Climate of India and Climate Controls

Climate refers to the average weather conditions of a region over a long period, typically 30 years, including temperature, precipitation, wind, humidity, and atmospheric pressure. Weather, in contrast, describes the day-to-day atmospheric conditions.

India's climate is predominantly of the monsoon type, characterized by seasonal reversal of wind direction. It exhibits both tropical and subtropical features due to its geographical location, with significant regional variations in temperature and precipitation.

Key factors controlling India's climate include:

- **Latitude:** Nearly half of India lies south of the Tropic of Cancer, resulting in tropical climate characteristics, while the northern part experiences subtropical climate.
- **Altitude:** Temperature decreases with increasing altitude, influencing local climate variations.
- **Pressure and Wind Systems:** Seasonal changes in pressure over Asia cause wind direction reversals, leading to monsoon winds.
- **Distance from the Sea (Continentality):** Areas farther from the sea experience more extreme temperatures, with hotter summers and colder winters.

- **Ocean Currents:** Warm and cold currents affect coastal climates by modifying temperatures.
- **Relief Features:** Mountains act as barriers to winds and influence precipitation patterns, creating rain shadows on leeward sides.

India's climate influences vegetation, wildlife, and human lifestyles across different regions.

Exam Questions

Q1: What is the difference between weather and climate?

Answer: Weather refers to the atmospheric conditions at a particular place and time, such as temperature and rainfall on a given day. Climate is the average weather pattern of a region over a long period, usually 30 years.

Q2: Name the six major controls of India's climate.

Answer: The six major controls are latitude, altitude, pressure and wind systems, distance from the sea (continentality), ocean currents, and relief features.

Seasons of India

India experiences four distinct seasons due to its monsoon climate:

- **Cold Weather Season (Winter):** From mid-November to February, northern India experiences cold temperatures with frost and snowfall in the Himalayas. North-east trade winds bring dry weather, with some rainfall in coastal Tamil Nadu.
- **Hot Weather Season (Summer):** From March to mid-June, temperatures rise due to the northward movement of the sun. Hot, dry winds called 'loo' blow in northern India, and dust storms and thunderstorms are common.

- **Advancing Monsoon (Rainy Season):** From June to September, south-west monsoon winds bring heavy rainfall. The monsoon is characterized by alternating wet and dry spells called 'breaks'.
- **Retreating Monsoon (Autumn):** From October to December, the monsoon withdraws, leading to clear skies, rising temperatures, and humid conditions known as 'October Heat'.

Rainfall distribution varies widely, with heavy rain on the west coast and northeast, moderate rain in most parts, and low rainfall in western Rajasthan and adjoining areas. Snowfall is limited to the Himalayas.

The monsoon is vital for agriculture, festivals, and economic activities, acting as a unifying bond across India.

Exam Questions

Q1: What are the four main seasons in India?

Answer: The four main seasons are the cold weather season (winter), hot weather season (summer), advancing monsoon (rainy season), and retreating monsoon (autumn).

Q2: Why is the monsoon important for India?

Answer: The monsoon brings essential rainfall for agriculture, influences festivals and lifestyles, and supports economic activities such as water resources and tourism.

Various Disasters and Preventive Protocols

India faces several natural disasters, each requiring specific preventive measures:

- **Earthquakes:** Identify safe spots indoors, secure heavy furniture, keep emergency supplies, and practice emergency plans.
- **Floods:** Avoid flood-prone areas, elevate homes if possible, prepare evacuation plans, and monitor weather warnings.
- **Hurricanes:** Install storm shutters, secure loose items, plan evacuation, and maintain emergency supplies.
- **Wildfires:** Clear flammable vegetation, create defensible spaces, have evacuation plans, and monitor fire progress.
- **Tornadoes:** Identify safe shelters, heed warnings, secure outdoor objects, and keep emergency kits ready.

Exam Questions

Q1: What are some preventive measures to take during an earthquake?

Answer: Identify safe spots like under sturdy furniture, secure heavy items to walls, keep emergency supplies accessible, and practice emergency plans regularly.

Q2: How can one prepare for floods?

Answer: Avoid flood-prone areas, elevate home foundations if possible, create evacuation plans, and follow local authority instructions during heavy rains.

Solved Examples

Example 1: Explain how altitude affects the climate of a region.

Solution: As altitude increases, temperature decreases because the atmosphere becomes thinner and cooler at higher elevations. This results in cooler climates in mountainous areas compared to lowlands.

Example 2: Describe the characteristics of the advancing monsoon season in India.

Solution: The advancing monsoon occurs from June to September, bringing south-west monsoon winds that cause heavy rainfall. It features alternating wet and dry spells called breaks, which affect agricultural activities.

Practice Set

Easy

- Define climate.
- What is continentality?

Moderate

- List the six major controls of India's climate.
- Explain the impact of ocean currents on coastal climate.

Challenging

- Discuss the significance of the monsoon as a unifying bond in India.
- Describe the preventive measures for wildfires.

Answer Key

- **Define climate:** The average weather conditions of a region over a long period, usually 30 years.
- **What is continentality?** The effect of distance from the sea causing more extreme temperatures in inland areas.

- **List the six major controls of India's climate:** Latitude, altitude, pressure and wind systems, distance from the sea, ocean currents, and relief features.
- **Impact of ocean currents:** Warm or cold currents influence coastal temperatures by warming or cooling the air, affecting local climate.
- **Significance of monsoon:** It brings essential rainfall for agriculture, influences culture and festivals, and supports economic activities, binding the country together.
- **Preventive measures for wildfires:** Clearing flammable vegetation, creating defensible spaces, having evacuation plans, and monitoring fire progress.

Quick Reference

- **Climate:** Average weather over 30 years.
- **Monsoon:** Seasonal wind reversal causing rainfall.
- **Continentality:** Extreme temperatures due to distance from sea.
- **Seasons:** Winter, summer, advancing monsoon, retreating monsoon.
- **Disasters:** Earthquakes, floods, hurricanes, wildfires, tornadoes.

Glossary

- **Altitude:** Height above sea level.
- **Continentality:** Climate effect due to distance from the sea.
- **Monsoon:** Seasonal reversal of wind direction.
- **Pressure System:** Areas of high or low atmospheric pressure influencing winds.
- **Relief:** Physical features of the land such as mountains and plains.
- **Trade Winds:** Winds blowing from subtropical high-pressure areas towards the equator.