Lesson - 13

Rajasthan : Climate, Vegetation and Soils

CLIMATE

Climate is an important geographical factor which not only influences the natural elements but also affects the economic and demographic aspects. The average weather conditions of a large area taken for a long period (for more than thirty years) is known as climate of that region whereas the sum of atmospheric conditions of a place at a particular time is called as the weather of that place. Temperature, atmospheric pressure, winds, rainfall, duration of the day etc. are the elements of climate. Temperature is the basic component of climate because other elements of climate are directly or indirectly associated with temperature. The world has been divided into torrid, temperate and frigid zones on the basis of temperature. Similarly, rainfall pattern is the fundamental element in the determination of climatic regions. The humid, sub-humid and dry climatic categories are based on it.

The climate of Rajasthan varies from dry to sub-humid monsoon type. The dry climate full of high daily and annual range of temperature, low rainfall, hot scorching Loo and sand storms are the climatic characteristics of western Rajasthan whereas comparatively low temperatures, low range of temperature and slightly higher rainfall are the characteristics of sub-humid climate to the east of the Aravallis. Latitudinal location, distance from sea, altitude above sea level, location and direction of Aravallis, soil structure and vegetative cover are the major factors which affect its climate.

Climatic Characteristics of Rajasthan

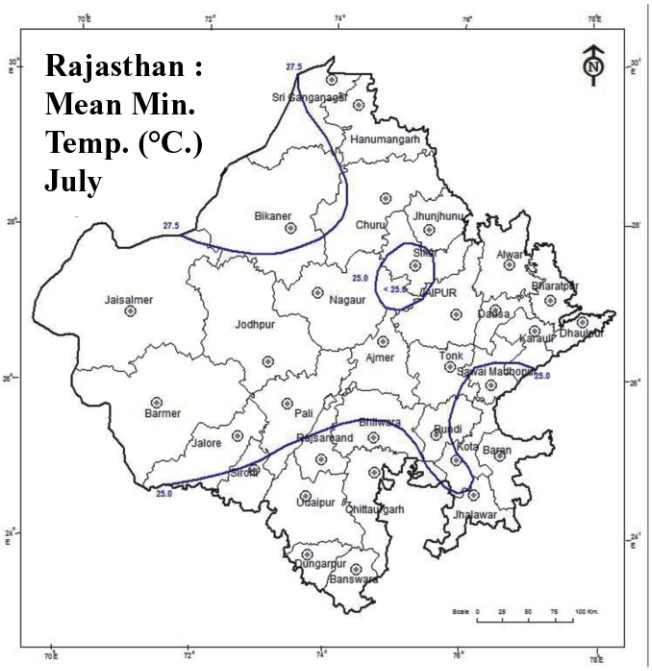
1. Rajasthan enjoys dry and sub-humid monsoon type of climate.
2. The distribution of rainfall is highly unequal.
3. The daily and annual range of temperature remain high due to abundance of sand.
4. The maximum daily temperature touches the mark of 49°C in summer season.
5. The hot, dry and stormy Loo blows in summer season.
6. At some places the temperature falls to freezing point in winter season.
7. Maximum rainfall occurs in rainy season. The quantity of rainfall decreases from east to west and south to north.
8. Droughts and famines are frequent here. It is an proverbial saying about the extension of famine that the legs of famine spread upto Poongal (a place of Bikaner), main body spreads is Kotre (Marwar), stomach at Bikaner, strayed occurrence at Jodhpur and permanent in Jaisalmer. It is quoted here - Pag Poogal, Dhad Kotre, Udraj Bikaner, Bhulyo-Chukyo Jodhpur, Thano Jaisalmer.

Seasons of Rajasthan

The twelve months period can be divided into three main seasons in Rajasthan –

(a) Summer season (March to Mid June)
(b) Rainy season (Mid June to September)
(c) Winter season (October to February)

(A) Summer Season (March to Mid June) – With the advancement of the sun towards Tropic



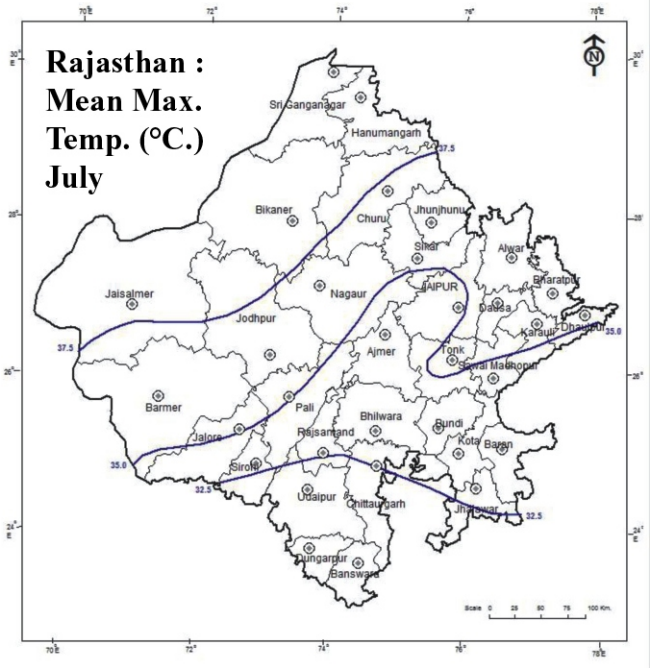
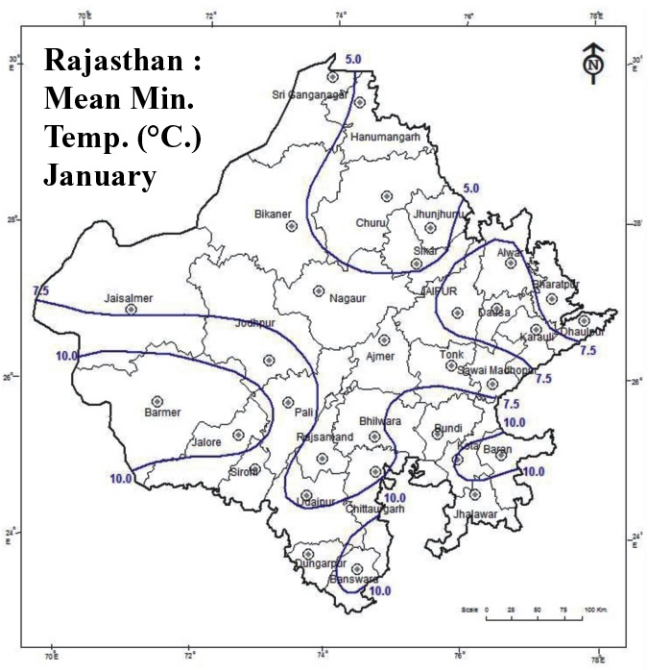


