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## IMD FORECAST FOILED BY 24% RAIN SHORTFALL

Relevant for: Geography | Topic: Important Geophysical phenomena - Weathering, Mass Movement & Groundwater

Far from the forecast of a “normal” monsoon in August, India ended the month with a 24% shortfall, according to data from the India Meteorological Department (IMD).

This brings India’s overall monsoon rainfall deficit to 9%, just a percentage-point shy of what would be considered “deficient” rainfall.

Meteorologists said that because of the shortfall in August, which normally receives the second highest rainfall in the four monsoon months, it was unlikely that rainfall in September, even if substantial, would be enough to wipe out the deficit, and India could well end up with “below normal” rainfall, which is characterised by rainfall being 90-96% of the long period average of 88 cm.

In June, the IMD, as part of its forecast, had also said that rainfall in northwest, south, east and central India would be “normal” or within an 8% error window of their historical average. This forecast too has been significantly off the mark, with Northwest India and Central India registering a 14% shortfall.

The key reason for the August monsoon failure has been an extended break in rainfall from August 8 to 18. “We expected it to last three or four days, but a week or a 10-day break is quite difficult to recover from,” said Mahesh Palawat, meteorologist at Skymet, a private weather forecasting company. It too, as the IMD, expected August rain to be “normal”.

M. Mohapatra, Director-General, IMD, declined to comment to *The Hindu*, saying that the organisation would be addressing the forecasting failure at a press conference shortly.

### Depressions on decline

Given the influence of the ocean surface temperatures on the monsoon, meteorological forecasts in June were of “neutral conditions” in the central Pacific, implying that these would not have a bearing on the monsoon. The Indian Ocean too was not expected to contribute. Wind-bearing depressions in the Bay of Bengal, coupled with moisture from the Arabian Sea, usually inject surges of rain over central India. But this did not happen and did not salvage the break-like conditions, according to Mr. Palawat. He said that September, though contributing only 17 cm of rainfall unlike 25 cm in August, would see a few more depressions.

Other meteorologists said that large effects of global warming were impacting monsoon rainfall. The number of rain-bearing depressions in the Bay of Bengal was declining and pre-monsoon cyclones, such as Tauktae that veered very close to Mumbai, possibly altered heat distribution patterns over the landmass, influencing moisture distribution and thereby causing erratic rainfall, said Roxy Mathew Koll, climate scientist at the Indian Institute of Tropical Meteorology, Pune.

“A single month’s failure isn’t climate change, but the predicted pattern of long dry spells with bursts of heavy rain is one of the consequences of warming,” he told *The Hindu*.

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# THREE NEW HEATWAVE HOTSPOTS IN INDIA PUT LARGE POPULATION AT IMMEDIATE HEALTH RISK: STUDY

Relevant for: Geography | Topic: Climate and Weather & Changes in Climate

North-Western, Central, and further to south-central region of the country are the new hotspot of intense heatwave events over the past half-century, a study, which found an increase in deadly Indian heat waves in recent years, stated.

The study also focuses on the need of developing an effective heat action plans in the three heatwave hotspot regions with a focus on different vulnerabilities among the inhabitants, a statement from the Ministry of Science and Technology said.

The study published in the journal "International Journal of Climatology" links the association of HW and SHW with mortality over India.

A team of researchers, led by Professor RK Mall and including Saumya Singh and Nidhi Singh from the Department of Science & Technology, Govt of India-Mahamana Centre of Excellence in Climate Change Research (MCECCR) at Banaras Hindu University, studied the change in spatial and temporal trends in Heatwaves (HW) and Severe heatwaves (SHW) over the past seven decades in different meteorological subdivisions of India.

The study showed a shift in the Spatio-temporal trend of HW events from the eastern region of Gangetic West Bengal and Bihar to North-Western, Central and further to south-central region of India.

