



Climatic Regions of World: Part-I

About

- Climate is the **average weather conditions in a place over a long period of time**—30 years or more. And as you probably already know, there are lots of different types of climates on Earth.
 - For example, hot regions are normally closest to the equator.
 - The climate is hotter there because the Sun's light is most directly overhead at the equator.
 - The North and South Poles are cold because the Sun's light and heat are least direct there.
- The **difference between weather and climate** is that weather consists of the short-term (minutes to months) changes in the atmosphere while climate is the average of weather over time and space.
 - In most places, weather can change from minute-to-minute, hour-to-hour, day- to-day, and season-to-season.
 - Climate, however, is the average of weather over time and space.
- The **factors that influence the climate** are latitude, elevation, nearby water, ocean currents, topography, vegetation, and prevailing winds.

Classification of World Climate

Koppen Classification

- The most widely used classification of climate is the empirical climate classification scheme developed by **Wladimir Koppen**.
- Koppen identified a close relationship between the distribution of vegetation and climate.
- It is an empirical classification based on mean annual and mean monthly temperature and precipitation data.
- Koppen recognised five major climatic groups, four of them are based on temperature and one on precipitation. He introduced the use of capital and small letters to designate climatic groups and types.
 - The capital letters : A,C, D and E delineate humid climates and B dry climates.
 - The seasons of dryness are indicated by the small letters : f, m, w and s, where f corresponds to no dry season.
- The categories were also influenced by a region's latitude—the imaginary lines used to measure our Earth from north to south from the equator.

Climatic Types According to Koppen

Climatic Types According to Koeppen

| Group | Type | Letter Code | Characteristics |
|--|----------------------|-------------|-------------------------------------|
| A-Tropical Humid Climate | Tropical wet | Af | No dry season |
| | Tropical monsoon | Am | Monsoonal, short dry season |
| | Tropical wet and dry | Aw | Winter dry season |
| B-Dry Climate | Subtropical steppe | BSh | Low-latitude semi arid or dry |
| | Subtropical desert | BWh | Low-latitude arid or dry |
| | Mid-latitude steppe | BSk | Mid-latitude semi arid or dry |
| | Mid-latitude desert | BWk | Mid-latitude arid or dry |
| C-Warm temperate (Mid-latitude) Climates | Humid subtropical | Cfa | No dry season, warm summer |
| | Mediterranean | Cs | Dry hot summer |
| | Marine west coast | Cfb | No dry season, warm and cool summer |
| D-Cold Snow-forest Climates | Humid continental | Df | No dry season, severe winter |
| | Subarctic | Dw | Winter dry and very severe |
| E-Cold Climates | Tundra | ET | No true summer |
| | Polar ice cap | EF | Perennial ice |
| H-Highland | Highland | H | Highland with snow cover |

Thornthwaite Classification

- In 1931, the American climatologist Charles Warren Thornthwaite divided climates into groups according to the **vegetation characteristic**.
 - The vegetation being determined by **precipitation effectiveness** (P/E, where P is the total monthly precipitation and E is the total monthly evaporation).
 - The sum of the monthly P/E values gives the **P/E index**, which is used to define five humidity provinces, with associated vegetation.
- In 1948 the system was modified to incorporate a **moisture index**, which relates the water demand by plants to the available precipitation, by means of an **index of potential evapotranspiration (PE)**, calculated from measurements of air temperature and day length.
 - In arid regions the moisture index is negative because precipitation is less than the PE.
- Based on the P/E index, Thornthwaite classified five humidity region:
 - A: (P/E index > 128) - **Wet-Rainforest**.
 - B: (P/E Index 64 to 127) - **Humid-Forest**.
 - C: (P/E index 32 to 63) - **Subhumid-Grassland**.
 - D: (P/E index 16-32) - **Semi Arid-Steppe**.
 - E: (P/E index less than 16) - **Arid-Desert**.
- On the basis of distribution of seasonal rainfall the above types of humidity regions were further divided into following subdivisions:
 - Y = Heavy rainfall in all seasons
 - s = Scarcity of rainfall in summer season
 - w = Scarcity of rainfall in winter season
 - d = Scarcity of rainfall in all seasons

Global Climate Classification

Hot, Wet Equatorial Climate

▪ Location:

- Hot, Wet Equatorial Climate is found between 5° and 10° north and south of the equator.
- It is dominantly found in the lowlands of the Amazon, the Congo, Malaysia and the East Indies.

▪ Temperature:

- There is great uniformity of temperature throughout the year.
- The mean monthly temperatures are always around 24 to 27°C, with very little variation.
- There is no winter.

