

## 6. Tropical Evergreen Rainforest Biome

**Location and Extent :** The evergreen rainforest biome extends between 10°N and 10°S latitudes. The maximum development of this biome is found in Amazon Basin (South America), Congo Basin (Africa) and Indo-Malaysian region. The biome corresponds with the equatorial climatic region.

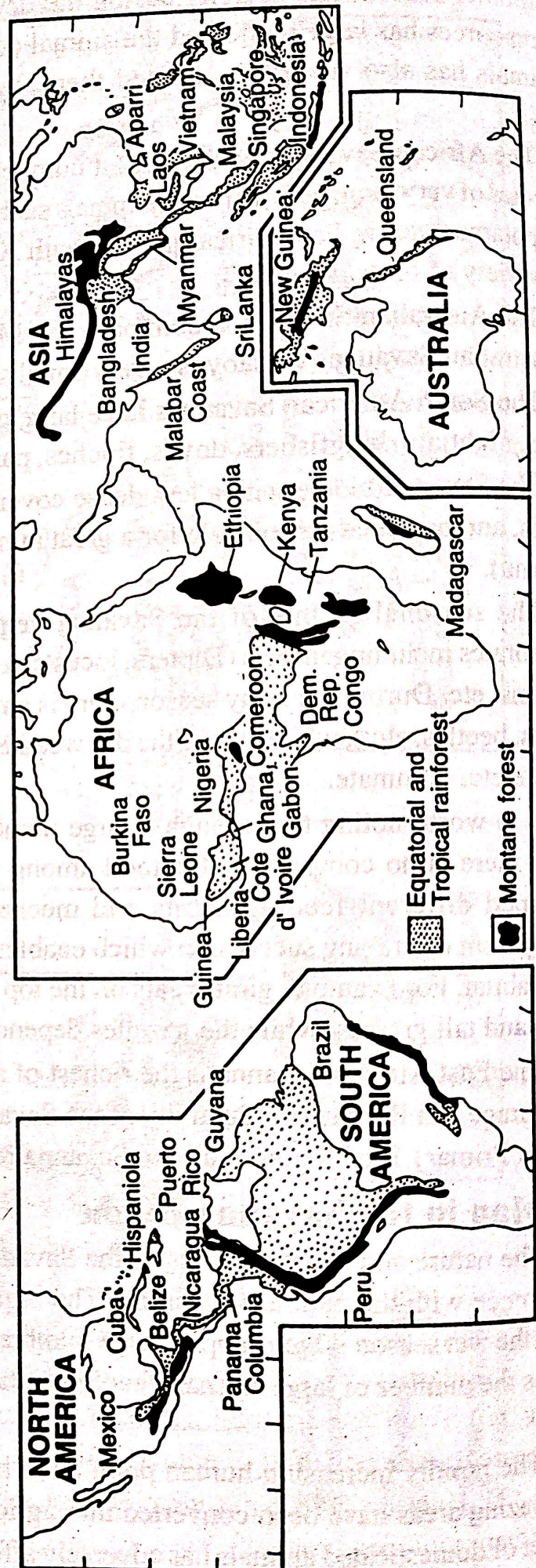
**Climate :** The biome receives an average annual rainfall of about 2000 mm or more., which occurs throughout the year except for two or three months. The rainfall is convectional type which normally occurs in the afternoon. High temperatures prevail throughout the year. Annual range of temperature is around 1°C, however, the daily range of temperature varies between 5°-10°C.

**Vegetation :** The tropical evergreen rainforest biome has the largest number of plant species. Much variation occurs in the composition of plant species. In Western Africa, 6000-7000 species of flowering plants are found, while Malaysia has 20,000 species of flowering plants and Brazil has as many as 40,000.

Trees, comprising 70% of the total plants species are the dominant members of the tropical evergreen forests. 40 to 100 species of trees are observed in just one hectare of land. Creepers or Climbers, belonging to the category of vines, form the second most important members of the rainforests. These climbers bind several trees and plants together and, as such, the forests become inaccessible.

Climbers may be divided into three major types :

- (i) Climbers of the lower strata of the forests, and
- (ii) Long woody climbers known as 'Lianas', found in all strata of the forests. The Lianas are the most significant members of the climbers.





(iii) Epiphytes which do not have their roots on the ground surface, these are developed on the trunks, stems, branches and leaves of trees, shrubs, and herbs.