Fig. 13.1 : Rajasthan : Temperature (July)



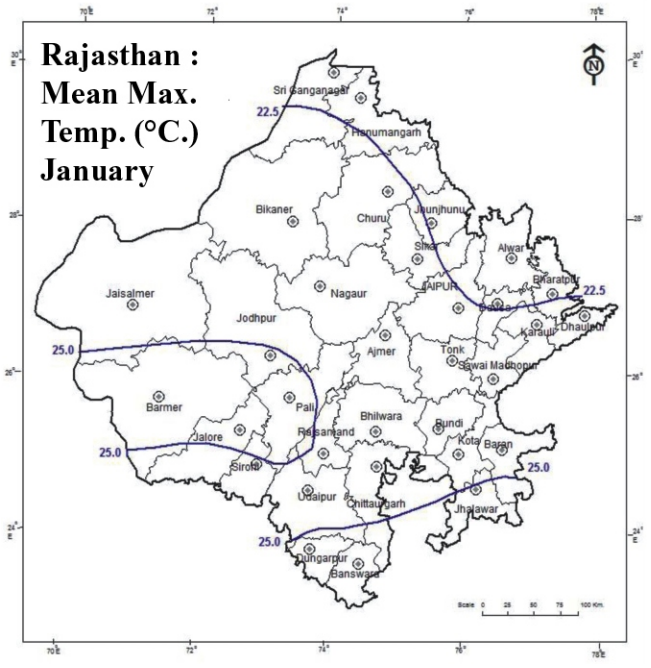


Fig. 13.2 : Rajasthan : Temperature (January)

of Cancer in northern hemisphere in March, temperatures begin to rise (Fig. 13.1). The sun shines vertically in the month of June over the Tropic of Cancer which passes through the southern part of the state. The average temperature remains between 30°C to 36°C in most of the state due to dry, sandy soil. At some places, day temperatures may go up to 48°C. Days are extremely hot. Body starts parching. Fierce loo and sand storms are frequent. Loo is a hot and dry wind. Nights are pleasant. Humidity is also considerably reduced. The climatic extremities are lower in the eastern Rajasthan as compared to the west.

(B) Rainy Season (Mid June to September) – Whole of the state is heated by mid June resulting into the reversal of pressure and wind

