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**Trewartha Climatic Classification**

The Trewartha climate classification is a climate classification system first published by American geographer Glenn Thomas Trewartha in 1966.

The Trewartha climate classification scheme is considered a modified version of the Koeppen system.

Besides being ‘simple and explanatory, Trewartha’s classification combines the basic fundamentals of the empirical as well as the genetic classification schemes.

Trewartha, while proposing his climatic classification, was conscious of the fact that the classification systems of Koeppen and ‘Thornthwaite being based on certain statistical parameters of certain weather elements were cumbersome and complex.

Trewartha recognized only a limited number of principal climatic types. He made use of the two most important and basic weather elements, i.e., temperature and precipitation as the basic for his own classification.

Besides these, the effects of land and water surfaces on the climate of an area have also been taken into consideration.

He has classified world climates in seven climatic groups out of which six-A, C, D, E, F, and H – are based on temperature criteria, and

Group A: Tropical climates

Group C: Subtropical climates

Group D: Temperate and continental climates

Group E: Boreal climates

Group F: Polar climates

Group H: Highland climates

the seventh- B – is the dry group based on precipitation.

Group B: Dry (arid and semi-arid) climates

Climatic Groups Based on Temperature Criteria

**Group A**

This is the tropical climate group. This type of climate is found in the low latitudes on each side of the equator in an irregular belt 20° to 40° wide. There is – no winter season in-this climatic-group. Temperature is uniformly high throughout the year with adequate annual rainfall. In marine areas, the average temperature for the coldest month is around 18°C to 20°G. This climatic group is subdivided into two climatic types: (i) Ar (ii) Aw

(i) Ar:

Ar. is a tropical wet climate. This type of climate is characterized by less than two dry months. The climate is under the influence of the intertropical convergence zone and the equatorial westerlies. The belt is distinguished by constant low pressure and is also known as the tropical rainforest.

(ii) Aw:

Aw is a tropical wet-and-dry climate. At the time of the low sun, two months are usually dry. The climatic regions are dominated by the dry trade winds or subtropical anticyclones. During the high sun period, the equatorial westerlies and intertropical convergence control the weather. The duration of the dry season is usually longer than that of the wet season. The temperature remains uniformly high in this type of climate.

**Group C**

This category encompasses sub­tropical climate with temperatures above 10 °C for only eight or more months. Frosts occur occasionally in continental parts, but the marine locations remain frostless, On the basis of the seasonal distribution of precipitation, the sub­tropical climate is further classified into two climatic types: (i) Cfw (ii) Cs

(i) Cfw:

Cfw. is a sub-tropical humid climate. This type of climate is found on the eastern side of continents. It has no distinct dry season and rains fall throughout the year. During the summer season, this type of climate comes under the influence of unstable air in the western end of a subtropical anticyclone. But & ring winter, the climate is influenced by temperate cyclones.

(ii) Cs:

Cs. is a sub-tropical dry summer climate. It is characterized by a moderate to scanty amount of precipitation. Winter is the rainy season, while summers are nearly or completely dry. This climate type represents a transition zone between the tropical dry climates towards the equator and the temperate climates towards the poles. The average annual precipitation is less than 890 mm (35 inches).

**Group D**

This group represents temperate climates. The climatic group is also known as the micro-thermal climatic type. The average temperature is around 10 °C for 4 to 8 months. This type of climate is found in the middle latitudes between the sub-tropical and boreal climates. The two types of climate that are included in the temperate group of humid climates are: (i) Do (ii) Dc

(i) Do:

Do. is temperate marine climate. With mild winters, the average temperature for all the 12 months is 0 °C or above. A humid climate with adequate precipitation at all seasons, it is found on the western windward side of the continents in the temperate zone.

(ii) Dc:

Dc. is a temperate continental climate found in the continental interiors of the middle-latitude continents. The climate is basically land-controlled. The climatic type is characterized by severe winters and summers. Annual temperature ranges are, therefore, high throughout this climate, Cold waves, heat waves, blizzards, and heavy downpours are all yearly events in this category, of climate. Precipitation occurs throughout the year with maximum concentration during summers.

**Group E**

The group represents sub-arctic or boreal climate found in the higher middle latitudes. Super-continental in temperate features, here the summers are short and comparatively cool. The winters are, however, long and very cold with a very short frost-free season. The average temperature hovers around 10 °C for one to three months during the year. The rest of the year has an average temperature below 10 °C. These regions are characterized by the lowest annual means of temperature for any part of the earth. Even though boreal climates are classified as humid, annual precipitation is comparatively very less. Precipitation occurs throughout the year, most during the warmer months when the amount of water vapour present in the air is highest. Because of the severity of climate, the population is sparse.

**Group F**

The group consists of polar climate found in the high latitudes. The climate is confined to the northern hemisphere only. The average temperature in this type of climate seldom exceeds -1O °C. There is no summer season. The polar climates are classified into the following two climatic types: (i) Ft,(ii) Fi

Ft. is Tundra climate found only in the northern hemisphere, where it occupies the coastal sides of the Arctic Ocean, and many Arctic islands and ice-free shores of northern Iceland and southern Greenland. No tundra climate is found in the southern hemisphere because of the complete absence of extensive land areas. The Tundra region, essentially a region of grasses, mosses, and lichen, is characterized by the absence of trees. The average temperature of the warmest month is recorded between 0 °C and 10 °C.