It is to be pointed out that because of a thick canopy of trees, covered by climbers and creepers, the underlying areas of the tree canopy receive very little sunlight, and there is almost complete absence of sunlight on the ground stratum. A dense undercover of shrubs, herbaceous plants and climbers, makes these forest impenetrable.

**Vertical Stratification :** According to Furley and Newey (1983), 'Stratification results from competition between species for favourable locations which, in turn, exerts control over micro-climate and other factors affecting the habitats of plants and animals.' From the ground surface to the uppermost canopy, the tropical evergreen forests reveal five layers (strata), of which three uppermost layers consist of trees.

(i) **First (Top) layer** is represented by the uppermost canopy of the tallest trees of the forests. It forms an umbrella. The height of this layer ranges between 30-60 m. It is also called 'Dominant layer'.

(ii) **Second layer** is formed below the uppermost layer of the forest canopy at the height 25-30 m. It is called the 'Second Dominant Layer.'

(iii) **Third layer** is formed of lower and smaller trees whose crown are formed of the height of 15-20 m above the ground surface.

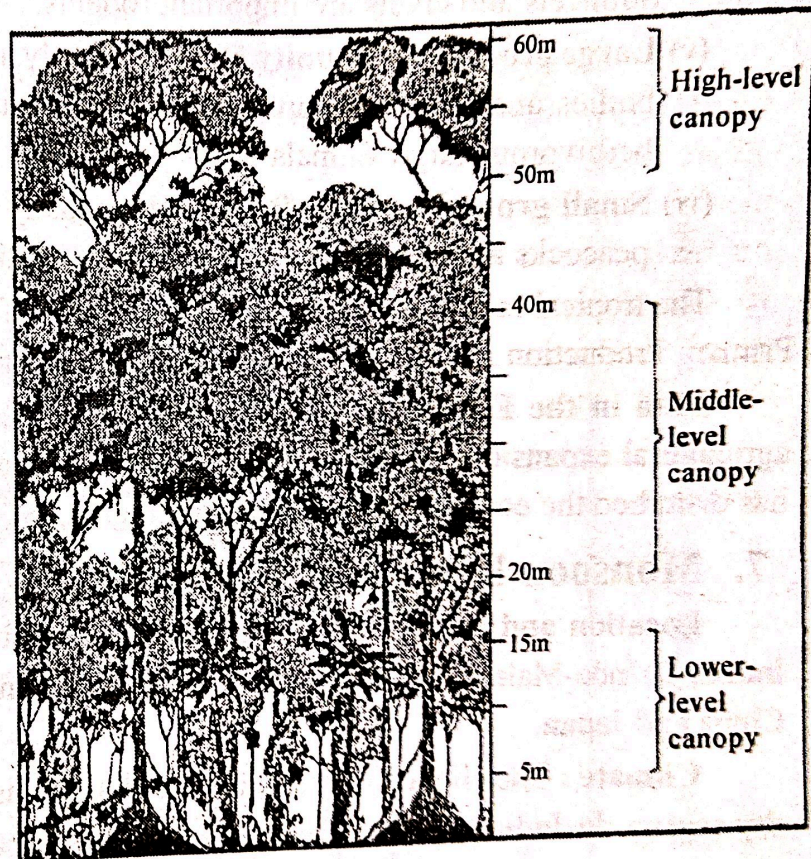
(iv) **Fourth layer** consists of shrubs, which is fragmented and sporadic in nature. It also includes some dwarf or stunted plants and trees of less than 5 m. height. The crown of this layer usually lies 5 m. above the ground surface.

(v) **Fifth (Ground) layer** represents the plants growing at the ground surface. It is hardly one or two metres in height, and is dominated by herbaceous plants and fern.

**Animals :** The rainforest biome exhibits unique characteristics of animals : (i) The animals of this biome are least mobile as they do not have to migrate for food, which is in abundant supply in this biome. (ii) There are different species of animals living in the various. Vertical strata of the forests. Therefore, the forest is full of animal activities throughout day and night.

J.L. Harison (1962) has identified the following six types of animal communities in the tropical evergreen rainforest biome :

(i) **Upper air community** occupying the upper surface of the canopy, is dominated by insectivorous



**Fig. 10.7 : Vertical stratification of the tropical evergreen rainforests**



birds and bats. A few carnivorous species also occur here. Asian falconet, swifts, swiftlet, etc. are the fast flying species of birds.

