

Decline in rainfall in W Ghats

6-7% Drop In Last 50 Yrs Due To Weakening Of Monsoon Flow

Neha Madaan | TNN

Pune: Researchers at the Indian Institute of Tropical Meteorology (IITM) have found that the heavy rainfall regions in the Western Ghats and the west coast of India have recorded a decline of 6-7% in the frequency of "moderate-to-heavy rainfall days" in the last 50 years.

Their research work indicates that the decrease of rainfall over the Western Ghats was a result of the weakening of the large-scale monsoon flow over the south Asian region in a "globally warming climate".

R Krishnan, executive director, Centre for Climate Change Research (CCCR) at the IITM, said, "In a global warming scenario, the rate of increase of surface temperature and moisture can far exceed the rate of rainfall increase. Under such circumstances, the strength of the large-scale monsoon circulation can weaken due to stabilisation of the atmosphere. Such an effect would weaken the intensity of updrafts of the moisture-laden monsoon winds which hit the Western Ghats, resulting in decrease of orographic precipitation over the region."

Atmospheric stability is a measure of the atmosphere's tendency to encourage or deter vertical motion, and vertical motion is directly correlated to different types of rain-producing weather systems and their severity.

Orographic precipitation is rainfall that is caused by hills or mountain ranges deflecting the moisture-laden air masses upward, causing them to cool



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and precipitate their moisture.

The research was undertaken by R Krishnan, T P Sabin and Ayantika Dey Choudhury of CCCR and K Rajendran from Centre for Mathematical Modelling and Computer Simulation (C-MMACS), Bangalore, jointly with researchers from Japan and UK. The findings from this research work were published recently in an international journal called *Climate Dynamics* by Springer, an international publisher.

He said the results of the research suggest that the intensity of the summer monsoon circulation and the associated southwesterly monsoon wind flow have significantly weakened during the last 50 years.

"The weakening trend of the mon-

soon circulation is further corroborated by a significant decrease in the frequency of moderate-to-heavy monsoon rainfall and upward vertical velocity of the wind over the narrow mountain ranges of the Western Ghats," he said.

Based on numerical simulations from a 20-km ultra high-resolution global climate model, the researchers suggest that the large-scale monsoon flow over the South Asian region can potentially weaken in response to global warming, leading to significant reduction (about 10 %) in the rainfall over the Western Ghats by the end of the 21st century.

Krishnan added that several studies in the past, based on climate model simulations, suggest that greenhouse warming is likely to intensify the monsoon rainfall due to increased atmospheric moisture content.

"However, the results of this research indicate that global warming can actually lead to a weakening of the large-scale southwesterly monsoon flow. With increase in the atmospheric CO₂ levels and the consequent rise of surface temperature, the atmospheric humidity increases at a faster rate as compared to that of rainfall. Such a situation would lead to an increase in the dry static stability of the atmosphere, thus weakening the large-scale monsoon circulation," he said.

Researchers further said that climate model projections come with uncertainties which have to be accounted for while conducting impact-assessment studies.