

**GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
LOK SABHA  
UNSTARRED QUESTION NO. 3454  
TO BE ANSWERED ON WEDNESDAY, 22<sup>ND</sup> MARCH, 2023**

**RISE IN HEAT WAVES**

3454. DR. KALANIDHI VEERASWAMY:  
SHRI VISHNU DAYAL RAM:  
SHRI GHANSHYAM SINGH LODHI:  
SHRI K. NAVASKANI:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Government is aware of the alarming rate of heat waves in the recent years, which is an impact of climate change, if so, the details of the steps taken to reduce the causes of heat waves in the upcoming years, if not, the reasons therefor;
- (b) the details of the impact of heat waves on the economy in the last climate year and if so, whether the Government has taken any steps to prevent life and economic loss due to heat waves in the upcoming year and if not, the reasons therefor;
- (c) whether all States/UTs have submitted their Heat Action Plan to the Union Government, if so, the details thereof along with the action taken by the Union Government in this regard;
- (d) the extent to which the temperature of the earth is increasing every year and the possibility of disasters is looming large;
- (e) the percentage of melting of glaciers recorded in the Himalayan region during the last five years; and
- (f) whether the Government has taken cognizance of the fact that the frequency of extreme weather events such as floods and heatwaves is projected to rise manifold in the country in the future due to climate change, if so, the details of the preventive steps that are proposed to be taken by the Government to address this major issue?

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

- (a-b) Yes Sir. The Government is aware of the increasing rate of heat waves in the recent years. As per the Climate summary of the summer season [Mar-Apr-May (MAM)]-2022, the trend in heat wave in most parts of the country has been increasing. Average maximum temperature of February month is highest in 2023 over All India & Northwest India, since 1901.

As per the recent IPCC Sixth Assessment Report, the global mean concentrations of anthropogenic aerosols and greenhouse gases which are the drivers of climate change have increased in South Asia region, which will result in more intense and frequent increase in the heatwaves and humid heat stress during the 21<sup>st</sup> century.

Loss of lives was reported during the heat wave episodes in 2022. The extreme heat wave hit at the critical time during the final period of the growing season, and caused extensive impacts on the agricultural sector. To minimize the loss of life due to heatwaves, during the period from 1 April to 30 June, IMD issues colour coded impact based heatwave warnings for the benefit of the public and stake holders. IMD also issues the impacts and suggested actions with respect to the intensity of heatwave and the colour coded warnings are issued, in collaboration with NDMA.

Recent developments in Heatwave Early Warning Services of IMD are as follow;

- Two special heat wave impact based bulletins are prepared in addition to routine daily bulletins. The first one is issued at 0800 hours IST with 24 hours subdivision wise impact based heat warning and the 2<sup>nd</sup> one is issued at 1600 hours IST with 5 days subdivision wise impact based heat warning in graphics as well as text format.
- Extended range forecast bulletin (include temperature forecast and warnings for next two weeks) is issued every Thursday.
- The following new Information in Web-GIS is added for better interpretation of Heat Wave warnings by various users:-
  - i. Interactive Map for actual maximum temperature & its departure from normal temperature based on the situations of the day.
  - ii. Interactive Map for Heat Wave and Severe Heat Wave along with Warm Nights and very Warm Nights based on the situations of the day.
  - iii. Normal Relative Humidity (RH) for March to June months based on 0830 and 1730 IST are provided to assess the impact of RH during the Heat Wave days since the impact of Heat Wave becomes more severe with increase in the RH.

In addition, IMD hosts FAQs on heat waves, NDMA Heat Wave Guidelines in a dedicated page created in IMD website (<https://mausam.imd.gov.in/>) with the name All India Heat Wave Information.

- For Dissemination of Heat Wave Warning, the following modes are used:
  - i. **Mass Media:** Radio/TV, News Paper network (AM, FM, Community Radio, Private TV): Prasar Bharati and private broadcasters
  - ii. Weekly & Daily Weather Video
  - iii. Internet (e-mail), ftp

- iv. Public Website ([mausam.imd.gov.in](http://mausam.imd.gov.in))
  - v. IMD Apps: Mausam/ Meghdoot/DAMIN/RAIN ALARM
  - vi. Social Media: Facebook, Twitter, Instagram, BLOG
- (c) Yes. IMD in collaboration with local health departments and NDMA have started heat action plan in many parts of the country to forewarn about the heat waves and also advising actions to be taken during such occasions.