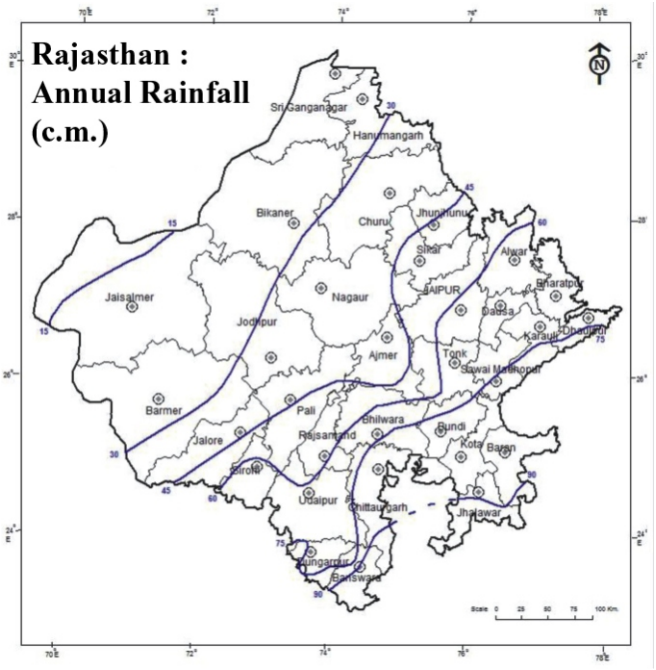


Fig. 13.3 : Rajasthan : Annual Rainfall

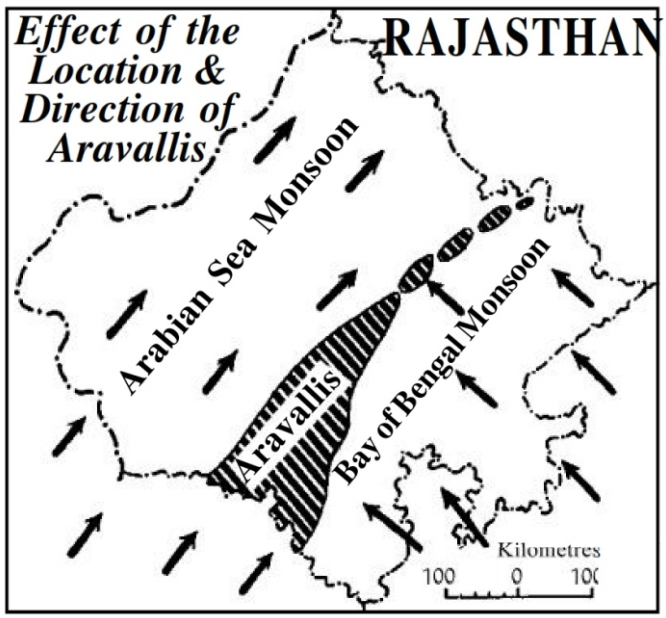


Fig. 13.4 : Rajasthan : Effect of the Location and Direction of Aravallis

direction. Monsoon reaches Rajasthan by the end of June or beginning of July. It receives rainfall by both - the Arabian Sea branch and Bay of Bengal branch. Bay of Bengal branch of monsoon is more effective in the north, east and south-eastern Rajasthan due to the specific location of the Aravallis. It is clear from Fig. 13.2, showing the distribution of rainfall, that 50 cms. isohyet line divides the state into two parts. Arid and semi-arid desert lies to the west of the line. The rainfall ranges between 50 to 100 cms. to the east of Aravallis (Fig. 13.3). Most of the rain of the state falls in this season. The rainfall decreases from east to west and south to north in the state. The overall average of rainfall of the state 52.37 cms.

The factors that are responsible for the low rainfall despite the fact that both the branches of monsoon reach the state are as follows –

1. The extension of Aravallis is parallel to Arabian Sea branch of monsoon which escapes northwards without providing much rain in the state. This fact is shown in Fig. 13.4.

2. Moisture is considerably reduced in Bay of Bengal branch of monsoon by the time it reaches in Rajasthan.

3. Low height and lack of vegetation on Aravallis are also responsible for low rainfall in the state. The southern part of the state receives more than 100 cms. rainfall due to higher elevation and dense vegetative cover.

(C) Winter Season (October to February)–

According to the Meteorological Department of Government of Bharat, winter season is divided into two parts -

1. Autumn season or Retreating monsoon period (October to Mid December), and

2. Dry winter season (Mid December to February).

1. Retreating Monsoon Period (Autumn Season) – Monsoon winds begin to retreat because lower pressure over land fades out and due to rise in temperature in Indian Ocean, low pressure develops there. Due to high temperature and high humidity in September and October sultriness prevails. The maximum and minimum temperature by the end of October remains at 35°C and 20°C respectively. This is the period of retreating monsoon. The winds are calm, very light and very unstable during this period.

2. Dry Winter Season – The commencement of actual winter season in the state occurs in December because sun shines vertically over Tropic of Capricorn in the southern hemisphere. North-westerly cold winds begin to blow in the state. Light rainfall occurs twice or

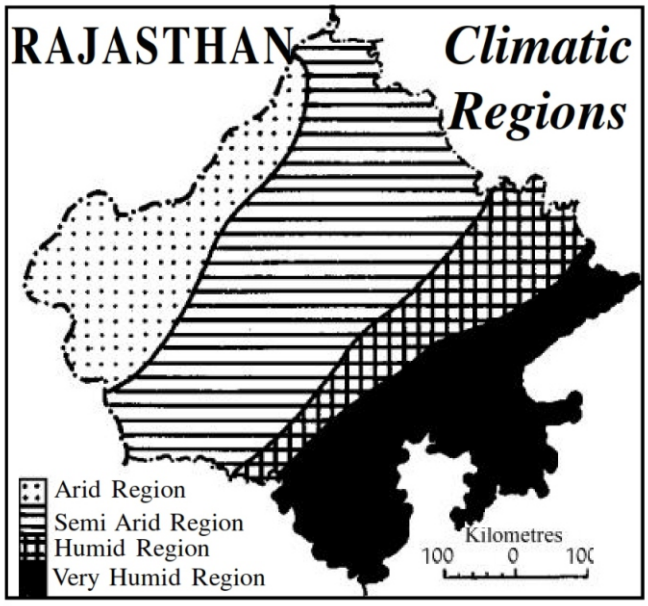


Fig. 13.5 : Rajasthan : Climatic Regions

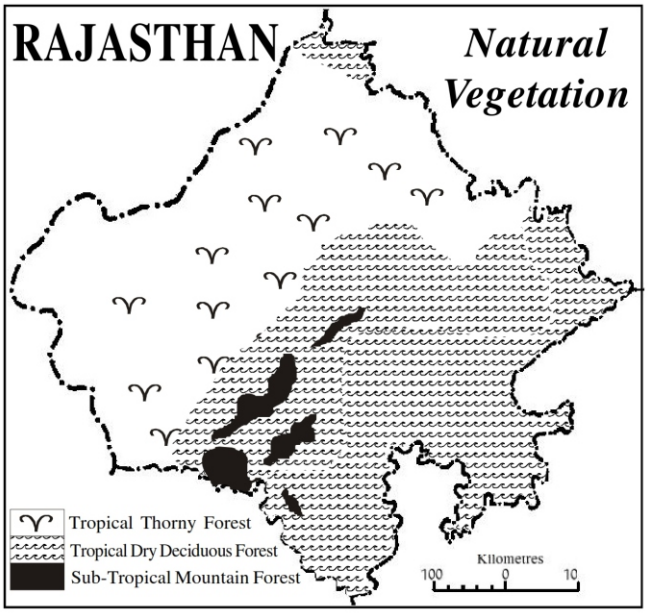


Fig. 13.6 : Rajasthan : Natural Vegetation

thrice in the state by temprature cyclones coming from west in December-January and is known as **Mawat**. This rainfall is a boon to rabi crop. It is clear from Fig. 13.2 that the temperatures are less than 10°C in northern Rajasthan in January and it remains around 20°C in Hadauti area. The average temperatures in the remaining Rajasthan ranges between 10° to 20°C. The state comes in the grip of cold wave, and temperature falls below freezing point at many places due to snowfall in Himalayan region.

