

For immediate release

75% districts and half of India's population vulnerable to extreme climate events: CEEW study

The study found a shift in pattern of extreme events in over 40 per cent of Indian districts

New Delhi, 10 December 2020: Over 75 per cent of Indian districts, which are home to over 638 million people, are hotspots of extreme climate events such as cyclones, floods, droughts, heat, and cold waves, according to a first-of-its-kind independent study released today by the Council on Energy, Environment and Water (CEEW). The frequency, intensity, and unpredictability of these extreme events have also risen in recent decades. While India witnessed 250 extreme climate events between 1970 and 2005, it recorded 310 extreme weather events post 2005 alone. 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 per cent of Indian districts. The study was launched two days before the Climate Ambition Summit where several countries are expected to announce enhanced commitments towards combating climate change.

Abinash Mohanty, Programme Lead at CEEW and the author of the study, said, "The current trend of catastrophic climate events results from a mere 0.6 °C temperature rise in the last 100 years. India is already the fifth most vulnerable country globally in terms of extreme climate events and it is all set to become the world's flood capital. Access to finance and technology along with democratisation of weather and climate-related data is critical for building climate resilience, especially for vulnerable countries from the Global South like India. Embracing risk assessment principles will be equally crucial to safeguard Indian agriculture, industry, and large-scale infrastructural projects from the vagaries of climate change."

Eightfold increase in flood frequency

The CEEW study found that, in the last 50 years, the frequency of flood events increased almost eight times. Further, events associated with floods such as landslides, heavy rainfall, hailstorms, thunderstorms, and cloudbursts increased by over 20 times. The frequency of floods surged significantly in the last two decades. Between 1970 and 2004, three extreme flood events occurred per year on an average. However, after 2005, the yearly average rose to 11. Also, the yearly average for districts affected until 2005 was 19, but after 2005, it jumped to 55. In 2019, India witnessed 16 extreme flood events, which affected 151 districts.

The study also found that over 97 million people were currently being exposed to extreme floods in India. Six of India's eight most flood-prone districts in the last decade - Barpeta, Darrang, Dhemaji, Goalpara, Golaghat, Sivasagar - were in Assam. The CEEW analysis indicates that while the number of rainy days during monsoon have decreased, single-day extreme rainfall events have been increasing, leading to flooding in the state. After 2000, there has also been a rise in urban floods due to flawed urban planning, encroachments on wetlands, and deforestation.

Cyclones compounded misery of eastern coastline

According to the CEEW study, after 2005, the yearly average of the number of districts affected by cyclones tripled and the cyclone frequency doubled. In the last decade alone, 258 districts were

affected. The cyclone hotspot districts - Chennai, Cuttack, East Godavari, Ganjam, Nellore, North 24 Parganas, Puri, and Srikakulam - are concentrated along the eastern coastline. The east coast's warming regional microclimate, land-use change, and degrading forests are triggering the region's cyclonic activity. Moreover, areas along the east coast are economically backward compared to the west coast, thereby compounding the effects of extreme climate events. The last 50 years also recorded a 12-fold surge in the number of associated cyclonic events such as extreme rainfall, floods, and thunderstorms. The compounding effect of cyclones is more severe than that of any other climatic event due to the amount of loss and damage they cause.

In recent years, non-coastal districts such as Araria, Bareilly, Gorakhpur and Patna had experienced more frequent and intense cloudbursts followed by flash floods. The study explains that local climate change drivers such as deforestation and land use surface change induce a warmer microclimate, thereby triggering the precipitation levels and intensifying flash floods across central India.

Droughts continue to affect agricultural income

While preparedness and resilience against droughts have improved in recent decades, extreme climate events continue to significantly affect the Indian farmer. The yearly average of drought-affected districts increased 13 times after 2005. Nearly 68 per cent of Indian districts have been facing droughts and drought-like situations. Drought-affected district hotspots of India in the last decade were Ahmednagar, Anantapur, Aurangabad, Bagalkot, Bijapur, Chikkaballapur, Chittoor, Gulbarga, and Hassan. While the intensity of damage in terms of loss of life has reduced significantly, droughts increase uncertainties related to agriculture and rural livelihoods.

Changing patterns of climate events

The study found a trend of several traditionally flood prone districts such as Cuttack, Guntur, Kurnool, Mahbubnagar, Nalgonda, Paschim Champaran, and Srikakulam becoming drought prone in recent years. Coastal southern Indian states such as Andhra Pradesh, Tamil Nadu, and Karnataka have also been increasingly witnessing more droughts. Further, floods and droughts coincide during the same season in several districts of Bihar, Uttar Pradesh, Odisha, and Tamil Nadu. These changing patterns are due to microclimatic changes across the Indian subcontinent that are triggered by local climate change drivers such as land-use-surface change, deforestation, encroachments upon mangroves, and wetlands.

The study recommends that risk assessment principles should form the core of India's strategy to build climate resilience. As a first step, it proposes developing a climate risk atlas covering critical vulnerabilities such as coasts, urban heat stress, water stress, crop loss, vector-borne disease, and biodiversity collapse. It also suggests an integrated emergency surveillance system to facilitate a systematic and sustained response to emergencies. Further, it highlights the significance of mainstreaming risk assessments at all levels, enhancing adaptive and resilience capacities, and increasing all stakeholders' participatory engagement in the risk assessment processes.

The CEEW study assumes significance as it provides a micro-level hazard assessment of climate extremes in India. It argues that comprehensive risk assessments at the localised level are the need of the hour. Moreover, identifying and estimating climatic risks is one of the key thematic areas of

the global Coalition for Disaster Resilient Infrastructure (CDRI) announced by Prime Minister Narendra Modi at the UN Climate Action Summit 2019.

Methodology

The study is the first-of-its-kind district-level profiling of India's extreme climate events by discussing the complexity and non-linear trends and patterns. The extreme events catalog was developed for a historical time scale of 50 years (1970-2019) through spatial and climatological modeling. CEEW is the first organisation to develop an extreme events catalog for India at a district level on a historical time scale.

About CEEW

The Council on Energy, Environment and Water ([CEEW](#)) is one of Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with the wider public. In 2020, CEEW once again featured extensively across nine categories in the *2019 Global Go To Think Tank Index Report*. The Council has also been consistently ranked among the world's top climate change think tanks. Follow us on Twitter [@CEEWIndia](#) for the latest updates.