GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOKSABHA
UNSTARRED QUESTION NO. 895
TO BE ANSWERED ON FRIDAY, 23RD JULY, 2021

UNEXPECTED INCREASE IN NATURAL DISASTERS

895. SHRIMATI POONAM MAHAJAN:
SHRI HIBI EDEN:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether there has been an unexpected increase in natural disasters like cyclones and floods in the country during last three years and if so, the details thereof;
(b) whether any study has been conducted to analyse the increase in natural disasters being caused due to climate change, if so, the details thereof;
(c) the details and major highlights in the report 'Assessment of Climate Change over Indian region' published by his Ministry;
(d) whether the Government is planning to take steps to improve the data collection capacity of India Meteorological Department (IMD) helping it to predict natural events with more accuracy;
(e) if so, the details thereof; and
(f) the details of the steps being taken to mitigate climate change disasters alongside coastal regions?

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

(a) There has been observed an increase in natural disasters like cyclones and floods in the country during last recent years. The number of Cyclones and Number of stations reported heavy and extremely heavy rainfall events since 2016 is given below. It can be seen that during recent years' frequency of cyclones and stations reporting very heavy and extremely heavy rainfall has been increased.

	Number of Cyclones		**Number of stations Reported during SW Monsoon season (June to September)**	
YEAR	**TOTAL**	**Severe Cyclone**	**V. Heavy Rainfall**	**Extremely Heavy Rainfall**
2016	4	1	1864	226
2017	3	2	1824	261
2018	7	6	2181	321
2019	8	6	3056	554
2020	5	5	1912	341

It has been found that there is a significant rise [+0.86 per decade] in the frequency of post-monsoon (October–December) season very severe cyclonic storms (VSCS) in the North Indian Ocean (NIO) during the past two decades (2000–2018). During the same period, frequency of extremely severe cyclonic storms (ESCS) over the Arabian Sea has increased. Also there is an increased frequency of localized heavy rainfall on sub-daily and daily

timescales that has enhanced the flood risk over India, contributing to increased frequency and impacts of floods in urban areas.

(b) Yes Sir. Recent studies have reported significant rising trends in the frequency and the magnitude of extreme weather events over different parts of the world and also over various regions of India against a backdrop of global warming/climate change. The climate change assessment report published by the Ministry of Earth Sciences (MoES), notes that complex interactions between the earth system components amidst the warming environment and regional anthropogenic influences, have led to a rise in frequency of localized heavy rainfall events, drought and flood occurrences, and increase in the intensity of tropical cyclones etc. in the last few decades.This book also summarises the present status and future projection of climate change over India.

(c) The report "Assessment of Climate Change over the Indian Region" published by MoES is the first of its kind where a comprehensive discussion has been made regarding the impact of human-induced global climate change on the regional climate and monsoon of the Indian subcontinent, adjoining Indian Ocean and the Himalayas. The assessment report provides a detailed overview and synthesis of the published scientific literature on climate change over India and adjoining regions. While the Intergovernmental Panel on Climate Change (IPCC) assessment reports published every 6–7 years, largely provide a global perspective on climate change, the focus on regional climate change aspects is considerably limited and therefore the reports fills this gap by discussing the past climate and regional climate change projections over the Indian subcontinent based on the climate models used in the IPCC Fifth Assessment Report (AR5) and climate change modeling studies using the Indian Institute of Tropical Meteorology (IITM) Earth System Model (ESM) and Coordinated Regional Downscaling Experiment (CORDEX) South Asia datasets. The report notes that surface air temperature over India has risen by about 0.7°C during 1901–2018 wherein the rise during 1986-2015 has been at a faster rate of about 0.15^{o}C per decade. The complex interactions between the earth system components amidst the warming environment and regional anthropogenic influences have led to a rise in frequency of localized heavy rainfall events, drought and flood occurrences, increase in the intensity of tropical cyclones, increasing SSTs and sea level etc. Future projections of regional climate, performed under different climate change scenarios, too indicate robust changes in the mean, variability and extremes of several key climatic parameters over the Indian subcontinent and adjoining areas (e.g. land temperature and precipitation, monsoons, Indian Ocean temperature and sea level, tropical cyclones, Himalayan cryosphere, etc).

The scope of this report is the physical science basis of climate change with a focus on regional climate drivers specific to the Indian land area and the surrounding ocean. It is a region-focused analogue of the global scale assessment by Working Group I of the IPCC. This report will be useful to advance public awareness of India's changing climate and to inform mitigation and adaptation decision making. While it is meant to be policy relevant, this report is not intended to be policy prescriptive.

(d)-(e) Yes Sir. The weather forecasting and early warning systems in the country are comparable to most of the developed countries in the world. Efforts are continuously made to enhance the observational network and the level of efficiency of the forecasting systems based on latest technology including Satellite, Radar and numerical models. During the past few years, IMD has been continuously improving weather prediction services in terms of accuracy, lead time and associated impact.

IMD uses a suite of quality observations from satellites, radars and conventional & automatic weather stations for monitoring of cyclones and prediction of weather. It includes INSAT 3D, 3DR and SCATSAT satellites, Doppler Weather Radars (DWRs) along the coast and Automated Weather Stations (AWS), Automatic Rain Gauges (ARGs), meteorological buoys and ships. Operational implementation of improved suite of prediction models has enhanced the weather forecasting capability through assimilation of all available global satellite radiance & Radar data for the production of forecast products at 12 km grid globally and 3 km grid over India/regional/mega city domains. Further improvements in the observational network and numerical modelling are in progressfor betterment of forecasting natural disasters like cyclone and heavy rainfall with respect to accuracy, lead time and spatial resolution.

(a) IMD is dedicated for monitoring, detection and forecasting of weather and climate including early warning for severe weather events such as, Cyclones, heavy rainfall, extreme temperature, thunderstorms, etc. Mitigation procedures are carried out by National Disaster Management Authority (NDMA) based on the warnings/forecasts issued by IMD. Further, the Government of India 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. 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;

- 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.