Geography · GS - I

Analyse the influence of Western Disturbances on winter weather and air-pollution dynamics in northern India.

EXAM YEAR	PAPER	SUBJECT
DAILY PRACTICE 24/11/2026	GS - I	Geography

MARKS	WORD LIMIT
15	~250 words

Answer Hint

Extra-tropical systems, westerly circulation, winter precipitation, Himalayan snowfall, pollutant dispersion, atmospheric stagnation, forecasting

Model Answer

Introduction

Western Disturbances are eastward-moving extra-tropical weather systems originating mainly around the Mediterranean and adjoining regions. They play an important role in shaping winter weather over north-western India and the western Himalayas.

Influence on Winter Weather

1. **Rainfall in North-West India:** They bring winter precipitation to Punjab, Haryana, Rajasthan, Delhi and adjoining regions, supporting rabi crops, particularly wheat.

2. **Himalayan Snowfall:** Their interaction with Himalayan topography produces snowfall, contributing to seasonal snow accumulation and regional water resources.

3. **Temperature Variations:** Cloud cover, precipitation and changing wind patterns influence minimum and maximum temperatures across northern India.

Relationship with Air Pollution

1. **Pollutant Dispersion:** Stronger winds associated with these systems can improve ventilation and transport accumulated pollutants away from affected regions.

2. **Wet Deposition:** Rainfall can remove particulate matter and certain atmospheric pollutants through wet scavenging.

3. **Stagnation during Weak Activity:** Prolonged absence of effective weather disturbances can favour low wind speeds, temperature inversions and pollutant accumulation.

4. **Forecasting Applications:** Monitoring their frequency, intensity and trajectories can improve seasonal assessments of winter pollution conditions.

Limitations and Way Forward

1. Western Disturbances alone cannot explain pollution variations; emissions from transport, industries, biomass burning and other sources remain major determinants.
2. Integrate meteorological observations, satellite data and emissions inventories into air-quality forecasting models.
3. Strengthen regional coordination for pollution monitoring and emergency response.

Conclusion

Western Disturbances are important meteorological indicators of winter air-quality fluctuations in northern India. However, reliable pollution forecasting requires combining weather prediction with continuous monitoring of local and regional emissions.

BECOME IAS
AI POWERED UPSC PREP