Climatic Regions

Rajasthan can be divided into four major climatic regions on the basis of temperature and rainfall (Fig. 13.5) –

1. Arid Region – It is also known as desert region. Hot and dry climatic conditions prevail in the region. The maximum temperature ranges between 45° to 49°C in summer season in this region and minimum temperature in winter season ranges between 0° to 8°C. Rainfall average is below 25 cms. Dust storms are frequent in summer season due to abundance of sand. High daily and annual range of temperature is the characteristic of this area. This type of climate is found in Jaisalmer, Barmer and Bikaner.

2. Semi Arid Region – It extends between western part of Aravallis and the arid climatic region. Annual rainfall averages between 25 to 45 centimetres in the region. Summer temperature varies between 36° to 42°C and winter temperatures between 10° to 17°C.

3. Humid Climatic Region – The region receives 50 to 75 cms. of rainfall. Summer temperature varies between 32°C to 34°C and winter temperature between 12° to 18°C. The region encompasses the districts of Alwar, Bharatpur, Dholpur, Sawai Madhopur, Tonk, Bundi, Rajsamand and northern part of Chittorgarh.

4. Very Humid Climate Region – The region receives more than 75 cms. of rainfall. It covers the districts of Kota, Baran, Jhalawar, Banswara, Dungarpur, Sirohi, Udaipur and southern part of Chittorgarh. Monsoon remains most active in this region.

NATURAL VEGETATION

Natural vegetation and forests play an important role in maintaining the environmental and ecological balance. Forests ameliorate local weather conditions, check soil erosion, regulate river flow and provide raw materials for various industries. Forests provide livelihood to many communities and recreational opportunities are provided. Forests minimize the velocity of storms. Forests provide industrial wood, wood for building materials, fuel wood, fodder and many useful and valuable products. Forests provide natural

environment for wild life. Description of the importance of forests is also found in our ancient religious treatise. There had been age-old tradition of worshiping trees as God. But it is regrettable that man has exploited and destroyed forests cruelly in the modern period.

Distribution of Forests

The forest cover in Rajasthan is very thin in comparison to the other states of Bharat because of its physical and climatic conditions

According to the National Forest Policy (1988), about one-third forest cover is required to conserve lively ecosystem whereas the percentage is 24.39 for Bharat and only 9.57 for Rajasthan. The dense forest coverage is found only on 3.83 percent area of Rajasthan. Per capita forest cover in Rajasthan is only 0.03 hectare which is very small in comparison to 0.13 hectare in Bharat. There are large variations in the geographical distribution of forests in Rajasthan (Fig. 13.6).

Dense forest cover in Rajasthan is concentrated mainly in the districts of Sirohi, Banswara, Dungarpur, Udaipur, Rajsamand, Chittorgarh, Jhalawar, Kota, Bundi, Sawai Madhopur and Alwar. More than 20% area of these districts is forested. Dry and desert districts of Churu, Nagaur, Jodhpur, Jaisalmer, Barmer etc. have less than 2 percent of their area under forest cover. Sirohi has the maximum forest coverage (31%) and minimum is in Churu (0.05%), and Jaisalmer is devoid of vegetation. Only thorny bushes and sevan grass is found in Jaisalmer. Now greenery is increasing here with the availability of water by Indira Gandhi Canal.

Types of Forests

The following types of forests are found in Rajasthan due to variations of relief features, climate and soils –

1, Tropical Thorny Forests,
2. Tropical Dry Deciduous Forests, and
3. Sub-Tropical Mountain Forests.

1. Tropical Thorny Forests – These forests are found in western arid and semi-arid regions especially in the districts of Jaisalmer, Barmer, Jodhpur, Pali, Bikaner, Churu, Nagaur, Sikar, Jhunjhunu etc. Trees are dwarf in these forests with preponderance of stunted bushes. Khejari, Rohida, Ber, Ker, Thor trees etc. and a few bushes grow in these forests. Their roots are long and leaves are thorny. **Khejri** is known as the **Kalp Vriksha** of desert due to its tremendous utility in the desert.

A number of bushes are also found in these forests. Foag, Akra, Ker, Lana, Arna and Jharber are the main bushes of this region. Besides, different types of grasses are also found in the region. Amongst these, **sevan** and **dhaman** grasses are very famous. Dhaman grass is very nutritive and useful for dairy cattle whereas sevan grass is nutritive for all animals.

2. Tropical Dry Deciduous Forests – These forests cover a huge area in Rajasthan (Fig. 13.6). These are found in the areas of 50 to 100 centimetre rainfall. Following varieties of trees are found in these forests –

(i) Dry Teak Forests – These forests are found in the areas ranging in elevation from 250 to 450 metres above M.S.L. These forests are so named because of abundance of teak trees. These forests are found in the district of Udaipur, Dungarpur, Jhalawar, Chittorgarh and Baran. Of the total forests, share of teak trees ranges from 50 to 75 percent. Besides, Tendu, Dhawara, Gurjan, Godal, Siris, Haldu, Kher, Semal, Reetha, Baheda and Imali trees are also found in these forests.

