



## Heatwaves

**For Prelims:** [Heatwaves](#), [Indian Meteorological Department \(IMD\)](#), [global warming](#), [urban heat island effect](#), [El Nino](#), [Sendai Framework for Disaster Risk Reduction 2015-30](#), [Nature-based solutions](#), [Intergovernmental Panel on Climate Change \(IPCC\)](#), [Passive cooling technology](#).

**For Mains:** Criterion for Declaring Heat Wave in India, Impacts of Heat Waves.

### Why in News?

Recently, casualties were observed from an apparent heat stroke while attending a **government award function in Navi Mumbai**. This incident highlights the **potential risks from heatwaves**, which are **expected to increase in intensity and frequency due to climate change**.

- Several factors, such as **long-distance travel, underlying health conditions**, and lack of access to drinking water and medical attention in large gatherings, can **increase vulnerability to heat strokes**.

### What are Heat Waves?

- **About:**
  - Heatwaves are **prolonged periods of excessively hot weather** that can cause adverse impacts on **human health, the environment, and the economy**.
    - India, being a tropical country, is **particularly vulnerable to heatwaves**, which have become more frequent and intense in recent years.
- **Criteria for Declaring Heat Wave in India:**
  - **Plains and Hilly Regions:**
    - Heat wave is considered if the **maximum temperature of a station reaches at least 40°C or more for Plains** and at least 30°C or more for Hilly regions.
    - **Based on Departure from Normal Heat Wave:** Departure from normal is **4.50°C to 6.40°C**.
      - **Severe Heat Wave:** Departure from normal is >6.40°C.
    - **Based on Actual Maximum Temperature Heat Wave:** When actual maximum temperature  $\geq 45^\circ\text{C}$ .
      - Severe Heat Wave: When actual maximum temperature  $\geq 47^\circ\text{C}$ .
    - If the above criteria are met in at least 2 stations in a Meteorological subdivision for at least two consecutive days, it is declared so on the second day.
  - **Coastal Areas:**
    - When maximum temperature departure is **4.50°C or more from normal**, a heat wave may be described provided the actual **maximum temperature is 37°C or more**.
- **Fatality:**
  - High temperature in itself is not fatal but the combination of **high temperature and high humidity, referred to as the wet bulb temperature**, is what **makes heatwaves deadly**.
  - **High moisture content in the atmosphere makes it difficult for the sweat to**

**evaporate and bodies to cool down**, as a result of which the internal body temperature increases sharply and is often fatal.

▪ **Causes:**

- **Global Warming:** One of the primary causes of heatwaves in India is [global warming](#), which refers to the long-term increase in Earth's average temperature due to human activities such as burning [fossil fuels](#), **deforestation, and industrial activities**.
  - Global warming can result in higher temperatures and changes in **weather patterns**, leading to heatwaves.
- **Urbanisation:** Rapid [urbanisation](#) and the growth of concrete jungles in cities can lead to the phenomenon known as the "[urban heat island effect](#)."
  - Urban areas with high population density, buildings, and concrete surfaces absorb and retain more heat, **leading to higher temperatures, particularly during heatwaves**.
- **El Nino Effect:** During an [El Nino event](#), the warming of the Pacific Ocean can affect **global weather patterns, causing changes in temperature, rainfall, and wind patterns around the world**.
  - The summer of the year 2023 is predicted to be **excessively hot because of the end of the strong La Nina phase in equatorial Pacific Ocean** and the earlier-than-expected occurrence of **El Nino event**.

▪ **Impacts:**

- **Impact on Health:**
  - Rapid rises in heat gain can **compromise the body's ability to regulate temperature** and can result in a cascade of illnesses, including heat cramps, heat exhaustion, heatstroke, and hyperthermia.
    - Deaths and hospitalizations from heat can occur extremely rapidly or have a lagged effect.
- **Impact on Water Resources:** Heatwaves can **exacerbate water scarcity issues in India**; drying up of water bodies, reduced water availability for agriculture and domestic use, and increased competition for water resources.
  - This can lead to **conflicts over water, affect irrigation practices, and impact water-dependent industries**.
- **Impact on Energy:** Heatwaves can **increase electricity demand for cooling** purposes, leading to strain on power grids and potential blackouts.
  - This can disrupt economic activities, **affect productivity, and impact vulnerable populations** who may not have access to reliable electricity for cooling during heatwaves.

## Way Forward

- **A Heat Waves Action Plan:** The adverse impacts of heat waves indicate that **effective disaster adaptation strategies** and more robust disaster management policies are required in **heatwave zones** to lessen the impact of heatwaves.
  - As deaths due to heatwaves are preventable, the **government must prioritise preparing a long-term action plan to safeguard human lives, livestock, and wildlife**.
  - Effective implementation of the [Sendai Framework for Disaster Risk Reduction 2015-30](#) with the State playing a leading role and sharing responsibility with other stakeholders is now the need of the hour.
- **Implementing Climate Action Plans:** National Action Plan for Climate Change (NAPCC) should be implemented in true spirit for inclusive growth and ecological sustainability.
  - [Nature-based solutions](#) should be taken into account, not just for tackling climate change induced heat waves but also doing it in a way that is **ethical and promoting intergenerational justice**.
- **Sustainable Cooling:** [Passive cooling technology](#), a widely-used strategy to create naturally ventilated buildings, can be a **vital alternative to address the urban heat island for residential and commercial buildings**.
  - The [Intergovernmental Panel on Climate Change \(IPCC\)](#) in the third part of its AR6 stated that **ancient Indian building designs that have used this technology, can be adapted to modern facilities in the context of global warming**.

- **Heatwave Mitigation Plans:** Heat-related fatalities can be mitigated through effective measures such as **access to water, oral rehydration solutions (ORS), and shade, especially at public places** along with **flexible working hours in workplaces**, and **special arrangements for outdoor workers**.
  - Proactive implementation by **vigilant local administration, monitored by higher authorities, is also crucial**.

### UPSC Civil Services Examination, Previous Year Question (PYQ)

**Q. What are the possible limitations of India in mitigating global warming at present and in the immediate future? (2010)**

1. Appropriate alternate technologies are not sufficiently available.
2. India cannot invest huge funds in research and development.
3. Many developed countries have already set up their polluting industries in India.

**Which of the statements given above is/are correct?**

- (a) 1 and 2 only
- (b) 2 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Ans: (a)**

**Source: IE**

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