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Mountain topography affects Monsoon in Western ghat states: Study

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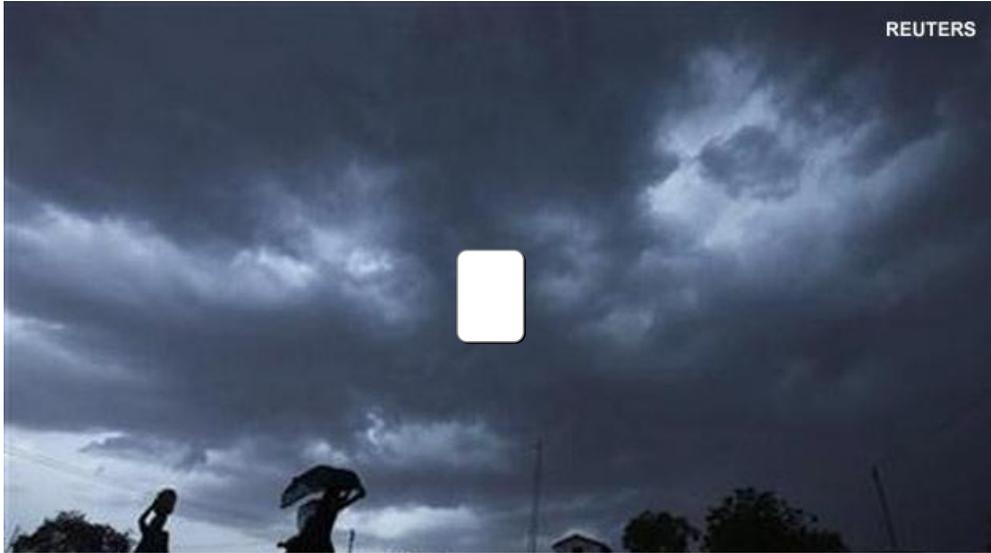
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New Delhi: Mountain topography of western ghats affect precipitation and it is also a reason why Karnataka receives more rainfall than Maharashtra, a study has revealed.

According to a recent research, published by the International Journal of Climatology, the average amount of rainfall was highest in Karnataka, followed by Maharashtra while Kerala received least amount of rainfall in the last 14 years.



...out by Sayli Tawde, a doctorate student at the Indian Institute of Science, Bangalore and Charu Singh, a ... Indian Institute of Remote Sensing, ISRO.

#mountain topography #study

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All these three states have the Western ghats, rich in flora and fauna, running through it. The

research was carried out by Sayli Tawde, a doctorate student at the Indian Institute of Science, Bangalore and Charu Singh, a scientist working with the Indian Institute of Remote Sensing, ISRO.

As per the data collected in past 14 years, heavy rain events occurred mostly in June and July whereas low rain events occurred mostly in August and September.

During summer, i.e. March-May, the land heats up and the difference in the sea and land temperatures is large. Due to this, moist winds from ocean to land surface get strengthen. This intensifies cloud formation and heavier rains occur in June and July.

After the rains, the temperature difference is reduced and large cloud formation is slowed down. So rainfall in August and September is lesser. Satellite data over the Western Ghats reveals that Kerela had least amount of extreme rain events in the past 14 years. The average rainfall amount was greatest in Karnataka, but the most number of extreme rain events happened close to Ratnagiri, in Maharashtra.

The areas most prone to heavy and extremely heavy rainfall are close to Mumbai in Maharashtra. It was observed that rain on the "windward" side of cascaded mountains, the side of mountain ranges that are exposed to monsoon winds, is greater than that compared to isolated mountains.

This is because, the barrier created by a cascaded mountain range restricts flow of clouds for a longer time, thus giving more time for rain formation. If the barrier is small, like an isolated mountain, the water droplets are carried away to the other side of the mountain and rain on windward side is less. Since Karnataka has a cascade mountain range in the Western Ghats, more rainfall is observed on the windward side of Karnataka, as compared to Maharashtra.

In the rain shadow region, more rain is seen in Maharashtra than Karnataka. In addition to the length of the mountain, the width of the mountain also affected the rainfall. The mountains in Maharashtra are narrower as compared to mountains in Karnataka. This is also a contributing factor to more rain in Karnataka as compared to Maharashtra.

The maximum rainfall is not at the highest points in the region, but about 50 km away from the summits. In general, taller mountains received higher rainfall. "Over 6000 rain gauges placed far and wide all over India help gather gridded information about the rainfall on a regular basis", said first author Sayli Tawde in an interview, as quoted by Gubbi Labs.

The study said that according to earlier researches, the reason for underestimation of rainfall specially in mountainous terrain could be that the current prediction models do not take into account the influence of different topography parameters on the rainfall in the region. But there were a few exceptions.

The exceptions were due to the fact that rainfall also depends on the gradient or slope of the mountain. It has been observed that rainfall increases for areas where there is a gradual slope as compared to areas where the slope is steeper.

These observations indicate a clear relationship between the topography of the Western Ghats region and spatial distribution of rainfall in the region. Tawde added, "My research has given a path which needs to be explored more in terms of quantitative/mathematical expressions, to include it in atmospheric models. Further research on this topic may lead to an improvement of atmospheric models and predictions of rainfall in mountainous terrains." Tawde added.

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