
**UNSTARRED QUESTION NO. - 1778**  
ANSWERED ON – 17/03/2022

**CYCLONE HAZARD PRORENESS OF COASTAL AREAS**

1778. SHRI V. VIJAYASAI REDDY:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether IMD has prepared map of cyclone hazard proneness of coastal districts;
- (b) whether all coastal districts of the State of Andhra Pradesh are either 'very highly prone' or 'highly prone';
- (c) if so, the details thereof;
- (d) reasons that in spite of having early warning system and cyclone prediction equipment, loss to coastal areas, nearly 100 kms from the coast of Andhra Pradesh have suffered property damage and loss of life;
- (e) whether Government believes that there is a need to tighten disaster management to minimize loss; and
- (f) details of revised disaster management plan prepared by NDMA recently?

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

- (a) Yes, Sir. India Meteorological Department (IMD) has carried out studies in this aspect and prepared a map of hazard proneness of various coastal districts of the country based upon the frequency of total cyclones, total severe cyclones, actual/estimated maximum wind strength, probable maximum storm surge associated with the cyclones and probable maximum precipitation for various coastal districts. Based upon the hazard criteria, 96 districts including 72 districts on the coast and 24 districts off the coast, but lying within 100 km from the coast have been classified as less prone, moderately prone, highly prone and very highly prone regions. The hazard proneness map of coastal areas is given in Annexure-I.
- (b)- (c) Out of 96 districts, 12 are very highly prone, 41 are highly prone, 30 are moderately prone, and the remaining 13 are less prone. 12 very highly prone districts include Nellore, Krishna & east Godavari districts of Andhra Pradesh. The remaining districts of Andhra Pradesh, which are coastal are highly prone districts.
- (d) IMD has one of the best Early Warning Services in the world related to Cyclones and has a well-defined Standard Operation Procedure for monitoring & forecasting the cyclones. Though there has been noteworthy decrease in death toll due to cyclones in recent years, containing damage and economic loss associated with cyclones is still a challenge. Various structural measures with multi-institutional support at national and state level are required to reduce damage due to cyclones.

The best practices followed by IMD related to cyclone warning services follow:

➤ **Early Warning System**

India Meteorological Department (IMD) has demonstrated its capability to provide early warning for Cyclones with high precision. As a result, the vulnerable population gets evacuated from the damage prone areas in a timely manner to safe shelters thereby reducing the human death toll to a bare minimum, in the recent years. It is noteworthy that death due to cyclones has been reduced to less than 100 in recent years.

IMD has continuously expanded its infrastructure for meteorological observations, data exchange, monitoring & analysis, forecasting and warning services using contemporary technology. 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 and SCATSAT satellites, Doppler Weather Radars (DWRs) along the coast and coastal automated weather stations (AWS), high wind speed recorders, automatic rain gauges (ARGs), meteorological buoys and ships.

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) for predicting tropical cyclones crossing both west and east coast of India and associated adverse weather over India. MoES has adapted global models from USA and UK under the bilateral cooperation for forecasting of cyclones. Global Forecasting System (GFS) with a resolution of 12 km and Global Ensemble Forecasting System (GEFS) with a resolution of 12 km have been adapted from NCEP, NOAA, USA and are being used operationally to provide forecast upto 7 days. Similarly, the Unified Model (UM) and unified Model Ensemble Prediction System (UMEPS) both with resolution of 12 km have been adapted from UKMO, UK to provide forecast upto 7 days.

IMD has a very effective Decision Support System for analyzing 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 also utilizes storm surge and coastal inundation models and wave models output from Indian National Centre for Ocean Information Services (INCOIS), Hyderabad) for issuing storm surge warning.

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 services on tropical cyclones developing over north Indian Ocean. It also carries out research on track, intensity, landfall and adverse weather associated with cyclones like heavy rainfall, gale wind and storm surge monitoring and prediction.

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 warning activities at state level and to carry out related research & development activities. There is a Cyclone Warning Research Centre at IMD Chennai to carry out the research on tropical cyclones. There is also a Climate Research & Services Division at IMD Pune to carry out the research on meteorological and atmospheric sciences including tropical cyclones.

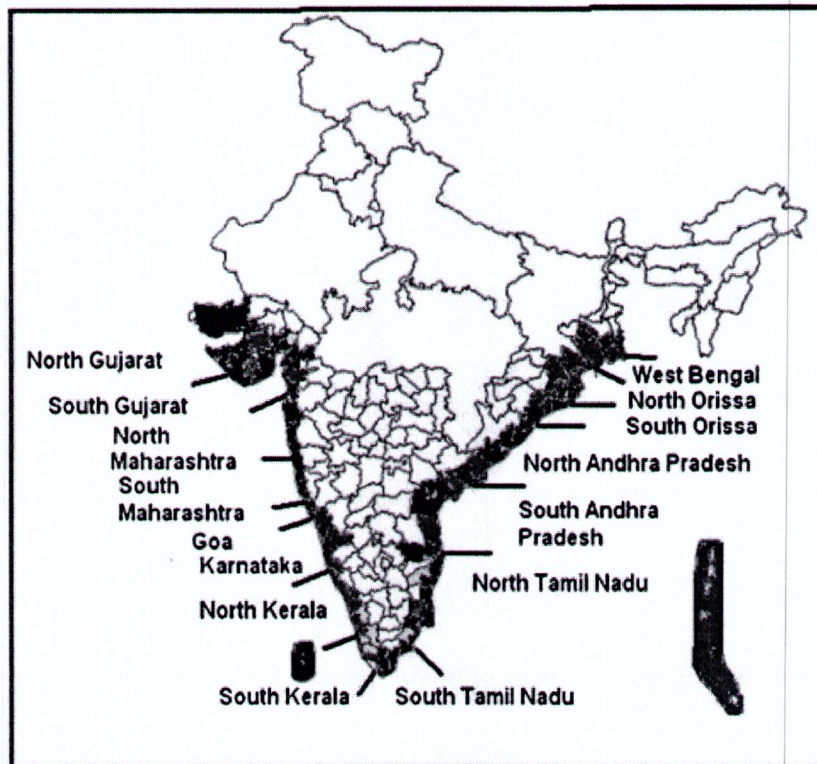
(e)-(f) To support the Disaster Management Authorities, there are continuous efforts towards vulnerability assessment and resilience building related to cyclones. Towards this, the Government of India (GoI) has initiated the National Cyclone Risk Mitigation Project (NCRMP) with a view to address cyclone 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) will implement 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

- Improved early warning dissemination systems
- Enhanced capacity of local communities to respond to disasters
- Improved access to emergency shelter, evacuation, and protection against wind storms, flooding and storm surge in high areas
- Strengthening Disaster Risk Management (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 Atlas). This has been developed jointly by India Meteorological Department / MoES and National Disaster Management Authority (NDMA), MHA under the National Cyclone Risk Mitigation Project (NCRMP) for cyclone prone coastal states. The purpose of this tool is mainly for static pre-event planning and dynamic response (responding to a real-time cyclone) for cyclone prone States/UTs.

As a part of this project it is also envisaged to develop an App (the web-DCRA App) specifically meant for communicating with the users (Disaster managers and all other Stake holders including General public) to access the Cyclone warning related updates during the event while on move as well as to provide pertinent information related to mitigation activities. Apart from NCRMP, the GoI has also set up various committees to develop processes & procedures for Hazard resilience development.



	Less Prone
	Moderately Prone
	Highly Prone
	Very Highly Prone

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