GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 2307
TO BE ANSWERED ON WEDNESDAY, 15TH MARCH, 2023

CHANGE OF WEATHER PATTERN

2307. SHRI THlRUNAVUKKARASAR SU:
SHRI RAVNEET SINGH BITTU:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether it is a fact that the northern parts of the country are witnessing severe cold conditions amidst changing weather patterns caused by climate change;
(b) if so, the details thereof along with the reasons therefor;
(c) whether the El Nino and La Nina impact has also been increasing in the country triggering significant climate change and if so, the details thereof;
(d) whether the Government is taking any measures to mitigate the impact of climate change in the country thus minimizing the impact on human life including flora and fauna in the country; and
(e) if so, the details thereof and if not, the reasons therefor?

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

(a) - (b) Yes Sir. It is a fact that the northern parts of India, during the winter months (January & February), have experienced severe cold conditions this year. About 74 cold wave events were reported over North India while over South India only 6 cold wave events were reported in January 2023. Moreover, analysis of cold wave data since 1971 shows a decrease in cold wave events over North India. It is seen that the cold wave conditions have significantly decreased over northern parts of India in the recent decades (2001-2020) as compared to 1971-80 decade.

It is important to note that weather patterns and their impact on specific regions can be complex and affected by a variety of factors, including but not limited to climate change. While climate change is a global phenomenon that affects the planet as a whole, its impact on specific regions and weather patterns can vary widely. It is generally agreed upon by the scientific community that climate change is contributing to more extreme weather events worldwide, including heat waves, droughts, and extreme cold conditions. However, the specific mechanisms through which climate change affects regional weather patterns can be complex and still require further research.

It is mentioned that, factors such as changes in wind patterns, cloud cover, and atmospheric moisture content can all contribute to changes in temperature and precipitation levels. Additionally, local factors such as urbanization and deforestation can further worsen the impact of climate change over the region.

(c) The El Niño–Southern Oscillation (ENSO), which is generated via seasonally modulated interactions between the tropical Pacific Ocean and atmosphere, influences severe weather, rainfall, river flow and agricultural production over large parts of the world including Indian region. The influence of El-Niño on heat wave and cold wave events are evident and it is observed that the intense heat waves are experienced during El-Niño years and intense cold wave during La-Niña years.

In general, Indian Southwest Monsoon Rainfall (ISMR) is weaker than normal during the El Nino years and vice versa during La Nina years. During the period 1951-2022, there were 16 El-Nino years and during 9 of these years, ISMR was below normal indicating that there is no one to one association between El-Nino and ISMR. However, there is stronger inverse relationship between El-Nino and rainfall during later half of the monsoon season (particularly with September rainfall). Recent studies reported that frequency and intensity of extreme El-Niño and La-Niña events in the Pacific Ocean have increased in recent decades, which has led to more frequent and intense droughts and floods in India. In addition to ENSO conditions over the Pacific, other factors such as Indian Ocean Sea Surface Temperatures (SSTs) also have influence on the South Asian southwest monsoon. A positive (or negative) Indian Ocean Dipole (IOD) is associated with a stronger (or weaker) than normal monsoon over the region.

(d)- (e) Climate Change is one of the reasons of increase in frequency and intensity of the extreme weather events. IMD issues forecasts and early warnings related to extreme weather events and share the same with Disaster Management Authorities as well as general public through various platforms for necessary preparedness and to support mitigation measures.

IMD follows a seamless forecasting strategy. The long-range forecasts (for the whole season) issued are being followed with extended range forecast issued on every Thursday with a validity period of four weeks. To follow up the extended range forecast, IMD issues short to medium range forecast and warnings daily valid up to next five days with an outlook for subsequent two days. The short to medium range forecast and warning at district and station level are issued by state level Meteorological Centres (MCs)/Regional Meteorological Centres (RMCs) with a validity of next five days and are updated twice a day. The short to medium range forecast is followed by very short range forecast of severe weather up to three hours (nowcast) for all the districts and 1171 cities and towns. These nowcasts are updated every three hours.

Forecast is issued for 36 meteorological sub-divisions from National Weather Forecasting Centre, IMD HQ and is updated four times a day. The forecasts and nowcasts are issued at District Level and Station Level by State Level Meteorological Centres and Regional Meteorological Centres.

IMD is implementing Impact Based Forecast (IBF) which gives details of what the weather will do rather than what the weather will be. It contains the details of impacts expected from the severe weather elements and guidelines to general public about do's and don'ts while getting exposed to severe weather. These guidelines are finalised in collaboration with National Disaster Management Authority (NDMA) and is already implemented successfully for cyclone, heat wave, thunderstorm and heavy rainfall.

IMD has taken various initiatives in recent years for improvement in dissemination of weather forecast and warning services based on latest tools and technologies. The forecasts and warnings are disseminated to users including disaster managers by e-mail on regular basis. In addition to this, WhatsApp groups are created including disaster managers and IMD officials and forecast & warnings are disseminated through this facility also. The forecast & Warnings are uploaded in social media & website for reference by all concerned. The nowcasts related to Severe Weathers are disseminated through SMS also to the registered users.

In 2020, IMD has launched seven of its services (Current Weather, Nowcast, City Forecast, Rainfall Information, Tourism Forecast, Warnings and Cyclone) with '**UMANG**' mobile App for use by public. Moreover, in 2020, IMD had developed mobile App '**MAUSAM**' for weather forecasting, '**Meghdoot**' for Agromet advisory dissemination and '**Damin**i' for lightning alert.

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