A Spatial Shift of Heatwaves in India

Why in News

Recently, a study has found **a spatial shift of** heatwaves **in India,** now occurring in new regions in the country.

- It also added that the eastern **and** western coasts**, which are currently unaffected by heatwaves,** wil be severely impacted in the future.
- It assessed the **monthly, seasonal, decadal and long-term trends in heatwaves** in the country from 1951-2016.

Key Points

- **Findings:**
    - A **warming pattern** was found **over northwestern and southern India,** while a **progressive cooling phase over northeastern and southwest regions** of the country.
    - A **"spatio-temporal shift"** is revealed in the occurrence of heatwave events, with a significantly increasing trend in three prominent heatwave prone regions- northwestern, central, and south-central India, with the **highest being in west Madhya Pradesh (0.80 events/year).**
        - Heatwaves have been traditionally associated with UP, Bihar, Delhi and northern parts of Madhya Pradesh.
    - Heatwaves were **found in southern Madhya Pradesh, Andhra Pradesh, Karnataka and Tamil Nadu,** where they would traditionally not take place.
        - Increases in heatwaves in Karnataka and Tamil Nadu are particularly significant, and point to increased events in the future.
    - A significant **decrease in heatwaves over the eastern region,** that is Gangetic West Bengal (−0.13 events/year).
    - An **increasing trend of heatwave days and severe heatwave days was observed in the decade of 2001–2010** as compared to previous decades.
- **Factors:**
    - Two elements that have exacerbated the heatwave conditions in the country are **the increase in night time temperatures,** which disallows heat discharge at night, and **increasing humidity levels.**
- **Heatwaves:**
    - **About:**
        - A heatwave is **a period of abnormally high temperatures,** more than the normal maximum temperature that occurs during the summer season in the North-Western and South Central parts of India.
        - Heatwaves typically occur between March and June, and in some rare cases even

extend till July.
- **India Meteorological Department** (IMD) classifies heatwaves according to regions and their temperature ranges.

◦ **Criteria for Heatwaves:**

- The heatwave is considered when the 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.**

◦ **Impact:**

- **Heat Stress:**
    - The presence of humidity in the environment prevents the thermoregulatory mechanism of evaporative cooling of the body through the process of perspiration, which can cause heat stress.
- **Increase in Heat-Related Mortality**
    - An increase of 0.5 degrees Celsius in mean summer temperatures can cause an increase of heat-related mortality from 2.5 to 32%, and an increase in the duration of a heatwave from 6 to 8 days and result in an increase in the probability of mortality by 78%.
- **Heat Strokes:**
    - The very high temperatures or humid conditions pose an elevated risk of heat stroke or heat exhaustion.
    - Older people avnd people with chronic illness such as heart disease**,** respiratory disease**, and** diabetes are more susceptible to heatstroke, as the body's ability to regulate heat deteriorates with age.
- **Increased Energy Demands:**
    - The sweltering heatwave also leads to rise in energy demand, especially electricity, leading to pushing up rates.
- **Lessens Workers' Productivity:**
    - Extreme heat also lessens worker productivity, especially among the more than 1 billion workers who are exposed to high heat on a regular basis.
    - These workers often report reduced work output due to heat stress.

Source: IE