The research also observed an alarming southward expansion and a spatial surge in SHW events in the last few decades that may put a greater population at additional risk of heat stress in a region already characterized by low Diurnal temperature range (DTR), or the difference between the maximum and minimum temperatures within one day and high humidity.

Importantly, the HW/SHW events were found to be positively correlated with mortality in Odisha and Andhra Pradesh, highlighting that human health is highly susceptible to severe heatwave disasters.

## A deadly health hazard

Heatwaves emerged as a deadly health hazard, claiming thousands of lives across the globe in recent decades, with episodes strengthening in frequency, intensity, and duration in the past half-century in India as well. This has caused severe impacts on health, agriculture, economy, and infrastructure.

In such a scenario, it is extremely important to identify the most heatwave vulnerable regions of the country to prioritize immediate policy intervention and stringent mitigation and adaptation strategies.

With an ever-increasing extreme-temperature threshold, a heat resilient future is the need of the hour. Dense population with an intensive outdoor work culture calls for an equitable heat resilient mitigation and adaptation strategies covering each section of the society depending on their vulnerability.

To mitigate future disastrous implications of exacerbated heat extremes and frame adequate adaptation measures in the wake of possible emergence of new hotspots, reliable future projections are needed.

The study found models LMDZ4 and GFDL-ESM2M to be the best-performing ones in simulating heat waves over the country in the present scenario, which can be reliably used for future projections as well. The two models have laid the grounds for preparation for a heatwave resilient future.

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# HIGH WATER: ON GROWING CHALLENGE FROM TROPICAL CYCLONES

Relevant for: Geography | Topic: Important Geophysical Phenomenon - Tropical Cyclones

Tropical cyclones laden with moisture and accumulated energy pose a growing challenge, as they have the propensity to inflict heavy damage to lives and property. As the annual monsoon retreats, [thousands are left assessing the impact of cyclone Gulab](#), a rare event for September, on coastal Andhra Pradesh, [Odisha](#) and other areas inland. This weather system, with a gusting wind speed of 70 knots at landfall, appears to have been less intimidating than cyclones Yaas and Tauktae, although it continued to keep the seas unsafe for fishermen all along the coastline north of Andhra Pradesh, after moving overland. There have been some distressing deaths and inevitable material losses for many, and the focus must now be on relief and rehabilitation; in the recovery phase of COVID-19, the weather system has upended life for many, disrupting key inter-State road links and leading to the cancellation or diversion of several trains. The imperative is to reach out to those affected by Gulab with food, shelter and health-care support, deploying the many administrative capabilities acquired during the pandemic with the same alacrity. The welcome concern for public health and economic security must lead to stronger institutional responses to natural disasters too.

The northern Indian Ocean, of which the Arabian Sea and the Bay of Bengal are a part, experiences only a minority of tropical storms annually, at about 7% of worldwide events, but their destructive impact on the subcontinent is severe due to a dense population and poor capacity to absorb large quantities of rainfall dumped in a short period over cities and towns. Financial arrangements to insure the population against material losses also remain weak, and as the experience in West Bengal with cyclone Amphan demonstrated last year, relief measures can easily fall victim to corruption. The influence of climate change on cyclone characteristics in a world that is heating up due to accumulation of greenhouse gases is an ongoing topic of study. The IPCC, in its scientific report on 1.5° C warming, said with a high degree of confidence that changes in the climate system, including the proportion of tropical cyclones, would experience a larger impact from increasing warming. Research evidence shows more cyclones forming over the Arabian Sea when compared to the Bay; overall there were eight storms of concern to India in 2019, and five last year, Amphan being a super cyclone. The Centre and all States cannot afford to allow large-scale losses to communities to continue each year, and, going beyond disaster response, must put in place institutional structures and insurance systems for financial protection. Cities must prepare to harvest every deluge that brings vast quantities of water, so vital to sustain mass populations.

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U.S. President Biden should not buckle to pressure from irate anti-vaccine campaigners

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