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4. Aravalli Range – Ecological Shield Against Desertification – Environment

A recent dust storm in Rajasthan highlighted the crucial ecological role of the Aravalli Range in shielding northern India from dust storms originating in the Thar Desert. Dust storms frequently occur in north western India during pre-monsoon months of April to June when intense land surface heating creates dry, unstable atmospheric conditions. Strong south-westerly and westerly winds transport large quantities of dust from the Thar Desert toward northern India. The Aravalli Range acts as critical natural barrier preventing eastward desert expansion and protecting the densely populated Indo-Gangetic Plains.

1. About the Aravalli Range

Overview

1. Oldest mountain range in India
2. Stretches approximately 692 kilometres in north-eastern direction
3. Traverses Gujarat, Rajasthan, Haryana before culminating in Delhi
4. Rajasthan accounts for nearly two-thirds of the range

Hydrological Significance

1. Supports water-recharge systems
2. Source of rivers – Sabarmati and Loni
3. Groundwater recharge for surrounding regions

Mineral Wealth

1. Rich in sandstone, limestone, marble, granite
2. Metals – Lead, zinc, copper, gold, tungsten
3. Economically significant but mining causing ecological damage

2. How Do the Aravalli's Protect Northern India?

Natural Barrier Against Thar Desert

1. Acts as natural barrier between Thar Desert and densely populated Indo-Gangetic Plains
2. Prevents eastward expansion of desert conditions
3. Protects agricultural, urban regions from excessive dust deposition

Dust Reduction Mechanism

1. Dust-laden winds lose speed when encountering Aravalli hills
2. Sand and dust particles settle on western slopes
3. Natural filtering effect reducing dust reaching eastern plains

Vegetation Role

1. Forests and vegetation further reduce dust movement
2. Trapping airborne particles through leaf surfaces, root systems
3. Stabilizing soils preventing wind erosion

Climate Regulation

1. Moderates' temperature extremes between desert and plains
2. Supports rainfall patterns in surrounding regions
3. Maintains ecological balance across north western India

3. Dust Storms in North-western India

Formation Mechanism

1. Intense heating of land surface creates dry, unstable atmospheric conditions
2. **Pre-monsoon months (April-June)** – Peak dust storm frequency
3. Strong south-westerly, westerly winds transporting large dust quantities from Thar Desert
4. Unstable atmosphere allowing dust to rise to high altitudes

Impact

1. Reduced visibility causing transport disruptions, accidents
2. Air quality deterioration (PM2.5, PM10 spike)
3. Crop damage, livestock losses
4. Health impacts (respiratory diseases, eye infections)
5. Infrastructure damage

4. What Is Causing Degradation of Aravalli's?

Extensive Mining

1. Mining of granite, red silica, marble, other minerals
2. Damaged hills and natural landscapes across range
3. Illegal quarrying particularly destructive in Rajasthan, Haryana

Deforestation

1. Removal of forests, natural vegetation
2. Reduced capacity to trap dust, stabilize soils
3. Loss of biodiversity, watershed functions

Land Use Change

1. Conversion of forest, grazing lands into settlements, agricultural areas
2. Weakened ecological resilience
3. Increased impervious surfaces reducing groundwater recharge

Other Threats

1. Encroachments on forest land
2. Overgrazing depleting vegetation cover
3. Urbanization pressure (particularly near Delhi, Gurugram)
4. Inadequate enforcement of forest protection laws

5. Aravalli Green Wall Initiative

Launch

1. Union Government launched Aravalli 'Green Wall' project in 2025

Objectives

1. Expand green cover in five-kilometre buffer around Aravalli range
2. Restore 26 million hectares of degraded land by 2030
3. Strengthen ecological resilience against desertification

Coverage

1. 29 districts across Gujarat, Rajasthan, Haryana, Delhi

Significance

1. Addressing root cause of Aravalli degradation
2. Inspired by Africa's Great Green Wall initiative (11-country belt across Sahel region)
3. Combating desertification threatening Indo-Gangetic Plains
4. Climate change adaptation through ecosystem restoration

Complementary Initiatives

1. **National Action Programme to Combat Desertification** – India's framework addressing land degradation
2. **CAMPA (Compensatory Afforestation Fund Management and Planning Authority)** – Funds for afforestation, ecosystem restoration
3. **National Mission for Green India (GIM)** – Increasing Forest cover, ecosystem services

6. Conclusion

Aravalli Range — India's oldest mountain range (692 km across Gujarat-Rajasthan-Haryana-Delhi) — serves as critical ecological shield protecting densely populated Indo-Gangetic Plains from Thar Desert's dust storms, desert expansion, and wind erosion. Dust-laden winds lose speed encountering Aravalli hills while forests trap airborne particles stabilizing soils. However, extensive mining (granite, marble, red silica), deforestation, and land use conversion have severely degraded this natural barrier. The 2025 Aravalli Green Wall initiative targeting 26 million hectares restoration by 2030 across 29 districts with five-kilometre green buffer addresses root causes of degradation. Strengthening this initiative through stricter mining regulation enforcement, community participation in afforestation, integration with national desertification combat programs, and urban planning reforms near Delhi-Haryana belt is essential ensuring Aravalli's continued ecological service protecting northern India from intensifying dust storms and creeping desertification amid climate change.

Source - <https://indianexpress.com/article/explained/explained-climate/churu-dust-storm-aravallis-shield-weakening-10717028/lite/>