Fi. is an ice-cap climate in which the average temperature for all the months is below freezing. There is no vegetation of any kind. The land is permanently covered with ice and snow. The climate is exclusively confined to the ice-caps of Greenland and Antarctica.

**Group H**

The group represents highland climates in which altitude plays a role in determining climate classification. The temperature under normal conditions decreases with altitude, with the summit area of a mountain being always cooler than its base. Windward slopes force the incoming air to rise up with the resultant condensation, cloud formation, and precipitation. The leeward slopes are characterized by descending air which is warmed up and produces little precipitation. Trewartha says there is no such thing as a highland type of climate because various types of local climates exist in every significant mountain range. There are no typical temperature and rainfall regimes in the highland climates.

Climate Group based on Precipitation Criteria:

**Group B**

This group represents a dry climate. The boundaries of this type of climatic group are fixed by precipitation values. The characteristic feature of a dry climate is that the loss of moisture through evapotranspiration is far in excess of the annual water gain collected from precipitation. Because of clear and calm weather and the dry atmosphere, the dry climates are quite severe for their latitudes with large annual ranges of temperature. Precipitation is comparatively very low in this type of climatic group. Relative humidity, high potential evaporation, abundant sunshine, and small cloudiness are some of the common features of Group B classification.

They are further classified into two climatic groups.

BW: BW is an arid or desert type of climate.

BS: BS is a semi-arid or steppe type of classification.

BW and BS are further classified into the following subdivisions on the basis of temperature:

(a) BWh: BWh is tropical-subtropical hot deserts;

(b) BWK: BWK is temperate boreal cold deserts;

(c) BSh: BSh is tropical-boreal steppes; and

(d) BSk: BSk is temperate-boreal and cold.

The BWh and BWK climates are constantly dry and are under the influence of subtropical high and dry trades. The BWh type of condition lasts for 8 months or more with an average temperature over 10 °C while the BWK lasts fewer than 8 months with an average temperature above 10 °C.

The BSh is characterized by a short moist season and is greatly influenced by sub­tropical high and dry trades. The BSK type of climate receives most of its major annual precipitation during the warmer season.

**Trewartha Climatic Classification of India**

Trewartha’s classification of climate, which is a modified form of Koeppen’s scheme, corresponds with the vegetative, agricultural, and even geographical regions of India, in a fairly satisfactory manner. Four major climatic groups (A, B, C, and H) which are further subdivided into seven climatic types have been recognized.

They are as follows:

A: Tropical Rainy Climatic Group

Am—Tropical Monsoon

Aw—Tropical Savannah

B: Dry Climatic Group

BS—Tropical Steppe (semi-arid)

Bsh—Sub-Tropical Steppe

Bwh—Sub-Tropical Desert

C: Humid Mesothermal Climatic Group

Caw—Sub-Tropical Humid (Dry Winters)

H: Mountain Climate

The climatic letters A, B, C, and H stand for the major groups of climate and the other letters designate the sub-divisions of major groups.

A stands for the tropical rainy climate with persistently high temperature which is not less than 18° C in the coolest month.

B is a dry climate of those regions where the rate of evaporation is more than the moisture received from precipitation.

C represents humid sub-tropical or humid mesothermal climate.’ The temperature of the coldest month is between 18° C and 0° C.

a – indicates hot summers with the warmest month having over 22° C temperature.

h – is used when the mean annual temperature is 18° C.

m – stands for heavy but seasonal monsoon rainfall; the dry period is very short.

s – means steppe or semi-arid climate.

w – stands for a desert.

The tropical monsoon type of climate (Am) is found over the Western Ghats, western Nagaland, and Tripura. The mean maximum and minimum temperatures here are 27° C and 18° C respectively. This region receives an annual rainfall of 250 cm.

The tropical savannah climate (Aw) covers almost the whole of Deccan Plateau except a narrow strip of the rain-shadow area in the east of the Western Ghats, north-eastern Guajrat, southern Madhya Pradesh, southern Bihar, Orissa, Andhra Pradesh and Tamil Nadu. This region receives, and an annual rainfall of 100 cm and the mean maximum temperature here is 45° C and the mean minimum temperature is 18° C.

The tropical steppe (semi-arid) type of climate (BS) covers interior Karnataka, central Maharashtra, western Andhra Pradesh, and interior Tamil Nadu. This region receives an annual rainfall of less than 75 cm and the mean maximum and means minimum temperatures here are 32° C and 23° C respectively.

The sub-tropical steppe (Bsh) type covers an area from Punjab to Kachchh, which is characterized by an annual rainfall that fluctuates between 50 cm and 75 cm. The mean maximum and mean minimum temperatures here are 46° C and 6° to 10° C respectively.

The sub-tropical desert type of climate (Bwh) prevails over western Rajasthan and Kachchh. This area receives a low annual rainfall of 12.5 cm and the mean maximum and mean minimum temperatures here are 48° C and 12° C respectively.

The sub-tropical humid (dry winters) type of climate (Caw) covers the Punjab foothills, Uttar Pradesh, Bihar, West Bengal, Assam, and Arunachal Pradesh. The annual rainfall varies here from 62.5 cm in the plains to up to 250 cm in the east. The mean maximum and minimum temperatures here are 46° C and 10° C respectively.

The mountain type of climate (H) prevails in mountain areas of Kashmir and Arunachal Pradesh. The northern slopes receive a low rainfall of 8-10 cm annually due to the rain-shadow effect, while the southern slopes receive 250 cm rainfall. The mean maximum temperatures vary between 10° C and 15° C and the mean minimum temperatures go below zero.

