

# Model Answers - Mains 2021 GS

## Paper - 1 Geography

**Q4. Differentiate the causes of landslides in the Himalayan region and Western Ghats.**

**(10 Marks, 150 words)**

**Answer:** Landslide is a **rapid movement of rock, soil, and vegetation** down the slope under the influence of gravity. Over 12% of Indian land is vulnerable to landslides.

Though it is a common feature of both the Himalayan and western ghats **they differ in their causes:**

### **Causes of Landslides in Himalayan Region:**

- **Seismic zone:** Himalayas lie at the plate boundary between Indian and Eurasian plate due to which it is vulnerable to earthquakes that cause landslides.
- **Over construction:** Beyond the geomorphic capacity that puts a considerable strain on the slopes that collapse under the influence of gravity.
- **GLOFs:** Glacial lake outburst floods also lead to sudden downflow of the material in the Himalayan region.
- **Cloud burst:** Sudden and heavy rains sometimes lead to landslides in the rainy season.

### **Causes of Landslides in Western Ghats:**

- **Mining:** such as sand mining weakens the structures leading to landslides. E.g. Idukki landslides 2021.
- **Deforestation:** Cutting of trees loosens the soil that leads to landslides. E.g. Malin Landslides, Pune
- **Heavy rainfall region:** Western Ghats receive 200-250cm of rainfall due to blocking of monsoonal winds. This heavy rainfall washes away the top layer leading to landslides.

Government has launched **the National Landslide Risk Management Strategy** to deal with the landslides exclusively to make India more disaster resilient on the lines of Sendai Framework.

**Q5. Despite India being one of the countries of Gondwanaland, its mining industry contributes much less to its Gross Domestic Product(GDP) in percentage. Discuss.**

**(10 Marks, 150 words)**

**Answer:** As a part of Gondwanaland **India is endowed with a huge mineral base specially in Chotanagpur Plateau.** India ranks 3rd in production of coal & lignite, 2nd in barites, 4th in iron ore, 5th in bauxite and crude steel, 7th in manganese ore and 8th in aluminium.

Despite this, the contribution of mining to **India's GDP has been stagnant and low around 2%** as compared to 7.5% and 7% in South Africa and Australia respectively.

**Reasons for low contribution:**

- **Low investment:** Lack of investment in exploration and the upgradation of technology. Still obsolete and low efficient technology is used. E.g. Still rat hole mining is prevalent in Meghalaya.
- **Land acquisition:** Several tribal communities and Particularly Vulnerable Tribal Groups (PVTGs) fall into the mining zones. Their rehabilitation & compensation is another major issue.
- **Administrative issues:** The auction of a mine is a process where the power rests in the hands of state governments.
- **Corruption:** In allocation of coal blocks that leads to underutilisation of potential. E.g cancellation of 204 coal blocks by the Supreme Court in 2014.
- **Environmental Concern:** The reforms in the act unshackle the mining sector of India, as much it is beneficial for the development of the country. Mining is harmful from an environmental point of view.
- **The lack of geological data:** The lack of geological data and modern technology has blocked significant discoveries of key minerals.

Government has launched **National Mineral Policy 2019** and **granted industry status to the mining** in order to promote the mining and its contribution to the GDP.

**Q6. What are the environmental implications of the reclamation of the water bodies into urban land use? Explain with examples.**

**(10 Marks, 150 words)**

**Answer:** With rising urbanisation, **the urban population in India is expected to be 50% by 2050**. This would further increase the water stress in urban areas in addition to the population pressure on land.

In the backdrop of this, **reclamation of water bodies into urban land use is seen as a solution to water stress** which can have both positive and negative implications:

**Positive implications:**

- **Groundwater recharge:** That will cater to the drinking water needs of urban population.
- **Rainwater harvesting:** Rain water can be directed to the urban water body which can be used in the time of need.
- **Moderating effect of water body:** which can help counter higher temperature due to urban heat island effect.

**Negative implications:**

- **Frequent Floods:** Water bodies act as sponges for extra rainfall, reclamation of water bodies, has led to higher incidences of floods. The biggest example of it is Mumbai.
- **Environmental hazards like soil liquefaction:** Reclaimed land is highly susceptible to soil liquefaction during earthquakes.
- **Encroachment and pollution:** due to demand for land. Deepor beel in Guwahati is a well-known example of water bodies that were encroached

Water bodies play an important part in sustaining the ecology. In this light their conservation **through waste water treatment, non-encroachment, reduced anthropogenic stress** etc., is essential to maintain sustainability.

**Q7. Mention the global occurrence of volcanic eruptions in 2021 and their impact on the regional environment.**

**(10 Marks, 150 words)**

**Answer:** A volcanic eruption is when **lava and gas are released from a volcano**, sometimes explosively. On an average there are around 20 to 25 volcanic eruptions every year. However, in 2021, this number went almost double. Some of the eruptions of 2021 are:



- Fajradalsfjall in Iceland
- Kilauea in the Hawaiian Islands.
- Nyiragongo in Democratic Republic of Congo
- Mt. Etna in Europe
- La Palma in Canaries.

