

Heat Storms

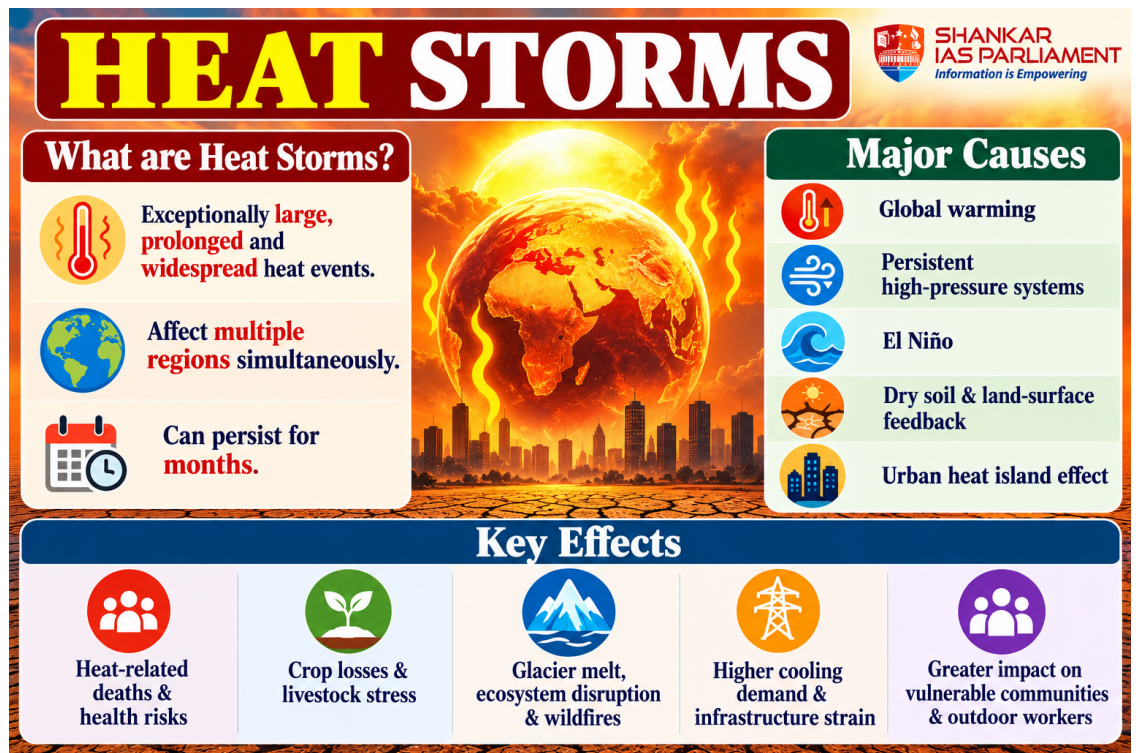
Mains - GSI - Geography

Why in news?

To understand the new reality of these immense expanses of heat, a consultation with two dozen climate researchers and an analysis of temperatures worldwide for every hour since 1960 has yielded a new concept - heat storm.

What are 'Heat Storms'?

- **Heat storm** - It is a proposed concept describing exceptionally large, prolonged and widespread heat events that affect multiple regions simultaneously exceeding the scale of conventional heatwaves.
- **Heat cascade** - A sequence of heat storms occurring one after another, simultaneously or in overlapping periods.
- **Emerging trend** - The duration of such widespread heat events reportedly increased from around two months in the 1960s to nine months in the early 2000s.
- **Record event** - 'Vera', reported as the largest heat storm, lasted 367 days during 2023-24 and affected nearly 85% of the globe.
- **Note** - *"Heat storm" is a proposed descriptive concept, **not yet a universally standardised meteorological classification.***



What are the geographical characteristics of heat storms?

- **Large spatial extent** - They can span multiple continents and extend into polar-regions.
- **Long duration** - Heat events can persist or recur over months, creating prolonged thermal stress.
- **Increasing frequency** - Reuters' analysis found an increase from around five heat storms annually in the 1960s to about 102 annually in the current decade.
- **Heat cascades** - Successive or overlapping events can expose different regions to extreme heat for extended periods.

What are the major geographical causes?

- **Global warming** - Greenhouse gas emissions raise average temperatures and intensify extreme heat.
- **Atmospheric circulation** - Persistent high-pressure systems can suppress cloud formation and rainfall, allowing heat to accumulate.
- **El Nino** - Periodic ocean-atmosphere warming can raise global temperatures and intensify heat extremes.
- **Land-surface feedback** - Dry soils reduce evaporative cooling, increasing surface temperatures.
- **Urban heat island effect** - Built-up surfaces, concrete and reduced vegetation amplify heat exposure in cities.

What are the geographical impacts of heat storms?

- **Human geography** - Heat-related deaths, occupational stress, pressure on healthcare and reduced labour productivity.
- **Agricultural geography** - Crop losses, soil-moisture depletion, livestock stress and

rising irrigation demand.

- **Physical geography** - Glacier melt, ecosystem disruption, wildfires and increased water stress.
- **Economic geography** - Higher cooling demand, electricity shortages and damage to infrastructure.
- **Regional inequality** - Poorer communities, outdoor workers and water-stressed regions face greater vulnerability.

What is their significance for India?

- **Heat-prone regions** - North-western and central India, the Indo-Gangetic Plain and several urban centres face significant heat risks.
- **Agricultural vulnerability** - Extreme heat can reduce wheat yields, affect crop growth and increase irrigation requirements.
- **Urban vulnerability** - Dense construction, limited green cover and high population density intensify heat exposure.
- **Water and energy security** - Higher evaporation and cooling demand increase pressure on water supplies and electricity systems.

What measures are needed?

- **Strengthen heatwave forecasting** and district-level early-warning systems.
- **Expand Heat Action Plans**, cool roofs, urban green spaces and heat-resilient infrastructure.
- **Promote climate-resilient agriculture**, efficient irrigation and drought preparedness.
- **Improve worker protection**, public drinking-water access and emergency healthcare.
- **Reduce greenhouse gas emissions** through clean energy and sustainable urban planning.

Conclusion

- Heat storms highlight the growing spatial scale, duration and interconnected impacts of extreme heat under climate change.
- From a geographical perspective, they demonstrate how global atmospheric processes interact with local land use, ecosystems and human vulnerability, making climate adaptation and resilient regional planning essential.

Reference

[The Hindu| Heat storms](#)