The teak trees cannot bear severe cold or frost, therefore, their concentration is in the southern areas of Rajasthan. Teak wood is very useful for making agricultural implements and building materials.

(ii) Salar Forests – These forests are found in the hills rising to more than 450 metres. These forests are prevalent in the districts of Udaipur, Rajsamand, Chittorgarh, Sirohi, Pali, Ajmer, Jaipur, Alwar and Sikar. The main trees of these forests are Salar, Dhok, Kathira and Dhavar. Salar tree is a good source of gum. Its wood is used for packing. Dominance of Salar trees has earned it the name of Salar forests.

(iii) Bamboo Forests – Due to the abundance of bamboo trees these forests are known as bamboo forests. These forests are found in the areas of abundant rainfall in Rajasthan. These forests are prevalent in the districts of Banswara, Chittorgah, Udaipur, Baran, Kota and Sirohi. Banswara has earned its name from the abundance

of bamboo trees. Dhawara, Teak, Dhokra etc. are also found in these forests.

(iv) Dhokra Forests – The Dhokra forests are found in a very large area of Rajasthan. Except that of the desert, geographical environment of all the areas of Rajasthan are favourable for dhokra trees. Therefore, it is found extensively in the state. These are more prominent at the height ranging from 240 to 760 metres in Rajasthan. These are more prevalent in the districts of Kota, Bundi, Sawai Madhopur, Jaipur, Alwar, Ajmer, Udaipur, Rajsamand and Chittorgarh. Dhokra is also known as **Dhok** in Rajasthan. These forests are included in the chief forest wealth of the state.

The trees of Arunj, Kher, Khirni, Salar, Godal are also found in addition to Dhok trees in these forests. Palash trees are prominent companions of Dhok in hilly and foot-hill areas. Occasional companions are Jharber and Adusa. The dhok wood is very durable. Coal is prepared by burning it.

(v) Palash Forests – These forests are found on hard and rocky surfaced. These trees are more prominent on plateau surfaces surrounded by hills. These forests are also prevalent in the stony plains and in those areas where the soil is hard. Companions of Palash are Jharber, Kankeri, Hingota, Harjan and Arunj trees. These forests are found in the districts of Alwar, Ajmer, Pali, Sirohi, Udaipur, Rajsamand and Chittorgarh.

(vi) Kher Forests – These forests are found in the southern plateau area of Rajasthan, covering Jhalawar, Kota, Baran, Chittorgarh and Sawai Madhopur districts. Bel, Dhokra and Arunj are also found with Kher trees.

(vii) Babool Forests – These forests are found in the districts of Ganganagar, Bikaner, Nagaur, Jalore, Alwar, Bharatpur etc. Their cover is thinner where surface moisture is low and denser in higher moisture areas. Neem, Hingota, Arunj, Ker and Jharber are also found with Babul trees.

(viii) Mixed Deciduous Forests – These forests are found in the southern hills of Rajasthan, covering the districts of Sirohi, Udaipur, Rajsamand, Chittorgarh, Kota and Baran. None of the tree is prominent in these forests. All kinds of trees are found in them. Main trees are Amla, Rosewood (Sheesham), Salar, Tendu, Amaltash, Rohan, Karanj, Gular, Jamun, Arjun etc.

3. Sub-Tropical Mountain Forest – These forests are found only in Mount Abu area. These include evergreen and semi-evergreen vegetation. Greenery continues throughout the year due to dense vegetation. Mango, Bamboo, Neem, Teak trees etc. are found in these forests. These forests are found in less than 0.5% of the total forested area of Rajasthan.

Administrative Classification of Forests

The forest resources of Rajasthan have been divided into three divisions on the basis of administrative set-up.

1. Reserved Forests – These are state-owned forests in which cutting of trees and grazing is prohibited. These forests cover 38 percent of the total forest area of the state.

2. Protected Forests – These forests are also under government control. Tree cutting and grazing may be done with permission. These forests are found on 51 percent part of the total forested area of the state.

3. Unclassified Forests – There is no government control on tree cutting and grazing in these forests. The remaining 11 percent forested area of the state comes into this category.

Now the aforesaid classification has been replaced by a new classification. The detailed description of which is given on pages 81-82 of this book.

Importance of Forests for Rajasthan

Forests are very important for environment and human society. According to the Forest Policy of 1952 of Government of Bharat, 33 percent area of the country should be devoted to forest. Of this, 65% should be in hilly areas and 20% in plain areas. On this scale, forest cover in Rajasthan is very limited. Hence all efforts should be made for its expansion. There are direct and indirect advantages of forests.

Direct Advantages of Forests – Wood for fuel and building materials, and bamboos etc. are obtained from forests. Besides, honey, wax, catechu, gum etc. are also obtained. Tendu leaves are used in Bidi industry. Many nutritive fruits like mango, jambu (Jamun), mulberry, amla, timru, corinda (Karonda), khirni, custard apple (Sitafal) etc. are obtained from forests. Forests provide fragrant grasses which are used for extracting

fragrant oil and scent. Khas grass is very useful for keeping rooms cool and fragrant. Many herbal plants are obtained from forests. These are used for preparing Ayurvedic medicines.

Indirect Advantages of Forests – Forests also yield many indirect benefits which cannot be evaluated in terms of money. They help in providing rainfall by attracting monsoons, checking the velocity of storms, keeping summer temperatures mild, checking soil erosion, enhancing beauty of natural scenery, patronizing wild life, maintaining environmental equilibrium and providing oxygen. Forests promote aesthetic sense and positivism of thoughts in the society.