The Heat Action Plan which became operational in 2013, is a comprehensive early warning system and preparedness plan for extreme heat events. The Plan presents immediate as well as longer-term actions to increase preparedness, information-sharing, and response coordination to reduce the health impacts of extreme heat on vulnerable populations. NDMA and IMD are working with 23 states prone to high temperatures leading to heat-wave conditions for supporting heat action plans.

The main aims of the Heat Action Plan are;

- Establish Early Warning System and Inter-Agency Coordination to alert residents on predicted high and extreme temperatures. Who will do what, when, and how is made clear to individuals and units of key departments, especially health department.
- Capacity building / training programme for health care professionals at local level to recognize and respond to heat-related illnesses, particularly during extreme heat events. These training programmes should focus on medical officers, paramedical staff and community health staff so that they can effectively prevent and manage heat-related medical issues to reduce mortality and morbidity.
- Public Awareness and community outreach Disseminating public awareness messages on how to protect against the extreme heat-wave through print, electronic and social media and Information, Education and Communication (IEC) materials such as pamphlets, posters and advertisements and Television Commercials (TVCs) on Do and Don't and treatment measures for heat related illnesses.
- Collaboration with non government and civil society: Collaboration with non-governmental organizations and civil society organizations to improve bus stands, building temporary shelters, wherever necessary, improved water delivery systems in public areas and other innovative measures to tackle Heat wave conditions.
- Identifying vulnerable populations and the health risks specific to each group.

- Developing effective strategies, agency coordination and response planning that addresses heat-health risks.
- Heat Health Information Surveillance System (HHISS) to monitor and assess the impact of heat waves on human health.
- Reducing Heat Exposure and Promoting Adaptive Measures by launching new efforts including mapping of high-risk areas, access to potable drinking water and cooling spaces during extreme heat days.
- Evaluating and updating the Heat Action Plan regularly.

- (d) Earth's temperature has risen by an average of 0.08°C per decade since 1880. Global mean temperature in 2022 is currently estimated to be  $1.15 \pm 0.13^\circ\text{C}$  above the preindustrial (1850-1900) average, likely making the past eight years (2015-2022) the warmest on record. Despite La Niña conditions keeping global temperature low for the second consecutive year, 2022 is still most likely to be 5th or 6th warmest year on record, as per WMO reports

The annual mean land surface air temperature averaged over India during 2022 was  $+0.51^\circ\text{C}$  above the long-term average (1981-2010 period). The year 2022 was the fifth warmest year on record since nationwide records commenced in 1901. However, this is lower than the highest warming observed over India during 2016 (anomaly of  $+0.71^\circ\text{C}$ ) and higher than the previous year 2021 (anomaly of  $+0.44^\circ\text{C}$ ).

- (e) Documented studies show that most of the glaciers of the eastern, central and western Himalayas are losing a significant mass but with varying rates of melting (mass loss and retreat). NCPOR (MoES) has been monitoring six glaciers in the Chandra basin of western Himalayas. These studied glaciers have experienced an average ice mass loss of  $-0.47 \text{ m w.e. a}^{-1}$  and lost  $2.3 \pm 0.46 \text{ m w.e}$  of glacier-wide ice during the last 5 hydrological years (2017-2022). The estimated melting rate (in percentage) of these glaciers are ranging from 0.1-1.1% per annum (mean value is 0.5% per annum) during the last five years.

- (f) IMD issues forecasts and warnings related to extreme weather events like heavy rainfall and cyclones that may lead to flood, heatwave, thunderstorm/lightning etc. 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. Work is in progress to implement the same for other severe weather elements.

While issuing the warning suitable colour code is used to bring out the impact of the severe weather expected and to signal the Disaster Management about the course of action to be taken with respect to impending disaster weather event. Green color corresponds to no warning hence no action is needed, yellow color corresponds to be watchful and get updated information, orange color to be alert and be prepared to take action whereas red color signals to take action.

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 addition to this, as and when the situation arises, Press Releases are issued by IMD and the same are also disseminated by all the platforms mentioned above.

IMD has taken various initiatives in recent years for improvement in dissemination of weather forecast and warning services based on latest tools and technologies. 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 'Damini' for lightning alert.

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