PRESS RELEASE

CSTEP Study: Winter Minimum Temperatures Expected to Be High in Northern India

For Immediate Release

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The Center for Study of Science, Technology and Policy (CSTEP)—a Bengaluru-based think tank—published a study on the climate of northern India titled '*District-Level Changes in Climate: Historical Climate and Climate Change Projections for the Northern States of India*'. The study projects changes in temperature and rainfall patterns in Haryana, Himachal Pradesh, Punjab, Uttarakhand, and Uttar Pradesh over the next three decades compared to the historical period (1990–2019). It analyses two representative scenarios: moderate emissions (RCP 4.5) and high emissions (RCP 8.5).

Highlights from the study

- Historically (1990–2019), temperature and rainfall have increased, and rainfall variability is high across all the northern states.
- Climate change projections by CSTEP indicate an overall warming of both summer and winter minimum temperatures, an increase in the number of rainy days (>2.5 mm rainfall/day), and an increase in the number of heavy rainfall events across almost all the districts of the northern states.
- **The projected increase in the winter minimum temperature is comparatively higher than the increase in the summer maximum temperature in almost all northern states.** The summer maximum temperature is projected to increase by 1°C to 1.5°C, and the winter minimum temperature is projected to increase by 1°C to 2°C in a majority of the districts of northern India.
- The number of rainy days is projected to increase in the 2030s in all the districts of northern India compared to the historical period. The increase is by 1 to 15 days under the RCP 4.5 scenario, with the maximum increase projected in Uttarakhand and Uttar Pradesh and a minimum increase projected in Himachal Pradesh.
- **Rainfall during kharif (June to September) season is projected to increase in the 2030s in all the districts of northern India compared to the historical period.** The projected increase in the kharif season rainfall is by 2% to 39% under the RCP 4.5 scenario and 5% to 46% under the RCP 8.5 scenario. The maximum increase in the kharif season rainfall is projected in the districts of Punjab and Uttar Pradesh.
- **The variability of both kharif and rabi season rainfall shows mixed trends in the 2030s across the districts of northern India compared to the historical period.** While an increase in rainfall variability is projected in some districts, a decline in variability is projected in several districts in all the states.
- **An increase in high-intensity (51–100 mm/day) and very high-intensity (>100 mm/day) rainfall events is projected in the 2030s across all districts of northern India compared to the historical period.** The increase in high-intensity rainfall events per annum is by one to four events under the RCP 4.5 scenario and one to five events under the RCP 8.5 scenario. The increase in very high-intensity rainfall events is largely by one to two or three events under RCP 4.5 and RCP 8.5 scenarios

- **A decline in rainfall deficient years is projected in the 2030s across almost all districts of northern India compared to the historical period.** The decline in rainfall deficient years is largely by 1 to 4 years out of the 30 years under RCP 4.5 and RCP 8.5 scenarios.

It is evident from the study that in the future, climate in the districts of northern India will be different from the historical climate. This has implications for water availability and management, agriculture, forest and biodiversity, health, and infrastructure. It underpins the need for integrated strategies to combat multiple hazards, floods due to heavy rainfall or dry spells and droughts at other times. Historically, states have focused on drought planning and management, but a wetter future demands plans to integrate flood management.

The district-level climate change assessment for the northern states provides an understanding of the historical climate and climate projections for the 2030s. States need to integrate this information into the State Action Plans on Climate Change, which are currently under revision. Additionally, states need to institute climate risk assessments. These assessments account for exposure and vulnerabilities in addition to the hazard mapping done in this study. Such climate risk mapping will help states buffer the loss and damage that are likely to incur from extreme climate events.

The full report is available **here**.

For more details and interviews, please write to us at cpe@cstep.in

About CSTEP: The Center for Study of Science, Technology and Policy (CSTEP) is one of India's leading think tanks, involved in solving Grand Challenges that the country faces. These include Sustainable and Secure Future, India's Green Energy Transition, Clean Air for All, and Digital Transformation.