Due to so many benefits of forests, tree plantation is considered to be the holy task in Bhartiya scriptures. Nurturing a tree is also a saintly task.

SOILS

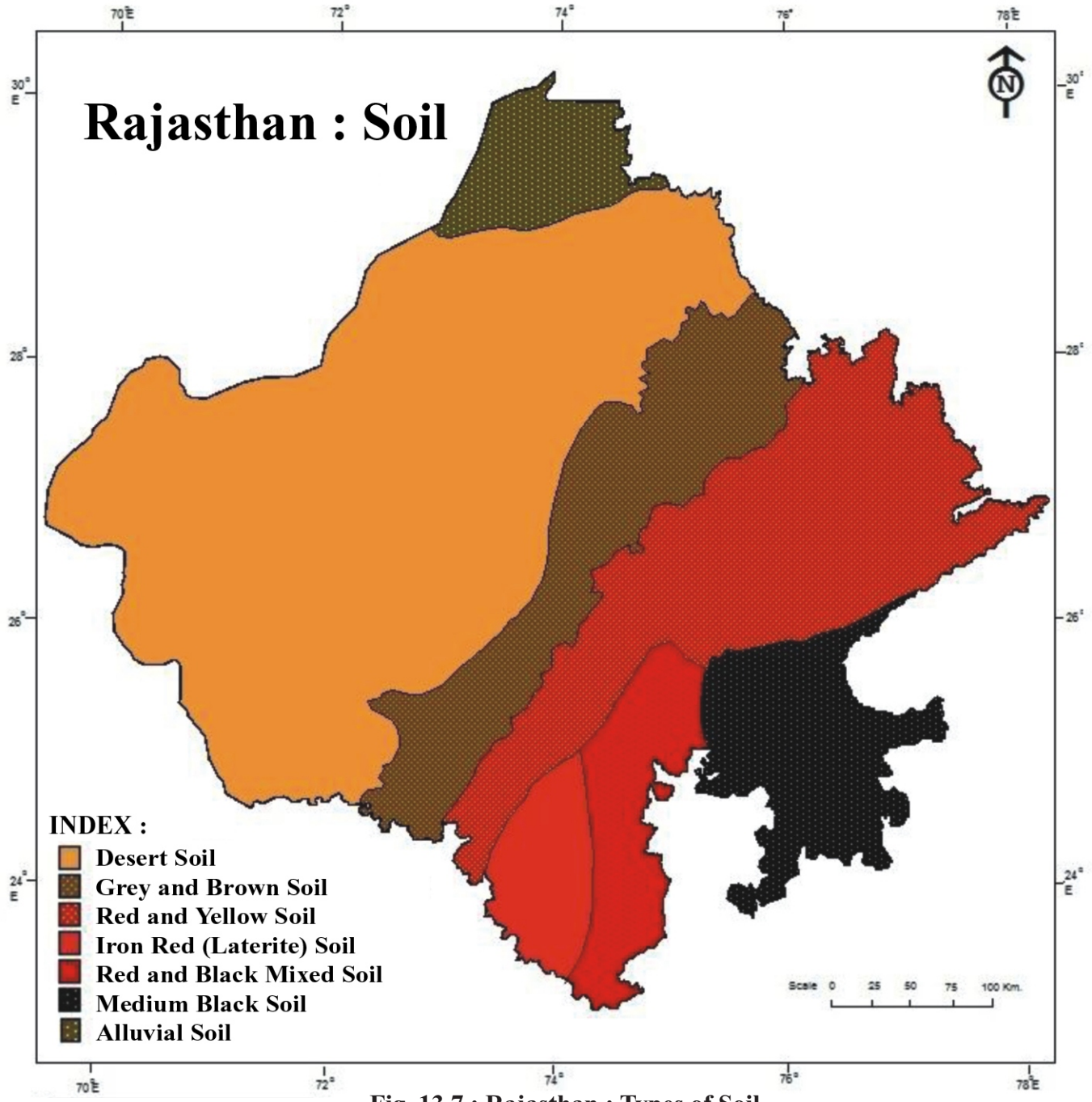


Fig. 13.7 : Rajasthan : Types of Soil

Off all the gifts of nature, soil is the supreme gift to man. It is a valuable wealth of farmer. Entire agricultural production depends on it. Rajasthan is an agricultural state and cattle rearing is a supplementary occupation. Therefore, the importance of soil for the state is further more. According to American pedologist Dr. Bennet - **Soil is the upper layer of unconsolidated materials, found on the surface of the earth which is formed by the combination of disintegrated rocks and vegetative materials**.

A large variety of soils are formed due to environmental diversities. Factors like relief, climate, natural vegetation, length of time etc. influence soil formation process. Parent material, water, air and humus are the four major constituents of soil. Soil is the mixture of solid, liquid and gaseous materials which are the result of interaction between weathering of rocks, climate, plants, and innumerable bacteria.

Types of Soil

The soils of Rajasthan have been divided into six categories on the basis of colour, composition and fertility. These have been shown in Fig. 13.7.

1. Desert Soil – It is found in western Rajasthan. This soil is found in most of the areas of Jalore, Barmer, Jaisalmer, Jodhpur, Bikaner, Churu, Jhunjhunu, Nagaur districts etc. It is a less fertile soil. High range of temperature and physical weathering are the major factors of its formation.

Characteristics –

(i) The soil is mainly formed by physical weathering.

(ii) It moves frequently with the wind.

(iii) It has low fertility and high salinity.

(iv) Its water holding capacity is low.

