



## Extreme Climate Events: CEEW

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### Why in News

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According to a recent study on the report “**Preparing India for Extreme Climate Events**” released by the **Council on Energy, Environment and Water (CEEW)**, **over 75% of districts in India are hotspots of extreme climate events** such as **cyclones, floods, droughts, heat waves** and **cold waves**.

- This is the **first time** that extreme weather event hotspots in the country have been mapped.

**CEEW** is an independent, non-partisan, one of Asia’s leading not-for-profit policy research institutions, devoted to research on all matters affecting the use, reuse, and misuse of resources.

- The report comes just after the **United Nations Environment Programme (UNEP) Emissions Gap Report 2020** which warned that the world is heading for a temperature **rise of over 3 degrees Celsius** this century.

### Key Points

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- **Major Findings:**

- The **frequency, intensity, and unpredictability** of extreme events have risen in recent decades.
  - While India witnessed 250 extreme climate events in 35 years between 1970 and 2005, it recorded 310 such weather events in only 15 years since then.
  - With an unusual spike in extreme events since 2005, these districts are bearing the **effects of changing microclimate with loss of property, livelihoods and lives.**
- The **pattern reflects the global changes:**
  - Extreme weather events resulting from climate change led to **4,95,000 human deaths across the world in 1999-2018.**
  - More than 12,000 extreme weather events led to **losses worth USD 3.54 trillion** (measured in terms of **purchasing power parity** or PPP) during this period.
- The **current trend** of catastrophic climate events **results from a mere 0.6 degrees Celsius temperature rise in the last 100 years.**
  - India is **already the 5<sup>th</sup> most vulnerable country globally** in terms of extreme climate events, and it is all set to become the world's flood capital.

- **Cyclones:**

- **After 2005**, the yearly average number of **districts affected by cyclones tripled** and the **cyclone frequency-doubled.**
- In the past decade, 258 districts were affected by cyclones with hotspot districts **all along the eastern coastline.**
- The east coast's warming regional microclimate, **land-use change**, and **degrading forests** are triggering the region's cyclonic activity.

- **Flood Events:**

- The decade **2000-2009 showed a spike in extreme flood events and in associated flood events**, which affected almost 473 districts.
  - Events associated with floods such as **landslides, heavy rainfall, hailstorms, thunderstorms, and cloudbursts** increased by over 20 times.
- The compounding effects of **land subsidence**, the **urban heat island phenomenon**, and **sea-level rise due to glacial melts** are leading to the **intensification of cyclonic disturbances**, thus increasing the number of flood events experienced during the decade and making it an outlier.
- While the **number of rainy days during monsoon has decreased, single-day extreme rainfall events are increasing**, leading to flooding.
- **Six of India's eight most flood-prone districts** in the last decade, Barpeta, Darrang, Dhemaji, Goalpara, Golaghat and Sivasagar, are **located in Assam.**

- **Droughts:**

- The **yearly average of drought-affected districts increased 13 times after 2005.**

Until 2005, the number of districts affected by drought was six, but **after 2005 this figure rose to 79.**

- While the **intensity of damage in terms of loss of life has reduced significantly**, droughts **increase uncertainties related to agriculture and rural livelihoods.**
- **Drought-affected district hotspots of India in the last decade** were Ahmednagar, Aurangabad (both Maharashtra), Anantapur, Chittoor (both Andhra Pradesh), Bagalkot, Bijapur, Chikkaballapur, Gulbarga, and Hassan (all Karnataka).

- **Weakening of Monsoon:**

The empirical evidence generated from the analysis coincides with the **weakening of monsoons due to rising micro-temperatures.**

This further can be validated by the fact that states like Maharashtra, Karnataka, and Uttar Pradesh saw severe **water scarcity during 2015 due to record-breaking temperatures during summer and weakening monsoons.**

- **Swapping of Nature of Extreme Events:**

- The study also found a **shift in the pattern of extreme climate events**, such as **flood-prone areas becoming drought-prone and vice-versa**, in over 40% of Indian districts.
- This swapping has **happened in two ways.**
  - In some cases, districts which were **flood-prone have now become drought-prone and vice versa.**
  - While **many districts are facing floods and droughts simultaneously.** This trend is both **unusual and alarming**, and **requires further investigation.**
- **Coastal southern Indian states** are increasingly **witnessing more droughts.**
- Further, **floods and droughts coincide during the same season** in several districts of Bihar, Uttar Pradesh, Odisha, and Tamil Nadu.

- **Suggestions:**
  - **Develop a Climate Risk Atlas** to map critical vulnerabilities such as coasts, urban heat stress, water stress, and biodiversity collapse.
  - **Develop an Integrated Emergency Surveillance System** to facilitate a systematic and sustained response to emergencies.
  - **Mainstream risk assessment at all levels**, including localised, regional, sectoral, cross-sectoral, macro and micro-climatic level.
  - **Enhance adaptive and resilience capacity** to climate-proof lives, livelihoods and investments.
  - **Increase the participatory engagement of all stakeholders** in the risk assessment process.
  - **Integrate risk assessment** into local, sub-national, and national level plans.

### **Microclimatic zones shifting**

- Microclimatic zones, or **areas where the weather is different from surrounding areas**, are **shifting across** various districts of India.
- A shift in microclimate zones may **lead to severe disruptions across sectors**.  
Every 2 degrees Celsius rise in annual mean temperature will reduce agricultural productivity by 15-20%.
- Some reasons **identified behind this shift** in microclimatic zones is **change in land-use patterns, deforestation, encroachments upon mangroves, disappearing wetlands and natural ecosystems by encroachment, and urban heat islands that trap heat locally**.

**Source: IE**