



Sambhav

Day 72

Question 1: Climate of India is unique on the globe. Discuss the factors that determine the climate of India. (250 words)

Question 2: Discuss the climatic region of India according to Koppen's empirical model. (150 words).

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Approach / Explanation / Answer

Answer 1

Approach

- Give a brief introduction about the climate of India.
- Describe the factors on which the Indian climate depends.
- Write a holistic and appropriate conclusion.

Introduction

- India has a diverse climate due to its large size and varied topography. The northern regions have a continental climate with cold winters and hot summers, while the southern regions have a tropical climate with moderate temperatures and high humidity.
- The monsoon season, which lasts from June to September, brings heavy rainfall to much of the country. The western coast also experiences a maritime climate, with cool winters and moderate summers.

Body

- The climate of India is unique and varies greatly depending on location. The climate of India is unique and diverse due to a variety of factors. The main factors that determine the climate of India are:
 - **Himalaya in North:** The **Himalayas** play a significant role in the **climate of India** by acting as a **barrier to the cold, dry winds** from **Central Asia** and trapping the **moist monsoon winds** that bring **rainfall to the subcontinent**.
 - The mountains also force the **monsoon winds to rise, leading to heavy precipitation** on the **windward side** of the range and creating a **rain shadow effect** on the **leeward side**, resulting in arid regions like the **Thar Desert**.
 - The **glaciers in the Himalayas** also provide water for the major rivers in India,

- such as the **Ganges, Brahmaputra, and Indus**, which are crucial for **agriculture and hydroelectric power generation**.
- **Ocean in South:** The ocean plays a significant role in shaping the **climate of India** by influencing **temperature, rainfall, and weather patterns**.
 - The **Indian Ocean**, particularly the **Bay of Bengal** and the **Arabian Sea**, provide warmth and moisture to the atmosphere that contribute to the formation of the **Indian monsoon**.
 - **Indian Ocean Dipole:**
 - The **Indian Ocean Dipole (IOD)** is another **ocean-atmosphere phenomenon** that plays an important role in the Indian climate.
 - The **positive phase of IOD** is characterized by **stronger trade winds** and **warmer sea surface temperatures** in the **western Indian Ocean**, which causes the **sea level pressure** to be **higher over the Indian subcontinent**.
 - This leads to **less rainfall** and **drought-like conditions** over India.
 - The **negative phase of IOD** is characterized by **weaker trade winds** and **cooler sea surface temperatures** in the **western Indian Ocean**, which leads to **increased rainfall and flooding** over India.
 - **Latitude:** India is located near the equator and as such, it experiences tropical weather with high temperatures and high humidity.
 - **Altitude:** The climate of India varies greatly with altitude. The high Himalayas in the north have a cold, alpine climate, while the low-lying coastal regions have a hot and humid climate.
 - **Monsoons:** India's climate is heavily influenced by the monsoon winds, which bring heavy rainfall to the country during the summer months. The monsoons are caused by the differential heating of land and sea and the resulting pressure gradients.
 - **Ocean currents:** The Indian Ocean has a significant impact on the climate of India. The warm currents from the equator bring warm and moist air to the coast, while the cool currents from the poles bring cool and dry air to the coast.
 - **Topography:** The topography of India also plays a role in determining the climate. The Western Ghats and the Eastern Ghats form natural barriers that affect the movement of air masses and the distribution of rainfall.
 - **Distance from the sea:** India has a long coastline, and the regions closer to the sea have a more moderate climate than the regions farther inland.

Conclusion

The climate of India is determined by a complex interplay of these factors, which results in a wide range of climatic conditions across the country. The tropical climate in the south, the temperate climate in the north, the arid climate in the northwest, and the alpine climate in the high Himalayas are just a few examples of the diversity of the Indian climate.

Answer 2

Approach

- Give a brief introduction about the Koppen's empirical model.
- Describe climatic region of India according to Koppen's empirical model.
- Write a holistic and appropriate conclusion.

Introduction

- Koppen's empirical model, also known as the Koppen climate classification system, is a widely used method for classifying the world's climates. Developed by German-Russian climatologist Wladimir Koppen in the early 1900s, the system classifies climates based on temperature and precipitation patterns.
- The model uses five main climate groups: A (tropical), B (dry), C (temperate), D (continental), and E (polar). Each group is then further divided into subcategories based on specific temperature and precipitation characteristics. For example, the A group is divided into tropical rainforest, tropical

monsoon, and tropical savanna climates.

Body

▪ **Tropical Wet Climate:**

- The tropical wet climate, also known as the tropical monsoon climate, is a type of climate characterized by high temperatures and high humidity throughout the year, with a distinct rainy season and a dry season. This climate is typically found in low-lying areas near the equator, such as the Indian subcontinent and parts of Southeast Asia. In India, this climate is found mainly in the southern states of Kerala, Tamil Nadu, and the coastal areas of Andhra Pradesh, Orissa, and West Bengal. These regions experience heavy rainfall during the monsoon season, which typically lasts from June to September, and relatively dry conditions during the rest of the year. The tropical wet climate in India is known for its lush vegetation and high biodiversity.

▪ **Tropical dry climate:**

- Tropical dry climate, also known as tropical savanna climate, is a type of climate that is characterized by a long dry season and a short-wet season. This climate zone is typically found near the equator, where the temperature remains warm or hot year-round. During the dry season, which can last up to several months, there is little to no rainfall, while the wet season typically sees a significant amount of precipitation. This climate is common in regions such as Central America, northern South America, and parts of Africa.

▪ **Subtropical humid climate:**

- In India, the subtropical humid climate is found in the northeastern region of the country, as well as along the western coast, including the states of Maharashtra, Gujarat and Goa. This region is characterized by mild winters, hot summers, and high levels of humidity. The temperatures in this climate remain relatively warm year-round, with occasional heat waves. The area also receives a significant amount of precipitation throughout the year, with the heaviest rainfall typically occurring in the summer months.

▪ **Montane climate:**

- Montane climate, also known as highland or alpine climate, is a type of climate found at high elevations, typically above 1,500 meters (5,000 feet) above sea level. In India, montane climate can be found in the Himalayan region, including the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, and Sikkim, as well as parts of northeastern India. This climate is characterized by lower temperatures and higher levels of precipitation compared to the surrounding lowlands. The temperatures decrease as the elevation increases and it can be quite cold in the higher elevations, with heavy snowfall in winter. The summer season is relatively short and mild. The precipitation is also high, mostly in form of snowfall and rain. This climate supports a variety of vegetation, including coniferous forests, alpine grasslands, and shrubs.

Conclusion

India's climate is greatly influenced by the monsoon winds, which bring heavy rainfall to the country during the summer months. The country also experiences a wide range of temperatures, with the northern regions experiencing colder temperatures than the southern regions. India is also known to have a tropical wet and dry climate, tropical savanna climate, and Desert climate. In addition to this, India's coastal regions are also affected by cyclones and tropical storms, which can cause significant damage to infrastructure and loss of life.

