

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
STARRED QUESTION No. *70
To be answered On Monday, December 17, 2018**

Impact of Cyclonic Storm "Titli"

***70: SHRI Sanjay Raut**

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether Regional Integrated Multi-Hazard Early Warning System (RIMES) for Africa and Asia has termed "Titli", as the severe cyclonic storm that devastated Odisha and Andhra Pradesh as rarest of rare cyclone;**
- (b) if so, the details thereof;**
- (c) reasons as to why the India Meteorological Department failed to anticipate titli's impact; and**
- (d) the plans made by Ministry to minimise impacts of such cyclone in coastal and non-coastal regions more effectively in future ?**

**ANSWER
MINISTER OF MINISTRY OF SCIENCE AND TECHNOLOGY AND
MINISTRY OF EARTH SCIENCES
(Dr. HARSH VARDHAN)**

(a) to (d): A Statement is laid on the Table of the House.

**STATEMENT LAID ON THE TABLE OF THE RAJYA SABHA IN REPLY (a) to (d) TO
STARRED QUESTION NO. *70 REGARDING IMPACT OF CYCLONIC STORM "Titli" TO
BE ANSWERED ON MONDAY, DECEMBER 17, 2018**

(a) Yes Sir.

(b) As per the RIMES Report "More than 200 years of cyclone track history in the Odisha coast reveals that the Titli cyclone is the rarest of rare in terms of (a) its characteristics such as recurvature after landfall, (b) retaining its destructive potential after landfall and (c) recurvature away from the coastal areas for more than two days".

IMD maintains the track of cyclones since 1891 in a digital format. During 1891-2017, there have been two cases one each in 14-16 Nov. 1998 and 8-14 Oct. 2013, when the cyclone has maintained its intensity of severe cyclonic storm after crossing Odisha /Andhra Pradesh coast for quite a long time travelling upto a distance of 300-400 km. However, the recurvature of these two previous severe cyclonic storms was relatively less.

(c) No Sir, IMD correctly predicted the track, landfall point & time, intensity and associated weather like heavy rainfall, winds and storm surge in association with the system. The northeastward recurvature was also well predicted. In the regular bulletins issued by IMD alongwith damage expected and action suggested was disseminated to all concerned disaster managers. The forecast performance is discussed below:

- In the first Bulletin issued on 8th, it was mentioned that the system would move north-westwards towards Odisha and adjoining north Andhra Pradesh coasts during next 72 hours.
- First information about that the system would cross Odisha and adjoining north Andhra Pradesh coasts between Gopalpur and Kalingapatnam around 11th morning was given in the bulletin issued at 0900 hrs IST of 9th October (about 43 hours prior to landfall). The system crossed north Andhra Pradesh and south Odisha coasts near Palasa (18.8°N/84.5°E) to the southwest of Gopalpur during 0430-0530 IST of 11th.
- The landfall point was further specified in the bulletin issued at 2030 hrs IST of 10th October that the system would cross Odisha and adjoining north Andhra Pradesh coasts close to Gopalpur around 11th morning (about 9 hours in advance).
- First information about the northeastwards recurvature of system towards Gangetic West Bengal across coastal Odisha from 12th morning was given in the bulletin issued at 1130 IST of 9th October (about 60 hours in advance of recurvature, the recurvature started at 1500 UTC of 11th).
- First information that the system would cross coast as a VSCS with maximum sustained wind speed of 140-150 kmph gusting to 165 kmph was issued at 0400 hours IST of 11th (about 5 hours prior to landfall).
- Regular bulletins were issued indicating damage expected and actions suggested along the expected track of the system. It included the damage expected over Gajapati, Ganjam, Nayagarh, Kandhamal and Raigada, north coastal & adjoining districts of north interior Odisha during 9th/ 0530 IST to 12th/0230 IST.

- (d) **IMD has one of the best systems for monitoring and forecasting tropical cyclones using a suite of quality observations from Satellites and Radars and high resolution advanced weather prediction models. IMD has a very effective Decision Support System for forecasting and early warning of tropical cyclones. IMD has defined Standard Operating Procedure (SOP) for monitoring & forecasting the cyclones and issue of warning services. IMD has one of the best forecasting capabilities in forecasting tropical cyclones.**

MoES currently uses the Global Forecasting System (GFS) with a horizontal resolution resolution of 12 km. In addition, a Global Ensemble Forecast System (GEFS) for short and medium range prediction at 12 km using 21 members of the model has been developed and is operational since 01 June 2018. The resolution (12 km) of the GEFS is the highest among all the operational global operational weather forecast centres in the world. The Ensemble forecasts enhance the weather information being provided by the current models by quantifying the uncertainties in the weather forecasts and generate probabilistic forecasts. The ensemble forecast also provides the probabilistic guidance for track and intensity of cyclones and depressions. Regional models like Hurricane Weather Research Forecast (HWRF) have also been implemented to generate forecasts at very high resolution of 2km.

IMD has always used contemporary technology and continuously expands its infrastructure for meteorological observations, data exchange, monitoring & analysis, state of art forecasting and early warning services.
