

## Changing Monsoonal Rainfall across India

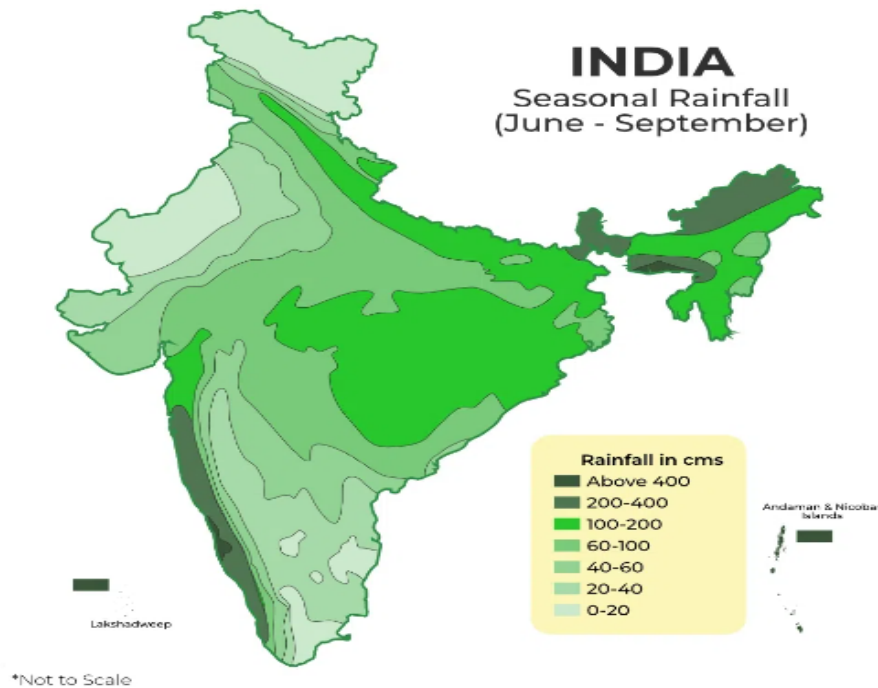
### Why in News?

Currently, multiple favourable weather systems have kept the monsoon either active or vigorous (with respect to rainfall events) over southern peninsular, east, northeast, and central India regions.

### What is monsoon?

- **Monsoon** - It is a seasonal change in the direction of the prevailing, or strongest, winds of a region.
- **Features** - It causes wet and dry seasons throughout much of the tropics.
- It always blow from cold to warm regions.
- The summer monsoon and the winter monsoon determine the climate for most of India and Southeast Asia.
- **In India** - There are three prominent seasons influencing rainfall which are
  - **Southwest Monsoon** - June to September
  - **Northeast Monsoon** - October to December
  - **Summer Monsoon** - march to May
- **Rainfall in India** - India experienced on an average 1,257 millimeters (125 cm) of rainfall in 2022.
- **Southwest monsoon**- It brings *about 70-90% of India's annual* precipitation.
- Regions like the Western Ghats and northeastern areas receive heavy rainfall during this season.
- **Northeast monsoon**- It is also known as the *retreating monsoon* and affects peninsular India.
- It isn't as intense as the southwest monsoon.

Rainfall Distribution in India	
Annual Precipitation Levels	Regions
Extreme (>400cm)	Northeastern India and windward side of Western Ghats.
Heavy (200-300 cm)	Eastern Areas and Sub-Himalayan belts
Moderate (100-200 cm)	Leeward side of Western Ghats and Parts of Central and Eastern India
Scanty (50-100 cm)	Parts of Gujarat, Maharashtra, Punjab, Haryana, Western UP, TamilNadu, Andhra Pradesh
Very less (<50 cm)	Majorly in Rajasthan, Gujarat, some parts of Jammu & Kashmir



### How climate change impacts rainfall pattern in India?

- **Altered cyclonic activity**- Climate change has altered the frequency and intensity of cyclones in the Indian Ocean, impacting coastal regions with intense rainfall and storms.
- **Increased variability**- Climate change has led to increased variability in rainfall patterns, resulting in unpredictable monsoon seasons and irregular distribution of rain across the country.
- **Intensified monsoon**- The intensity of the monsoon has increased, with heavier rainfall over shorter periods, causing flash floods and waterlogging in various regions.
- **Increase in Northeast monsoon rainfall**- In the past 10 years, retreating monsoon rainfall increased by over 10% in about 80% of tehsils in Tamil Nadu, 44% in Telangana, and 39% in Andhra Pradesh.
- Odisha, West Bengal, Maharashtra, and Goa also experienced a rise in rainfall during this period.
- **Extended droughts and dry spells**- It have become more common due to the shifting monsoon patterns, adversely affecting agriculture and water resources.
- **Regional disparities**- Recent study reveals over 30% increase in southwest monsoon rainfall in traditionally dry areas like Rajasthan, Gujarat, Konkan, central Maharashtra, and parts of Tamil Nadu since 1981-2011 baseline.
- While traditionally high rainfall areas like Assam and Meghalaya experienced a 30% reduction in rainfall.

#### Impacts of Changing Rainfall Patterns in India

- Extreme rainfall events increased the frequency of flash floods.
- Uneven distribution of rainfall give rise to pest attacks and diseases.
- Changing rainfall pattern makes it difficult for forecasting the monsoon pattern.
- Heavy rainfall in growing and harvesting season can reduce the yield of crops.
- Irregular rainfall can affect the supply of drinking water and also can have implication in electricity production.

## What are the factors causing widespread monsoonal rainfall across India in recent times?

- **Continuous westerly winds** - Continuous incoming of *moisture-laden* strong westerly winds *from the Arabian Sea*.

*Monsoon trough* is a semi-permanent, low-pressure area extending between Pakistan and the Bay of Bengal during the monsoon season which usually oscillates between north and south within the season.

- **Presence of monsoon trough in south** - It gives *more rainfall* can take place *in central, eastern and peninsular India*.
- When it shifts towards the north, the Himalayan foothills are likely to receive more rainfall but the rest of India sees a drop in rainfall.
- **Persistence of an off-shore trough** - A *shallow trough of low pressure* developed along India's coast during the monsoon *between south Gujarat and north Kerala* for more than a week now.
- **Intermittent development of a wind shear zone** - It causes the winds to move in different velocities and directions along latitudes 20 ° N between central and peninsular India.
- **Development of a low-pressure system** - It is present over the west-central Bay of Bengal, off the Odisha coast.

## What lies ahead?

- **Improve forecasting** - *Satellite monitoring* and sophisticated climate models are developed to better predict rainfall patterns and prepare for extreme weather events.
  - *National Monsoon Mission (NMM)* aims to improve monsoon prediction capabilities through research and development of weather forecasting technologies.
- **Proper implementation of MGNREGA projects** - Develop water conservation projects, such as check dams and ponds, to improve water availability and resilience against erratic rainfall.
- **Follow CRZ notifications** - It is to regulate developments along India's coastline to protect coastal ecosystems & communities from the impacts of climate change related cyclonic activities.
- **Promote climate resilient activities** - Initiatives like rainwater harvesting, sustainable agricultural practices, and afforestation projects, to adapt to changing rainfall patterns are encouraged.

## References

1. [The Indian Express| Factors causing Widespread Rainfall Across India](#)
2. [The Indian Express| Climate Change Impacting Monsoonal Rainfall](#)



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