

**GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
LOK SABHA  
UNSTARRED QUESTION No. 1994  
TO BE ANSWERED ON WEDNESDAY, MARCH 07, 2018**

**FOUR-STAGE WARNING SYSTEM**

**1994. DR. SHASHI THAROOR:**

**Will the Minister of EARTH SCIENCES be pleased to state:**

- (a) whether the Government has taken steps to improve the Indian Meteorological Department's four-stage warning system, particularly on the West coast, to ensure that the commencement of cyclonic disturbance is known to those affected at least 24 hours in advance and if so, the details thereof;**
- (b) whether a comprehensive review of existing advance warning infrastructure has been initiated to analyse and remedy under-utilisation and wasteful use of resources, such as that of the recently installed Doppler Radar in Thiruvananthapuram and if so, the details thereof;**
- (c) whether a comparative study of advanced warning systems across the world, such as the Joint Typhoon Warning Centre of the U.S., has been conducted to identify and incorporate best practices into our own; and**
- (d) if so, the details thereof and if not, the reason therefor?**

**ANSWER**

**MINISTER OF STATE FOR MINISTRY OF SCIENCE AND TECHNOLOGY  
AND MINISTRY OF EARTH SCIENCES  
(SHRI Y. S. CHOWDARY)**

- (a) Madam, IMD has one of the best forecasting systems for predicting tropical cyclones using high resolution advanced mathematical models and a suite of quality observations from Satellites and Radars. IMD utilises an array of high resolution advanced mathematical models (including global, regional and cyclone specific models) and a suite of quality observations from Satellites, Radars and conventional & automatic weather stations for monitoring & predicting tropical cyclones crossing both west and east coast of India. IMD has a very effective Decision Support System for generating track of cyclones and analysing various observations at a single platform. IMD has defined Standard Operating System for monitoring & forecasting the cyclones and issue of warnings.**

**Once a cyclone is noticed, as per Standard Operating Procedure four stage forecasting system like Pre cyclone Watch is issued 72 hours in advance of commencement of adverse weather, Cyclone Alert is issued 48 hours in advance of commencement of adverse weather, Cyclone Warning is issued 24 hours in advance of commencement of adverse weather and Post landfall outlook is issued 12 hours before the expected landfall time.**

**(b) IMD and Ministry of Earth Sciences have a review mechanism to constantly review and upgrade the forecasting systems and standard operating procedures. IMD also conducts a Cyclone Review Meeting annually in the month of January/February to review the existing infrastructure and their utilisation as well as plan for the future. The existing advisory/warning infrastructure is being utilised to monitor, analyse and predict cyclonic disturbances. The Doppler Weather Radar (DWR) at Thiruvananthapuram is being utilised fully for weather monitoring after it's installation in 2017. The radar was used effectively during the period of cyclone Ockhi.**

**(c) & (d) Yes. A comparative study of advance warning systems across the world is carried out internationally in International Workshop on Tropical Cyclones every 4 years. Last such meeting was held in December, 2014 and the next meeting is proposed to be held in December, 2018.**

**IMD also functions as Regional Specialised Meteorological Centre (RSMC) of the World Meteorological Organization (WMO) to provide tropical cyclones warning for the cyclonic disturbances developing over north Indian Ocean. These advisories are issued to the WMO/ESCAP panel member countries including Bangladesh, India, Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Yemen. The outcomes are shared among various agencies in the world. Further, a comparative analysis of forecasting skills of various centres is carried out in these workshops.**

**There has been comparative study of cyclone forecasting skill of India Meteorological Department (IMD) for the cyclones over the north Indian Ocean with other leading centres of the world like (i) national Hurricane centre (NHC), USA for the cyclones over the North Atlantic Ocean and (ii) Japan Meteorological Agency (JMA) for the cyclones developing over Northwest Pacific Ocean. The study showed that the tropical cyclone track and intensity forecast skill of IMD is at par with other leading centres.**

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