- (ii) **Main canopy community** includes those birds and bats which live in the canopy of the tallest trees. Toucans, parakeets, barbets, cotingas, curassows, bill birds, etc. are such species of animals in the Amazonian rainforests. A few mammals, such as squirrels and monkeys are also found.
- (iii) **Middle Zone flying community** includes mostly flying birds and bats.
- (iv) **Middle Zone climbing community** includes both carnivorous and herbivorous animals. Squirrels and civets are important rodents.
- (v) **Large ground community** includes mostly animals and some birds. These animals have large bodies and, as such, cannot climb. Elephants, mouse deer and cassowaries are important herbivorous large animals.
- (vi) **Small ground community** includes mostly insectivorous animals, such as Argus pheasant, peacocks and numerous types of fowl such as Guinea fowl.

The tropical rainforests possess the highest (40%) Net Primary Productivity of the World. The Net Primary Production is 5000 dry grams per square metre per year.

**Man in the Equatorial Rainforest Biome :** Large scale deforestation, mining, industrial and agricultural expansion, etc. have caused much damage to this biome. The removal of rich forest cover has disturbed the ecological balance of the region.

## 7. Monsoon Deciduous Forest Biome

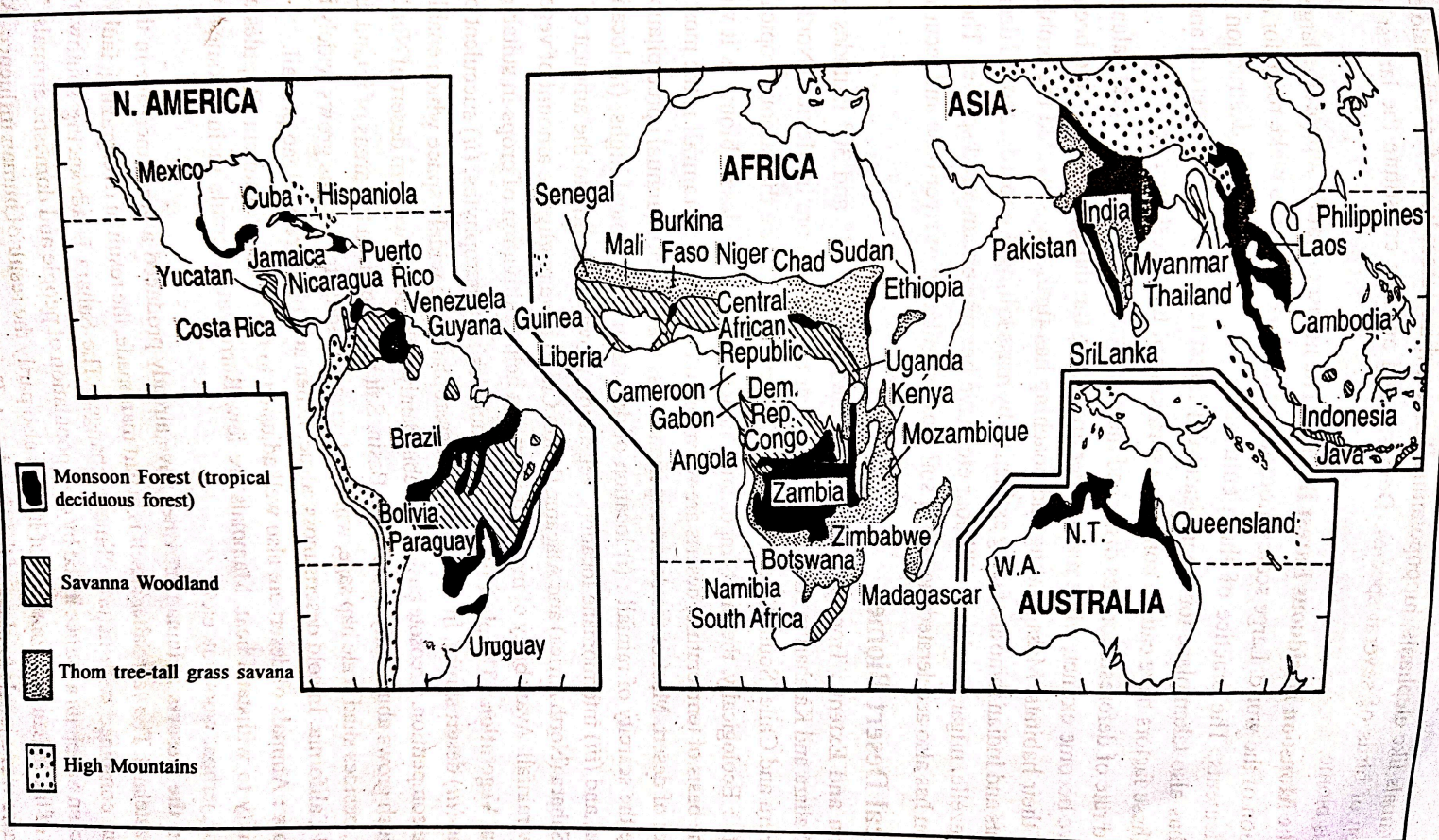
**Location and Extent :** There are three major areas of tropical deciduous forest biome : (i) West Indies, (ii) Indo-Malaysian zone, and (iii) East Africa found in southern Brazil, Madagascar, Taiwan, southern China and Japan.

