# **Extreme Climate Events: CEEW**

## Why in News

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 <u>cyclones</u>, <u>floods</u>, <u>droughts</u>, <u>heat waves</u> and <u>cold</u> <u>waves</u>.

- 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 <u>United Nations Environment Programme</u> (UNEP) <u>Emissions</u> <u>Gap Report 2020</u> which warned that the world is heading for a temperature rise of over 3 degrees Celsius this century.

## **Key Points**

- 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 <u>purchasing power parity</u> 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 <u>landslides</u>, **heavy rainfall, hailstorms**, thunderstorms, and cloudbursts increased by over 20 times.
- The compounding effects of land subsidence, the <u>urban heat island phenomenon</u>, and <u>sea-level rise</u> 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** <u>monsoons</u> 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 recordbreaking 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 **floodprone 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 droughtprone 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

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