2. Red-Yellow Soil – The soil is found in the western parts of Sawai Madhopur, Sirohi, Rajsamand, Udaipur and Bhilwara districts.

Characteristics –

(i) This soil is suitable for groundnut and cotton cultivation.

(ii) This soil lacks fertile elements.

(iii) It is made up of the disintegrated materials of granite, schist and gneiss rocks.

(iv) It lacks calcium and nitrogen.

(v) Red and yellow colour of this soil is due to its iron content.

3. Laterite Soil – It is found in Dungarpur, central and southern part of Udaipur and southern Rajsamand districts. This soil is composed of the disintegrated materials of old crystalline and metamorphic rocks.

Characteristics –

(i) It lacks nitrogen, phosphorous, humus contents etc.

(ii) The colour of this soil is red due to the presence of iron content.

(iii) Maize, rice and sugarcane are cultivated in this soil.

4. Mixed Red and Black Soil – It is found in Banswara, eastern Udaipur, Dungarpur, Chittorgarh and Bhilwara districts.

Characteristics –

(i) It lacks calcium, nitrogen and phosphorus but contains sufficient potash.

(ii) It has a larger proportion of clay.

(iii) Cotton, sugarcane, maize etc. are cultivated in this fertile soil.

5. Black Soil – This soil is found in the state's south-eastern districts of Kota, Bundi, Baran and Jhalawar.

Characteristics –

(i) It is a loamy soil with higher clay content.

(ii) Calcium and potash are sufficient in this soil but it lacks nitrogen.

(iii) The fertile soil yields high production of commercial crops like sugarcane, coriander, rice and soyabean.

6. Alluvial Soil – The soil is found in the state's northern and eastern districts of Ganganagar, Hanumangarh, Alwar, Bharatpur, Dholpur, Karauli, Sawai Madhopur, Dausa, Jaipur and Tonk.

Characteristics –

(i) It has a light brown red colour.

(ii) It is a sandy loam in composition.

(iii) It is a fertile soil.

(iv) It is rich in calcium, phosphorous, potash and iron contents but lacks nitrogen.

(v) This soil is suitable for growing wheat, mustard, cotton and tobacco.

Soil Problems

1. Soil Erosion

Soil erosion is a serious problem in

Rajasthan. It is known as **creeping death** in view of the loss of soil and its fertility. Flowing or blowing away of upper fertile layer of soil by water or wind is known as soil erosion. Soil erosion occurs in the form of sheet erosion and gully erosion. About 4 lakh hectares of land of Rajasthan is affected by water erosion. Chambal and its tributaries have eroded Hadauti plateau considerably. Kota, Sawai Madhopur and Dholpur districts have suffered gully erosion whereas the western dry desert is affected by wind erosion (sheet erosion). Thus, thousands of acres of Rajasthan has become and is becoming badland.

Causes of Soil Erosion

1. Fast flowing water pirates upper fertile layer of soil.
2. Several gullies and depressions are created by fast flowing water on steep and vertical slopes.
3. Unconsolidated soil particles are blown away by speedy winds in the absence of vegetative cover.
4. Soil erosion is enhanced by illogical deforestation. Tree roots keep the soil bound and consolidated.
5. Overgrazing has exposed surface soil for erosion.
6. Jhooming or shifting cultivation promotes soil erosion.
7. Unscientific ways of agriculture enhance soil erosion.

Measures to Check Soil Erosion

1. Velocity of running water should be checked by bunding the fields and by constructing dams and anicuts in areas of flooding.
2. Deforestation should be checked and afforestation be encouraged.
3. Grazing should be controlled.
4. Plantation should be done in rows in order to check wind velocity and soil erosion in arid areas.
5. Soil erosion can be checked considerably by terracing fields, contour ploughing and practicing crop rotation.

2. Problem of Soil Fertility Loss

Soil fertility decreases and the problems of salinity and alkalinity arise due to continuous use of soil and by adopting faulty ways of cultivation. About 7.2 lakh hectares of land is saline and alkaline in Rajasthan. Although, the problem is prevalent everywhere in the state but it is prominent in Alwar, Bharatpur, Jaipur, Nagaur, Pali, Jodhpur, Bhilwara, Chittorgarh and Sirohi districts. Soils suffer from the problem of water logging in the areas where canal network is dense.

Ways to Maintain Soil Fertility

1. Excessive surface flow of water creates the problem of water logging by which fertile ions of soil are leached. Hence, drainage should be controlled.
2. Barley, cotton, maize etc. should be cultivated to control soil salinity.
3. Crop rotation of pulses like gram, green lentil (moong) etc. to recover nitrogen component in the soil.

Crores of rupees are being spent by the government on various projects but the farmer's awareness and participation can be more effective.

Important Points

1. The long term average weather conditions of a given area is known as the **climate** of that area.
2. Temperature, pressure, winds, rainfall etc. are the elements of climate.
3. The climate of Rajasthan varies from dry to semi-humid monsoon type.
4. Fast moving, dry and hot **Loo** blows in summer season.
5. Maximum rainfall occurs in rainy season.
6. Unequality, variability and uncertainty is found in the quantity, distribution and duration of rainfall.
7. Summer season prevails from March to mid-June.
8. In summers, the sun shines vertically over the Tropic of Cancer which passes through the southern part of Rajasthan.
9. Rajasthan receives rainfall through the Arabian Sea and Bay of Bengal branches of monsoon.
10. The annual average rainfall for the whole of Rajasthan is 52.37 centimetres.
11. Temperate cyclones coming from the west and north-west in winter season provide rains twice

or thrice in the form of **Mawat** which is useful for Rabi crop.
12. Rajasthan has been divided into four main climatic regions on the basis of temperature and rainfall.
13. Forests play a major role in maintaining environmental and ecological balance.
14. The forest cover in Rajasthan is very small in comparison with that of Bharat.
15. The maximum forest cover in Rajasthan is in Sirohi district.
16. Teak forests are mainly found in Banswara, Dungarpur, Chittorgarh and Udaipur districts.
17. Parental materials, relief, climate, natural vegetation and duration are the contributors to the soil formation process.
18. Desert soil is found in western Rajasthan.

