

CLASS 9 | SOCIAL SCIENCE

UNDERSTANDING SOCIETY:
INDIA AND BEYOND – PART I

CHAPTER 3

ATMOSPHERE AND CLIMATE

Atmosphere

- Blanket of air surrounding Earth
- Held close by gravity
- Supports life on Earth
- Protects from harmful solar radiation
- Regulates Earth's temperature



Composition of the Atmosphere

- Nitrogen about 78%
- Oxygen about 21%
- Small amounts of carbon dioxide, argon, and other gases
- Contains water vapour and dust particles
- Water vapour is important for clouds and rainfall



Structure of the Atmosphere

- Divided into layers differing in temperature and density
- Troposphere
- Stratosphere
- Mesosphere
- Thermosphere and Exosphere



Troposphere

- Lowest layer, closest to Earth's surface
- Contains most air needed by living beings
- Weather changes mainly occur here
- Clouds, rain, fog, and storms form here



Stratosphere and Ozone Layer

- Lies above the troposphere
- Contains the ozone layer
- Ozone protects life from harmful ultraviolet rays
- Fewer clouds occur here
- Suitable for aeroplane flights



Upper Layers

- Mesosphere lies above the stratosphere; meteors burn here
- Thermosphere has very high temperatures
- Ionosphere is part of the thermosphere
- Exosphere is the outermost layer



Weather

- Day-to-day atmospheric conditions
- Can change within hours or days
- Includes temperature and rainfall
- Also includes wind, humidity, and cloud cover



Climate

- Average weather over a long period
- Studied over many years
- Influences food, clothing, houses, and occupations
- Different regions have different climates



Insolation and Temperature

- Insolation means incoming solar radiation
- The Sun is the main source of heat and light
- Temperature tells how hot or cold air is
- Temperature varies by place
- Influenced by latitude, altitude, and distance from sea



Atmospheric Pressure

- Pressure exerted by air
- Warm air rises, causing low pressure
- Cold air sinks, causing high pressure
- Pressure differences cause winds
- Pressure changes influence weather



Winds

- Winds are moving air
- Air moves from high- to low-pressure areas
- Direction and speed affect weather
- Local winds influence nearby regions
- Strong winds can cause storms and cyclones



Humidity and Precipitation

- Humidity is the amount of water vapour in air
- High humidity makes air moist
- Cooling water vapour forms clouds
- Precipitation includes rain, snow, and hail
- Rainfall is vital for water, agriculture, and life



Factors Affecting Climate

- Latitude
- Altitude
- Distance from the sea
- Relief features
- Winds and ocean currents



India's Climate

- Monsoon-type climate
- Monsoon strongly influences life and agriculture
- Great regional climatic variation
- Himalayas and surrounding seas influence climate
- Rainfall and temperature vary across regions



Seasons of India

- Four main seasons are recognised by the India Meteorological Department
- Cold weather season
- Hot weather season
- Southwest monsoon season
- Retreating (northeast) monsoon season



Cold Weather Season

- Mainly December to February
- Lower temperatures in northern India
- Himalayas experience snowfall
- Winter rainfall benefits some crops
- Weather is generally cool and dry



Hot Weather Season

- Mainly March to May
- Temperatures rise across most of India
- Hot, dry winds blow in the northern plains
- Local storms may occur in some regions
- Low pressure develops over northwestern India



Southwest Monsoon

- Usually begins around June
- Moist winds blow from the Indian Ocean towards land
- Brings rainfall to large parts of India
- Vital for agriculture and water resources
- Rainfall is uneven across the country



Northeast Monsoon

- Retreating monsoon mainly October to November
- Winds withdraw from northern India
- Tamil Nadu receives important rainfall
- Cyclones may develop over the Bay of Bengal
- Rainfall patterns change by region



Importance of Monsoon

- Supports agriculture
- Replenishes rivers, lakes, and groundwater
- Helps generate hydroelectric power
- Affects livelihoods and the economy
- Irregular rainfall can cause droughts or floods



Climate Change

- Long-term changes in climate patterns
- Global temperatures are rising
- Human activities contribute
- Burning fossil fuels increases greenhouse gases
- Deforestation affects climate



Greenhouse Gases

- Carbon dioxide is a major greenhouse gas
- Methane, nitrous oxide, and others trap heat
- Greenhouse gases increase Earth's temperature
- Increased emissions cause global warming
- Reducing emissions is important



Effects of Climate Change

- Increase in average temperatures
- Heatwaves and changing rainfall patterns
- More frequent or intense extreme weather
- Floods and droughts
- Effects on agriculture, water, and livelihoods



Floods

- Water covers normally dry land
- Often caused by heavy rainfall
- Rivers may overflow during intense rain
- Floods damage houses, crops, roads, and livelihoods
- Climate change can increase extreme rainfall events



Carbon Footprint

- Amount of greenhouse gases released by activities
- Transport, electricity use, and industries add emissions
- Burning coal, oil, and gas increases emissions
- Saving energy reduces carbon footprint
- Sustainable choices help protect the environment



Key Takeaways

- Atmosphere makes life possible on Earth
- Weather is short-term; climate is long-term
- India's climate is shaped strongly by monsoons
- Monsoons are essential for agriculture and water
- Climate change requires responsible action

