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Q14

Briefly mention the alignment of major mountain ranges of the world and explain their impact on local weather conditions, with examples.

UPSC Civil Services Mains 2021 · GS I · 15 marks · World's Physical Geography

Salient features of world's physical geography.

Core demand of the question

- Briefly mention the alignment of major mountain ranges of the world and explain their impact on local weather conditions, with examples
- Keep a 15-mark length

Revision summary

Young fold mountains follow the Alpine-Himalayan and American cordilleran belts.

Island arcs mark Pacific subduction.

Alignment sets orographic rain, **rain shadow**, and foehn winds.

Himalaya and **Western Ghats** are India's teaching pair.

Altitude zonation on Andes and Himalaya is climate stacked by height.

Introduction

The world's great ranges are not random wrinkles. They follow plate edges and old orogenies, and they steer wind, rain, and temperature for the people at their feet.

Body**Alignments**

- **Young fold west-east:** Alps, Carpathians, Caucasus, Zagros, Himalaya-Karakoram - the Alpine-Himalayan belt from the Atlantic to the South China Sea.
- **Young fold north-south in the Americas:** Rockies and Andes along the Pacific Ring of Fire.
- **Island arcs:** Japan, Philippines, Indonesia - volcanic mountains on subduction trenches.
- **Old residual:** Urals (N-S), Appalachians, **Western Ghats** (more scarp than Alpine fold), Aravallis - lower, worn, still climatic.

Weather impacts, with examples

- **Orographic rain and **rain shadow**:** **Western Ghats** make the Konkan wet and the Deccan lee drier; Himalaya wring the monsoon onto India and leave Tibet and interior Asia drier; Cascades rain-shadow the US interior.
- **Barrier to cold air:** Himalaya largely blocks Siberian outbreaks from north India in winter, while also trapping western-disturbation moisture as snow.

- **Foehn / chinook:** downslope warming on the leeward Alps and Rockies melts snow and dries farms.
- **Altitude climate:** Andes and Himalaya create vertical zonation - coffee, potato, pasture - on one slope.
- **Monsoon channel:** Arakan Yoma and Naga hills steer Bay moisture into Northeast India; the gap at the Brahmaputra is a wet funnel.
- **Mediterranean west coasts:** west-east Alps help isolate a milder south; north-south Pacific ranges shape California's wet-west, dry-inland pattern.

Local life

- Tea on Darjeeling slopes, rainfed rice on windward Konkan, and snowmelt rivers of Punjab are weather written by alignment.

Flow diagram

Alpine Himalayan E-W -> Orographic rain
Andes Rockies N-S -> Rain shadow foehn
Orographic rain -> Local weather
Rain shadow foehn -> Local weather

Conclusion

- **Major ranges align with plates:** east-west in Eurasia, north-south in the Americas, arcs in the Pacific. They make rain, shadow, foehn, and altitudinal belts. Name the range, then name the wind it stands in.

Facts & figures

Alpine-Himalayan belt

Collision orogeny from the Mediterranean to Southeast Asia.

Rain shadow

Dry lee of a range, as in the Deccan east of the Ghats or Tibet north of the Himalaya.

Foehn/chinook

Warm dry downslope wind on the lee of Alps and Rockies.

Western Ghats

North-south scarp that splits Konkan rain from interior rain-shadow.

Western Disturbances

Winter moisture that the Himalaya turns into north-Indian rain and snow.