▪ Precipitation:

- Precipitation is heavy and well distributed throughout the year.
- Annual average is always above 150 cm. In some regions the annual average may be as high as 250 – 300 cm.
- There is no month without rain. The monthly average is above 6 cm most of the time.
- There is much evaporation and convection air currents are set up, followed by heavy thunderstorms in the afternoons.

▪ Natural Vegetation:

- High temperature and abundant rainfall support a luxuriant tropical rainforest.
- In the Amazon lowlands, the forest is so dense that it is called '**selvas**'.
- The equatorial vegetation comprises a multitude of evergreen trees that yield tropical hardwood, e.g. mahogany, ebony, dyewoods etc.
- In the coastal areas and brackish swamps, mangrove forests thrive.

▪ Economy and Development:

◦ Major Tribes:

- Indian tribes of Amazon basin
- Pygmies of Congo basin
- Orang Asli of Malaysia

◦ Economy:

- In the forests, most primitive people live as hunters and collectors and the more advanced ones practice shifting cultivation.
- Some plantation crops are also practiced like natural rubber, cocoa, etc.

Tropical Monsoon and Tropical Marine Climates

▪ Location:

- **Tropical Monsoon** is found in the zones between 5° and 30° latitudes on either side of the equator.
 - It is best developed in the Indian subcontinent, Burma, Thailand, Laos, Cambodia, parts of Vietnam and South China and northern Australia.
- **Tropical Marine climate** is found in Central America, West Indies, the Philippines, parts of East Africa, Madagascar, the Guyana coast and eastern Brazil.
- **Temperature:**
 - Though the mean annual temperature is fairly high, summer and winter seasons are sharply differentiated due to northward and southward movement of the sun.
 - Average temperature of warm dry summer months ranges between 27°C and 32°C.
- **Precipitation:**
 - Most of their annual rainfall occurs through cyclonic and orographic types of rain.
 - The average annual rainfall is around 150 cm but there are many variations in the temporal and spatial distribution.
 - Most of the annual [monsoonal rainfall](#) is received through moisture laden **South-West monsoon winds**.
- **Natural Vegetation:**
 - Trees are normally deciduous.
 - The forest is open and less luxuriant.
 - Most of the forests yield valuable timber like teak. Other kinds of timber are sal, acacia and eucalyptus.
- **Economy:**
 - People are mainly engaged in agriculture.
 - The crops grown here include rice, wheat, pulses, cotton, jute, sugarcane, oilseeds, coffee, tea and various types of fruits and vegetables.
 - All types of domestic animals are reared in this region.
 - This region is highly developed in agriculture and other agro-based activities.
 - The region is also very rich in deposits of various types of minerals which are essential ingredients for modern industrial activities.

Savannah or Sudan Climate

- **Location:**
 - The Savannah or Sudan Climate is a transitional type of climate found between the equatorial forest and the hot deserts.
 - It is located between 5°-20° latitudes on either side of the equator.
 - It is best developed in Sudan where the dry and wet seasons are most distinct, hence its name the Sudan Climate.
 - The belt includes **West African Sudan**, and then curves southwards into **East Africa** and **southern Africa** north of the Tropic of Capricorn.
 - In South America, there are two distinct regions of savannah located north and south of the equator, namely the **Ilanos** of the **Orinoco basin** and the **Campos** of the **Brazilian**

Highlands.

▪ **Temperature:**

- The Savanna climate is characterized by distinct wet and dry seasons.
- **Mean high temperature** throughout the year is between 24°C and 27° C.
- The annual range of temperature is between 3°C and 8°C.
- The extreme diurnal range of temperature is a characteristic of the Sudan type of climate.

▪ **Precipitation:**

- The average annual rainfall ranges between 100 cm and 150 cm.
- The prevailing winds of the region are the **Trade Winds** which bring rain to the coastal regions.

▪ **Natural Vegetation:**

- It is characterized by tall grass and short trees.
- Trees are deciduous and hard.
- The grass is tall and coarse like elephant grass.
- Scrubland is well represented by a number of species in Australia like mallee, mulga, Spinifex grass, etc.

▪ **Economy:**

- Many tribes live within the Savanna lands.
- Some tribes live as pastoralists like the Masai and others as settled cultivators like the Hausa of northern Nigeria.
- However, agriculture is not much developed.

