**Classification of Dry areas**

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**Major classification systems**

The word arid implies a deficiency of rainfall as the basic characteristic of a dry climate. Hence, the earliest attempts to classify dry climates were generally based on the annual amounts of rainfall. However, the amount of rainfall in dry regions cannot serve as an adequate measure of aridity unless it is related to its effectiveness, which in turn depends on many factors.

Classification of dry climates by various workers has been based on indices that range from simple combinations of precipitation with temperature, with evaporation, with relative humidity; on length of dry season or growing season; and on types of vegetation.

**The Koppen system of climates** (Koppen and Geiger, 1936)

Koppen considered vegetation to be the best expression of the totality of a climate; his criteria for determining climatic boundaries were suggested with vegetation units in mind (Meher-Homji, 1980). This is the best known system, and has gained wide acceptance because it is based on relatively simple values that can be measured or estimated with sufficient accuracy in most regions of the world, namely rainfall (amount and distribution) and temperature.

Koppen first defines five major categories of world climate, of which one only - comprising those regions in which the average precipitation is deficient in relation to evaporation - is termed dry. The dry climates are subdivided into deserts (or arid climates), in which rainfall is insufficient for arable crop production, and steppes (semi-arid climates), in which rainfall is sufficient for certain types of crops when adequate management techniques are adopted and grasses constitute an important element of the native vegetation.

**De Martonne De Martonne (1962)**

Attempted to find an empirical relationship between precipitation and temperature, that would enable a more accurate and general definition of dry climates. This relationship is expressed in his 'aridity index", which can refer to a selected period of a few days, a month, a season, or an entire year,

**Equation I = np/ t+10**

where /is the aridity index, n is the number of rainy days. is the mean precipitation per day, and t is the mean temperature of the selected period in °C.? When calculated on an annual basis, 7<20 is characteristic of an arid climate and 20</<30 defines a semi-arid climate.

**Gaussen Gaussen (1954),**

from studies of natural vegetation, developed a classification of climates based on the number of arid months in a year. A month is considered arid if p<2t, where p = mean monthly precipitation (cm) and t - mean monthly temperature (°C). This classification gave good results when applied to Mediterranean climates, but was found less satisfactory when applied on a worldwide scale (Wallen, 1966).

**Thornthwaite Thornthwaite (1948)**

improved on Martonne's approach by introducing the water balance concept in his classification system. He based his classification of climate on two elements: (a) water supply in the form of precipitation, and (b) water needs resulting from evapotranspiration. Precipitation and evapotranspiration are due to different meteorological causes and may be markedly different from each other both in quantity and in seasonal distribution. In principle, Thornthwaite defines a climate as moist when precipitation exceeds evapotranspiration; a dry climate occurs where evapotranspiration is markedly in excess of precipitation.

Thornthwaite further differentiates between actual evapotranspiration, which in an arid climate may be very low simply because the moisture supply is limited, and potential evapotranspiration, or 'water need', which is the amount of water that would be transpired and evaporated under ideal conditions of soil moisture and vegetative cover.