**Climate :** The climate of this biome is characterised by two distinct seasons, *i.e.* moist season, and dry season. In India there are three main seasons in a year : (i) dry warm summer season, (ii) warm humid season, and (iii) dry winter season. The average summer temperature ranges between 27°C-32°C, although the maximum temperature soar to 48°C during May and June. The average temperature during the winter season ranges between 10°C and 27°C. The mean annual rainfall is around 1500 mm, which exhibits much spatial and temporal variations. More than 80% of the annual rainfall occurs within three wet months of July, August and September. Winters receive a low rainfall in some areas. The seasonal regime of monsoon rainfall gives deciduous character to vegetation when trees shed their leaves during dry season (between winter and summer).

**Vegetation :** Most of the trees are deciduous while the shrubs are evergreen. These forests are less dense than the tropical rainforests. Their height ranges between 12-30 m. Four strata (layers) are observed in the vertical structure of these forests. The upper most and the second strata consists of trees, the third layer is formed by shrubs, while the fourth (ground) layer consists of herbaceous plants. Besides, there are numerous climbers mainly Lianas and Epiphytes. Sal, bamboo, shisham, teak, etc. are the major species of trees.

**Animals :** The seasonal character and density of vegetation has determined the seasonal behaviour of animals, their breeding and migration. The animals of this biome range from micro-organism to very







large bodied animals like elephants, hippopotamus, horses, rhinoceros, lions, forest buffalo etc., and a large population of birds of several species. Domesticated animals constitute the largest number of mammals in this biome.

**Man in the Monsoon Deciduous Forest Biome :** The monsoon lands support the largest number human population of the world. Large scale deforestation has taken place to make room for agricultural lands and settlements. The practice of Jhum cultivation has caused further destruction of forests. Deforestation has also taken place for the utilisation of forest resources for commercial and industrial purposes. All these factors have caused continued shrinking of the forest area.

The rapid rate of deforestation has disturbed the ecological balance, as several valuable species of animals have become extinct, while many other are facing the danger of extinction because of the destruction of their habitats. Mass hunting and poaching has further aggravated the problem. Lions, tigers, elephants and Indian rhino are facing extinction by mass killing. Leopards, spotted deer, sambhar deer, Indian gazelle, nilgai, antelope, wild boar etc. have become endangered species. The rapid rate of deforestation has also accelerated the rate of soil erosion, siltation of river base and recurrent floods.

## 8. Tropical Desert Biome

**Location and Extent :** Tropical deserts are located between  $15^{\circ}$  and  $30^{\circ}$  latitudes in both the hemisphere. Sahara and Kalahari in Africa, Arab and Thar in Asia, Sonora in Mexico (North America), Atacama in Peru and Chile (South America) and Victoria in Australia are the famous tropical deserts.