Hot Desert and Mid-latitude Desert Climates

▪ **Location:**

- The major hot deserts of the world are located on the western coasts of continents between latitudes 15° and 30° N and S.
- They include the Sahara Desert, the largest single stretch of desert, which is 3,200 miles from east to west and at least 1,000 miles wide.
 - The Great Australian Desert covers almost half of the continent.
 - The other hot deserts are the Arabian Desert, Iranian Desert, Thar Desert, Kalahari and Namib Deserts.
- In North America, the desert extends from Mexico to the USA and is called by different names at different places, e.g. the Mojave, Sonoran, Californian and Mexican Desert.
- In South America, the Atacama or Peruvian Desert (rain shadow effect and off-shore trade winds) is the driest of all deserts with less than 2 cm of rainfall annually.

▪ **Temperature:**

- There is no cold season in the hot deserts and the average summer temperature is around 30°C.
- The diurnal range of temperature in the deserts is very great.
 - Intense insolation by day in a region of dry air and no clouds causes the temperature to rise with the sun.
 - But as soon as the sun sets, the land loses heat very quickly by radiation and the mercury levels drop.
 - Average diurnal range varies from 14 to 25° Celsius.
 - Frosts may occur at night in winter.

▪ **Precipitation:**

- In South America, the Atacama or Peruvian Desert is the driest of all deserts with less than 0.5 inches of rainfall annually.
- The Patagonian Desert is more dry due to its rainshadow position on the leeward side of

the lofty Andes than to continentality.

- The hot deserts lie astride the Horse Latitudes or the Sub Tropical High-Pressure Belts where the air is descending, a condition least favorable for precipitation of any kind to take place.
- The relative humidity is extremely low, decreasing from 60 percent in coastal districts to less than 30 percent in desert interiors.
- Rain normally occurs as violent thunderstorms of the conventional type.
- The deserts are some of the hottest spots on earth and have high temperatures throughout the year.

▪ **Vegetation:**

- All deserts have some form of vegetation such as grass, scrub, herbs, weeds, roots, or bulbs.
- The predominant vegetation of both hot and mid-latitude deserts is xerophytic or drought-resistant scrub.
- This includes the bulbous cacti, thorny bushes, long-rooted wiry grasses, and scattered dwarf acacias.

▪ **Economy:**

- It is home to primitive hunters and gatherers who do not cultivate any crops, or domesticate any animals.
 - They include the **Bushmen of the Kalahari desert, Bindibu or the Aborigines of Australia.**
- The nomadic herdsman pursue a livestock economy, wandering through the deserts along with their herds in search of water and green pastures.
 - They include **Bedouins of Arabia**, the **Tuaregs of Sahara**, the **Mongols of Gobi desert.**
- The settled cultivators cultivate crops like wheat, barley, sugarcane, fruits and vegetables
- It is for gold mines in Australia, Diamond mines in Kalahari, Copper mines in Chile, Silver mines in Mexico, Oil in the Persian Gulf countries.

Previous Year Questions

Q. Consider the following statements:

1. The winds which blow between 30 N and 60 S latitudes throughout the year are known as westerlies.
2. The moist air masses that cause winter rains in the North Western region of India are part of westerlies.

Which of the statements given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Q. The seasonal reversal of winds is the typical characteristic of?

A. Equatorial climate

B. Mediterranean climate

C. Monsoon climate

D. All of the above climates

Q. Consider the following statements:

1. In the tropical zone, the western sections of the oceans are warmer than the eastern sections owing to the influence of trade winds.
2. In the temperate zone, westerlies make the eastern sections of oceans warmer than the western sections.

Which of the statements given above is/are correct?

A. 1 Only

B. 2 Only

C. Both 1 and 2

D. Neither 1 nor 2

Q. Consider the following statements:

1. The annual range of temperature is greater in the Pacific Ocean than that in the Atlantic
2. The annual range of temperature is greater in the Northern Hemisphere than that in the Southern Hemisphere.

Which of the statements given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Q. Which one of the following is the Characteristic climate of the Tropical Savannah Region?

A. Rainfall throughout the year

B. Rainfall in winter only

C. An extremely short dry season

D. Definite dry and wet season

Q. What could be the main reason/reasons for the formation of the African and Eurasian desert belt?

1. It is located in the subtropical high pressure cells.
2. It is under the influence of warm ocean currents.

Which of the statements given above is/are correct in this context?

A. 1 only

- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Mains Questions

- Q. Major hot deserts in the northern hemisphere are located between 20-30 degrees north and on the western side of the continents. Why?
- Q. "As regards the increasing rates of melting of Arctic ice, the interests of the Arctic Council nations may not coincide with those of the wider world. "Explain.
- Q. Why is India undertaking expeditions to Antarctica? Describe the influence of Antarctica and Antarctic ocean on the climate of India and on the nutrient and energy supply to the Indian Ocean.

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