

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 5531
TO BE ANSWERED ON WEDNESDAY, 6TH APRIL, 2022**

RISING TEMPERATURE

5531. PROF. SOUGATA RAY:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the details of rising temperature in almost all parts of the country since the last three years and the current year;
- (b) whether the Government has ascertained the reasons behind the rising temperature;
- (c) if so, the details thereof; and
- (d) the steps taken/being taken by the Government to check the rising temperature globally?

ANSWER

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

- (a) Details of rising temperature over the entire country during the last three years are given below :

2019

Average temperature over India during the year 2019 was above normal. During the year, annual mean surface air temperature, averaged over the country, was +0.36 °C above (1981-2010 period) average. The year 2019 was the seventh warmest year on record since nation-wide records commenced in 1901. However, the warming during 2019 was substantially lower than the highest warming observed over India during 2016 (+0.71°C). The pre-monsoon and monsoon seasons with anomaly of +0.39°C and +0.58°C, respectively have mainly contributed to this warming.

The Global mean surface temperature anomaly during 2019 (January to October) was +1.1°C as per WMO provisional statement on the state of global climate. (source: <https://public.wmo.int/en/resources/library/wmo-provisional-statement-state-of-global-climate-2019>).

2020

The annual mean land surface air temperature averaged over India during 2020 was above normal. During the year, annual mean land surface air temperature averaged over the country was +0.29°C above normal (based on the data of 1981-2010). The year 2020 was the eighth warmest year on record since nation-wide records commenced in 1901. However, this is substantially lower than the highest warming observed over India during 2016 (+0.71°C). The monsoon and post-monsoon seasons with mean temperature anomalies (Actual temperature-Normal temperature) of +0.43°C and +0.53°C respectively have mainly contributed to this warming. Mean temperature during the winter was also above normal with anomaly of +0.14°C. However, during the pre-monsoon season temperature was below normal (-0.03°C).

The Global mean surface temperature anomaly during 2020 (January to October as per WMO state of the global climate) is +1.2°C (source: <https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate>).

2021

The annual mean land surface air temperature averaged over India during 2021 was 0.44°C above the long period average (LPA) based on 1981-2010 period. The year 2021 was the fifth warmest year since nationwide records commenced in 1901. However, this is lower than the highest warming observed over India during 2016 when it was 0.71°C above the LPA. The winter (January to February) and post-monsoon (October to December) seasons with all India mean temperature anomalies (Actual-LPA Temperature) of +0.78°C and +0.42°C respectively mainly contributed to this warming. The all India mean temperatures during the other two seasons; pre-monsoon (March to May) and monsoon (June to September) seasons, were also above normal with anomalies of +0.35°C and +0.34°C, respectively.

The Global mean surface temperature anomaly during 2021 (January to September as per State of the Global Climate 2021 WMO provisional statement) was about 1.08 ± 0.13°C above the 1850-1900 pre-industrial average and the global annual temperature is also likely to be between the 5th and 7th warmest year on record. (source: https://library.wmo.int/doc_num.php?explnum_id=10859)

2022

Above normal (by about 4-6°C) maximum temperatures are being experienced over many parts of the country and heat wave conditions also prevailed from 3rd week of March onwards.

- (b)-(c) Latest studies show an increase in temperatures as well as occurrence of heat waves in many parts of country during the recent years in line with other countries. One of the reasons for the rise in temperatures and increase in heat waves is global warming associated with the increase in greenhouse gases in the atmosphere. The global average temperature has risen by around 1°C since pre-industrial times. This magnitude and rate of warming cannot be explained by natural variations alone and must necessarily take into account changes due to human activities. Emissions of greenhouse gases (GHGs), aerosols and changes in Land Use and Land Cover (LULC) during the industrial period have substantially altered the atmospheric composition, and consequently the planetary energy balance, and are thus primarily responsible for the present-day climate change.

- (d) As an adaptive measure, India Meteorological Department (IMD) in collaboration with local health departments have started heat action plan in many parts of the country to forewarn about the heat waves and also advising action to be taken during such occasions. Heat action plan became operational since 2013.

The Heat Action Plan 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.

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.

NDMA and IMD are working with 23 states prone to high temperatures leading to heat-wave conditions to develop heat action plans. Till May 2019 following States are already under Heat Action Plan:

1. Andhra Pradesh
2. Arunachal Pradesh
3. Bihar
4. Chhattisgarh
5. Delhi
6. Gujarat
7. Goa
8. Haryana
9. Himachal Pradesh
10. Jharkhand
11. Jammu and Kashmir
12. Karnataka
13. Kerala
14. Maharashtra
15. Madhya Pradesh
16. Odisha
17. Punjab
18. Rajasthan
19. Tamil Nadu
20. Telangana
21. Uttarakhand
22. Uttar Pradesh
23. West Bengal

For supporting the cause, IMD has started Forecast Demonstration Project (FDP) on heat waves from April 2017 for the hot weather season under which a detailed daily report including realized data of heat waves, synoptic situation leading to the occurrence of heat waves, diagnosis on the basis of Numerical Model outputs and forecast and warnings for five days is prepared. This bulletin is disseminated to all concerned including health departments. From April 2018 onwards, IMD started issuing an additional bulletin on heat wave in the morning (8 a.m.) valid for 24 hours for supporting the planning of activities for the day and this bulletin is also disseminated to all concerned. Both these bulletins are posted to IMD website also, on a special page created for heat waves.