**Impact on regional environment:**

- **Lava flow:** Eruptions can produce such features as pyroclastic flows and mudflows that can cause major loss of life within minutes.
- **Reduced insolation:** Volcanic ash reflects incoming solar radiation leading to localized cooling effect in the temperature. E.g.: Mt. Krakatau brought a mini-ice-age.
- **Pollution:** Plumes of volcanic ash can spread over the large areas of the sky, reducing visibility.
- **Habitat destruction:** It also leads to the deterioration of water quality, fewer periods of rain, crop damages, and the destruction of vegetation.

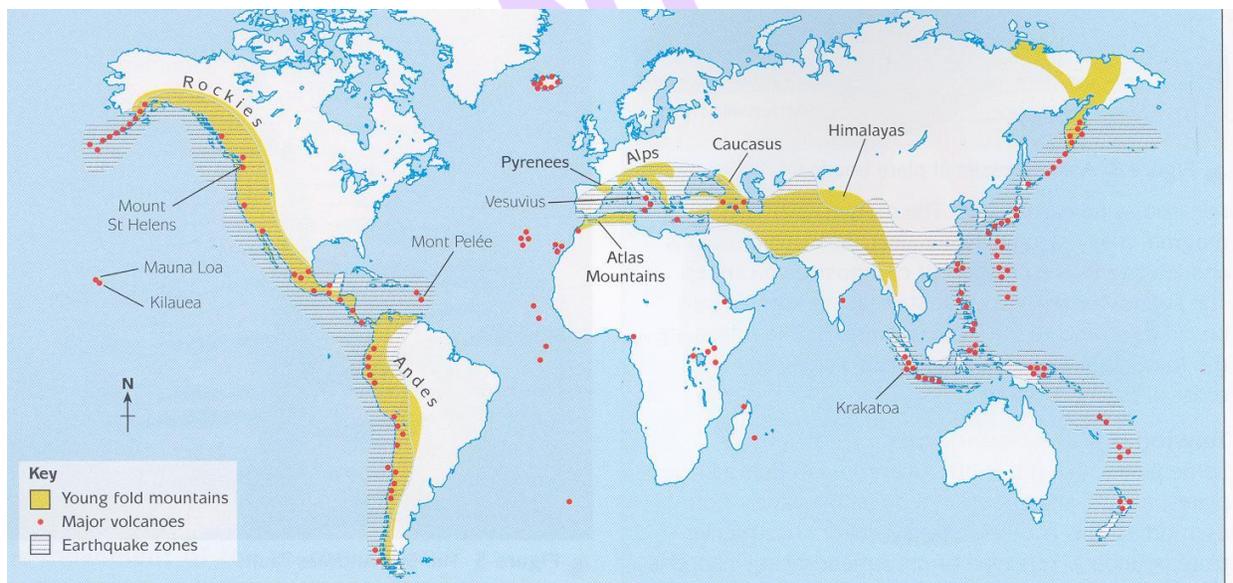
However, such volcanic eruptions also provide **new opportunities for Geothermal Energy, and also the Lava and ash is a good source of Nutrients for the soil.** A report by the Intergovernmental Panel on Climate Change predicts a major volcanic eruption can counteract anthropogenic global warming to a small extent. Though volcanoes cannot be avoided, steps can be taken to mitigate their effects.

**Q14. Briefly mention the alignment of major mountain ranges of the world and explain their impact on local weather conditions, with examples.**

**(15 Marks, 250 words)**

**Answer:** A mountain system or mountain belt is a group of mountain ranges with similarity in form, structure, and alignment that have arisen from the same cause, usually an orogeny. **These mountain ranges have different alignment which impacts their physical characteristics.** Across the globe, these mountain ranges have been broadly classified into 2 alignments.

1. North South Alignment
2. East West Alignment



The world distribution of young fold mountains, active volcanoes and earthquake zones.

**Major mountain ranges of the world and their impact on the local weather:**

**A. North-South Alignment**

## **1. Impact of the Aravallis**

- It acts as a barrier for the clouds to shift eastwards to the lower Himalayas.
- Protects the plains from the effect of westerly flowing from the Central Asia region.

## **2. Impact of the Andes.**

- The northern part of the Andes is typically rainy and warm.
- The mountains form a rain cover over the eastern plains of Argentina, which have extremely dry weather.

## **3. Impact of the Rockies.**

- The mountains block rain-producing weather.
- Because the air is now dry, it absorbs moisture from the landscape, leaving it more arid.

## **4. Impact of the Urals.**

- The western slope of the Ural Mountain receives more moisture than the eastern.
- The eastern slope is particularly chilled, and winter lasts longer than summer throughout the Urals.

## **B. East-West Alignment.**

### **1. Impact of the Himalayas:**

- The Himalayas act as a climatic divide between India and Central Asia.
- During the monsoon it acts as a physical barrier for rain bearing south-west monsoon winds.
- Himalayas divide the Bay of Bengal branch of monsoon winds into two branches.