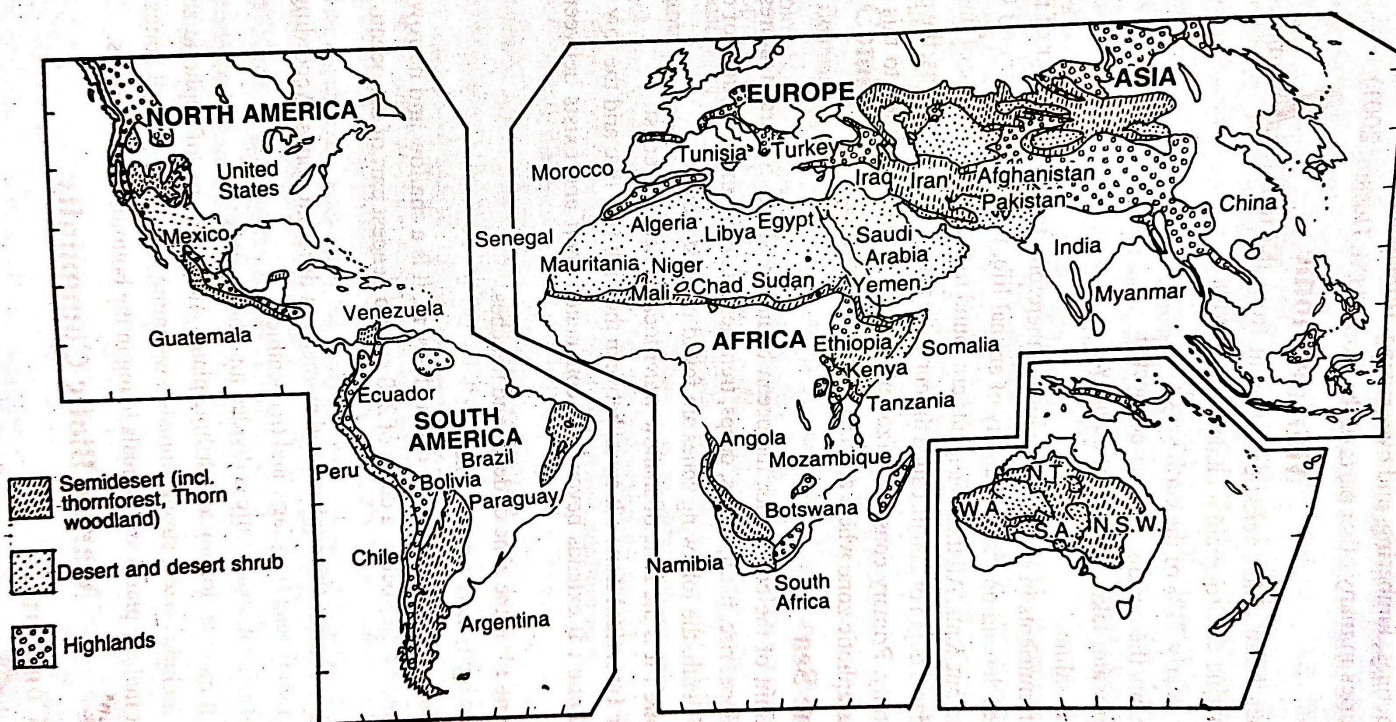
**Climate :** Ecologically, the most important characteristic of the desert biome is its wide spread aridity. On the basis of temperature, deserts are warm or cold. Scarcity of rainfall is the most important characteristics of desert. Most of the desert experience less than 25 cm. (annual) precipitation. Several factors cause the scarcity of rainfall : (i) location of deserts in sub tropical highs, (ii) location in rain shadow areas, and (iii) intermontane location. Vegetation grows according to the amount of rainfall in the deserts. Sahara (North Africa) and Atacama (North Chile) have negligible amount of vegetation due to a very low rainfall. Availability of means of irrigation helps cultivation of crops in suitable areas.

**Natural Vegetation :** The plant life in desert includes : (i) therophytes, (ii) succulent plants such as cactus, and (iii) desert shrubs. It is notable that desert plants are widely spaced which enables them to survive in the competition. Creosote bush grows abundantly in the south-western desert of North America, while sage bush grows abundantly in the Great Basin. Salt bush occurs in the areas of inland drainage, in alkaline soil, besides shadscale, sage, winter fat, grease wood, etc. (cactus grows widely in Mexico, Arizona and California. In cold deserts moss, algae, lichen and blue green algae prevail.

**Animals :** Animals of desert are also well adjusted to the arid environment. Reptiles and insects have the ability to withstand heat. Mammals are few. Burrowing animals include kangaroo, mouse, pocket mouse, jerboa, wood rat, etc.

**Man in the Deserts :** Human activities have already produced a great increase in the spread of desert and wasteland. The vast Sahara itself is in part man-made, the result of overgrazing, faulty irrigation, deforestation, combined with natural climatic changes. The Sahara is advancing southward into the drought stricken Sahel, its advance aided by over population of people and domestic animals. "The great Thar Desert of the Indian Sub continent of India is also partly the result of human influence. About 3000 years ago, there was a jungle in place of the Thar desert. The spread of the desert has been aggravated by







poor cultivation practices, lumbering, and overgrazing. Human activities could lead to repetition of the Sahara and Thar stories in many other parts of the world.” (M. Husain, 2001)