Heat Waves

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Why is in news? Union Minister Dr. Jitendra Singh says, NDMA and IMD are working with 23 States to develop Heat Action Plans

As per studies, the stress induced due to the heat waves for livestocks increases respiration and mortality, reduces fertility, modifies animal behavior, and suppresses the immune and endocrine system, thereby increasing animal susceptibility to some diseases.

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.

As an adaptive measure, 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**.

According to a report by Lancet, **India's vulnerability to extreme heat increased 15%** from 1990 to 2019. The five warmest years ever recorded in India have all been in the last decade.

A Heat Wave is a **period of abnormally high temperatures, more than the normal maximum temperature** that occurs during the summer season in the North-Western parts of India.

Heat Waves typically occur **between March and June**, and in some rare cases even extend till July.

The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they cause physiological stress, sometimes resulting in death.

India Meteorological Department (IMD) classifies heat waves according to regions and their temperature ranges. As per IMD, the number of heatwave days in India has increased from 413 over 1981-1990 to 600 over 2011-2020.

This sharp rise in the number of heatwave days has resulted due to the increasing impact of climate change.

India too is feeling the impact of climate change in terms of increased instances of heat waves which are more intense in nature with each passing year, and have a devastating impact on human health thereby increasing the number of heat wave casualties.

The health impacts of Heat Waves typically involve dehydration, heat cramps, heat exhaustion and/or heat stroke.

Criteria for Heat Waves :

Heat Wave need not be considered till maximum temperature of a station reaches atleast 40°C for Plains and atleast 30°C for Hilly regions

When normal maximum temperature of a station is less than or equal to 40°C Heat Wave Departure from normal is 5°C to 6°C Severe Heat Wave Departure from normal is 7°C or more

When normal maximum temperature of a station is more than 40°C Heat Wave Departure from normal is 4°C to 5°C Severe Heat Wave Departure from normal is 6°C or more

Reasons why India is experiencing more heat waves:

Magnified effect of paved and concrete surfaces in urban areas and a lack of tree cover.

Urban heat island effects can make ambient temperatures feel 3 to 4 degrees more than what they are.

More heat waves were expected as globally temperatures had risen by an average 0.8 degrees in the past 100 years. Night-time temperatures are rising too.

Higher daily peak temperatures and longer, more intense heat waves are becoming increasingly frequent globally due to climate change.

High intensity of UV rays in medium-high heat wave zones.

WHAT CAUSES A HEATWAVE

Heatwaves are generally the result of trapped air

- Heat waves form when high pressure aloft (3,000–7,600 metres) strengthens and remains over a region for several days up to several weeks
- High-pressure systems force air downward
- This force prevents air near the ground from rising
- The sinking air acts like a cap. It traps warm ground air in place
- This high concentration of pressure makes it difficult for other weather systems to move into the area, which is why a heatwave can last for several days or weeks
- The high-pressure inhibits winds. It also prevents clouds from entering the region
- The end result is a continual build-up of heat at the surface that people experience as a heat wave

'HEAT DOME' Effect

The 'heat dome'

Occurs when the atmosphere traps hot ocean air like a lid or cap

1 In summer, the **jet stream** (which moves the air) shifts northward

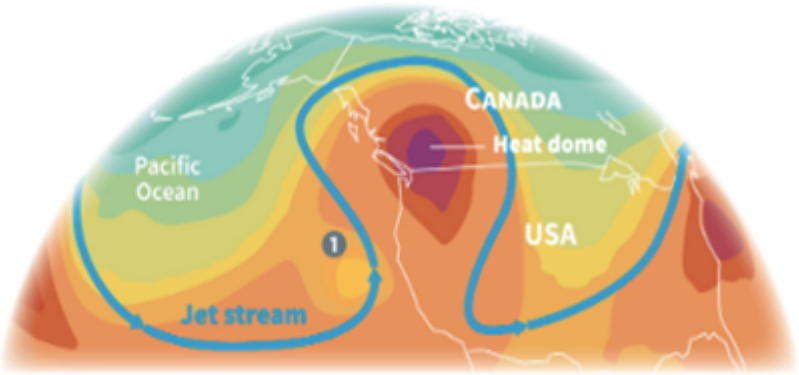
2 **Hot** and stagnant **air expands** upwards

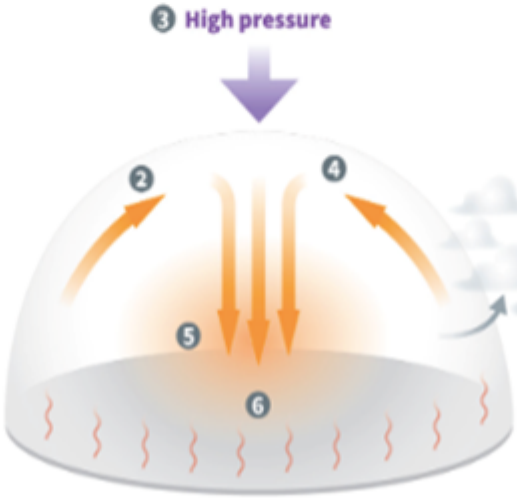
3 Strong and **high-pressure** atmospheric conditions combine with influences from La Nina act like a dome or cap

4 In a process known as **convection,** hot air attempts to escape but high pressure pushes it back down

5 Under the dome, the air sinks and **compresses,** releasing more heat

6 As winds move the hot air east, the jet stream traps the air where it sinks, resulting in **heat waves**





Temperature forecasts (darker color = hotter)

Heat dome also blocks out clouds, which provide some relief from the sun's heat

The hotter the temperature is, the stronger the heat dome gets, and vice versa