### **2. Impact of the Alps:**

- Daily weather is influenced by the location and passage of cyclonic storms and the direction of the accompanying winds as they pass over the mountains.
- Cold winds such as Mistral flows over southern alps also affects the temperature of the place.

Mountain ranges play an important role in influencing the local weather patterns and lifestyles of the people. Apart from this they are also **crucial in separating different cultures** from each other.

**15. How do the melting of the Arctic ice and glaciers of the Antarctic differently affect the weather patterns and human activities on the Earth? Explain.**

**(15 Marks, 250 words)**

**Answer: As per Intergovernmental Panel on Climate Change (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate**, the growing events of melting of glaciers have resulted into many unprecedented events. However, there are certain aspects in which the melting of Arctic ice and glaciers of the Antarctic differs.

#### **Melting of the Arctic Ice:**

Arctic sea ice has declined at a rate of almost **13 per cent per decade** in the last 30 years.

#### **A. Impact:**

- Permafrost in the Arctic region stores large amounts of methane, which is a greenhouse gas that contributes to climate change.
- The melting of the Arctic will open a new trading route, bypassing the Suez Canal.
- The national economic interest may supersede the global conservation efforts of the Arctic.
- Glacial lake outburst floods (GLOF) are becoming frequent.
- The freshwater runoff into the ocean disrupts part of a major circulation system known as the Atlantic Meridional Overturning Circulation (AMOC).

#### **B. Melting of the Arctic Ice:**

The Antarctic region has registered its highest-ever temperature. Although the reading was not part of a wider study, scientists warn it is enough to indicate how fast Antarctica is warming.

#### **Impact:**

- It is triggering the movement of Earth's crust. Example: Recently the breaking of the Thwaites glacier is expected to cause a crustal shift.
- It adds to rising sea levels, which in turn increases coastal erosion. Tuvalu Island, Cox Bazaar and the coast of Indonesia are few of the global examples.
- Melting glaciers also elevates storm surge as warming air and ocean temperatures create more frequent and intense coastal storms like hurricanes and typhoons.

Melting sea ice is also likely to **have global consequences** and the effects are transboundary in nature. Thus, it is reasonable to assume that the only solution could be integrated international negotiations and frameworks.

**Q16. Discuss the multi-dimensional implications of uneven distribution of mineral oil in the world.**

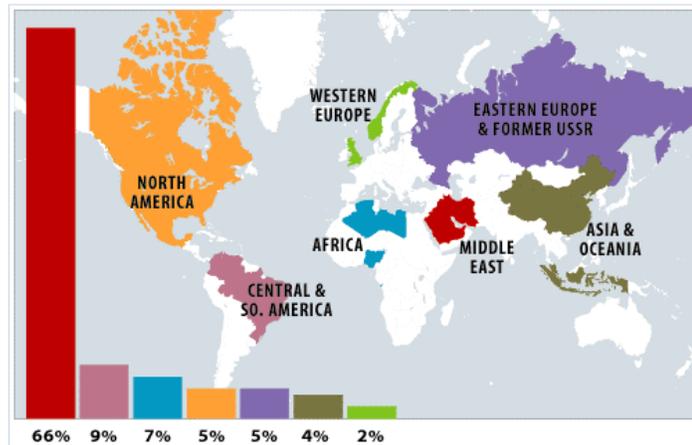
**(15 Marks, 250 words)**

**Answer:** Mineral Oil is not distributed evenly in the world. However, most of the oil and natural gas reserves are in **Saudi Arabia, Russia, the United States, and Iran**. Though minerals have played unknowingly huge importance in our daily life across the globe, there are implications for such distribution.

**The implications are as follows:**

- **International geopolitics:** is also affected by the presence of oil and the market for the same such as India Iran relations despite threats of US sanctions.
- **Uneven Supply Chain:** Given the complexity of value chains, no country can control the entire critical mineral value chain. This was evident during the initial phase of the Coronavirus outbreak.

### Where Are the World's Oil Reserves?



- **Economic Viability:** Uneven distribution of the mineral oil across the world, leads to economic consequences like inflation, for the importing country.
- **Energy Security:** The cross-border mineral explorations lead to Oil Surplus and Global Liquidity.
- **Human migration:** large groups of people often migrate (move) to a place that has the resources they need or want and migrate away from a place that lacks the resources they need. Example: The Middle East is one of the top destinations for the Indian migrants.
- **Economic activities** in a region related to resources in that region: Economic activities that are directly related to resources include farming, fishing, ranching, timber processing, oil and gas production, mining, and tourism.
- **Trade:** Countries may not have the resources that are important to them, but trade enables them to acquire those resources from places that do.
- **Wealth and quality of life:** The well-being and wealth of a place are determined by the quality and quantity of goods and services available to people in that place. This measure is known as the standard of living.

With countries **shifting towards renewables** and the **target of net carbon neutrality**, these dynamics are bound to change in the future. India should also look towards the diversification of sources to make it less dependent on foreign players.