



## Heatwave Conditions

**For Prelims:** [Criteria for Heat Waves](#), [El Nino](#), [Indian Meteorological Department](#), [National Action Plan for Climate Change \(NAPCC\)](#)

**For Mains:** Causes, Impact, Mitigation strategies of Heat Waves, [Urban Heat Island](#), [Sendai Framework for Disaster Risk Reduction](#)

### Why in News?

Odisha is currently facing an intense heatwave since April 2023, with temperatures exceeding 40°C in most monitoring centers across the state.

- Delayed monsoon could be a contributing factor for this heat wave. In 2023, the **monsoon arrived over the Kerala coast on June 8**, which is a delay compared to its normal onset date of June 1.

### 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.

#### ▪ **IMD** Criteria for Declaring Heat Wave in India:

- Heat Wave **need not be considered till maximum temperature** of a station **reaches at least 40°C for Plains and at least 30°C for Hilly regions.**
- If the **normal maximum temperature of a station** is less than or equal to **40°C**, then **an increase of 5°C to 6°C from the normal temperature** is considered to be heat wave condition.
  - Further, **an increase of 7°C or more from the normal temperature** is considered a severe heat wave condition.
- If the **normal maximum temperature** of a station is **more than 40°C**, then an **increase of 4°C to 5°C from the normal temperature** is considered to be heat wave condition. Further, **an increase of 6°C or more** is considered a **severe heat wave condition.**
  - Additionally, if the **actual maximum temperature remains 45°C or more** irrespective of **normal maximum temperature**, a heat wave is declared.

Heat wave Scenario	40°C	30°C
Maximum Temperature	Plains	Hills
<b>Heat wave conditions prevail when...</b>	<b>Severe heat wave conditions prevail when....</b>	
Normal maximum temperature	Normal maximum temperature	Normal maximum temperature
Deviation from normal	Deviation from normal	Deviation from normal
▲ Above	▲ Above	▲ Above
40°C	40°C	40°C
4-5°C or more	6°C or more	6°C or more
▼ At or below	▼ At or below	▼ At or below
40°C	40°C	40°C
5-6°C or more	7°C or more	7°C or more

## What are the Causes of Heat Waves?

### ▪ **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.

### ▪ **Sparse Pre-Monsoon Season Showers:**

- Less moisture in many areas, leaving large parts of India arid and dry.
- The **sudden end of pre-monsoon rain showers**, an uncommon trend in India, has contributed to the heat waves.

### ▪ **El Nino Effect:**

- El Nino often **increases temperatures in Asia**, combined with the weather pattern to create record high temperatures.
- Trade winds coming from South America normally blow westward towards Asia during the Southwest Monsoon and **warming of the Pacific Ocean results in weakening of these winds.**
  - Therefore, moisture and heat content get limited and results in reduction and uneven distribution of rainfall across the Indian sub-continent.

## What are Its 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:**

- 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.

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

### Prelims

**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)**

### Mains

**Q. Bring out the causes for the formation of heat islands in the urban habitat of the world. (2013)**

**Source: DTE**

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