Exercise

Multiple Choice Questions

1. Rajasthan's average rainfall is –
   (A) 52.37 cms. (B) 65.62 cms.
   (C) 25.25 cms. (D) 100.85 cms.

2. The district in which sub-tropical mountain forests are found, is –
   (A) Alwar (B) Jaipur
   (C) Ajmer (D) Sirohi.

3. The forest cover required in any given area as per the National Forest Policy, is –
   (A) 2/3 (B) 1/3
   (C) 1/4 (D) 3/4.

4. The types of soil found in Rajasthan, are –
   (A) Seven (B) six
   (C) Nine (D) Ten.

Very Short Answer Type

5. What type of climate is found in Rajasthan?
6. In which month, the sun shines vertically over the Tropic of Cancer?
7. What is Mawat?
8. In how many climatic regions is Rajasthan divided?
9. In which districts teak forests are found?
10. Give two major soil problems of Rajasthan.
11. What is creeping death?
12. Name two types of soil erosion.

Short Answer Type

13. Define climate and describe its elements.
14. Give any four characteristics of the climate of Rajasthan.
15. Why Rajasthan receives low rainfall?
16. Give the main characteristics of highly arid climatic region.
17. Where are dense forests found in Rajasthan?
18. Give causes of soil erosion.
19. Mention the ways to check soil erosion.

Essay Type

20. Give a detailed description of the main seasons of Rajasthan.
21. Divide Rajasthan into climatic regions and describe them in detail.
22. Give detailed description of the forests of Rajasthan.
23. Describe briefly the soils of Rajasthan.

Skill

24. Mark the isotherms of January and June on an outline map of Rajasthan.
25. Mark the climatic regions of Rajasthan on its outline map.
26. Mark the forest areas of Rajasthan on its outline map.
27. Mark the soil types on an outline map of Rajasthan.

Answer Key

1. (A), 2. (D), 3. (B), 4. (B).

Glossary

A

Abrasion :
The degradation of any part of the earth's surface by the movement of air, water or Glacier.

Absolute Humidity :
It is the mass of water vapour, in a given volume of air which is usually expressed in grams of water vapour per cubic metre of atmosphere, at specific temperature.

Absorbtion :
It is a natural process in which a specific substance absorbs the radiating heat and the observed energy cannot be transformed again in any other form.

Abyssal :
It is related to the depth of the oceans. Generally, its depth varies from 2200 to 5500 m (1200 to 3000 fathom)

Abyssal deposit :
The organic deposits accumulated on the ocean basins.

Ablation :
It is the natural removal of Snow or Ice from the surface of a Glacier or snow field, this can occur through melting or sublimation.

Actinometer :
The instrument which is used to measure the intensity of radiation.

Advection :
The horizontal movement of wind, water or any other liquid material. For example the horizontal transfer of heat by the wind neither increases nor decreases.

Aoelin :
The transported, eroded and deposited material by the wind.

Aerology :
The study of atmosphere with the help of atmospheric balloons, airplanes and clouds.

Airmass :
A homogeneous mass of the air that covers a considerable area on the surface of the earth. Air masses are classified according to the regions of their origin example tropical or polar and according to whether they are of maritime or Continental type.

Albedo :
The proportion of the radiation which is being received from the sun and which is falling on a non -luminous body that is reflected later. It is generally expressed as decimal. The albedo of the Earth is approximately 0.4 i.e 40 percent.

Alluvial Cone :
A type of alluvial fan in which the deposit is deep and the surface is steeply inclined due to the sinking and evaporation of the water of the stream.

Alluvial Fan :
The deposition of the sediments brought down by the river as it enters the plain. The Alluvial fan extends to many kms and many alluvial fans of the nearby rivers may often unite to form a continuous plain, which is also known as pedimont Alluvial plain. The Alluvial material may extends upto hundreds of metres.

Alluvial Plain :

A plain formed by the deposition of the sediments brought by the river.

Altimeter :

A type of aneroid barometer, used to display the average height above the ocean floor by the airplane or surveyors.

Antarctic:

It is the portion of the Earth's surface, in the southern hemisphere that lies within the Antarctic circle 66° -32' south. The sun does not rise on 22 December and 21 June.

Anticyclone :

Region where the atmospheric pressure is high compared with that of the nearby regions and is depicted by very close isobars. The winds blow in the clockwise circulation in the Northern hemisphere and anticlockwise in the southern hemisphere.

Antipodes :

The exact opposite points on the surface of the earth to any other given point is known as Antipode. If a line is drawn between these it will pass through center of earth.

Atmosphere :

The envelope of air which includes gases, water vapour and dust particles that surrounds the Earth.

Aphelion :

The position of the Earth on its Orbit when it is farthest from the sun , like on 4th July at this position the Earth is 15.2 million kilometres away from the sun.

Arctic circle :

The parallel or line of latitude of 66° -32' in the Northern hemisphere. The sun does not set here on one day of the year, about 21st June and on 22 December, during the northern mid winter the sun does not rise.

Arete :

Slopy ridge of nacked rocks, specially the top between two nearby cirques which is almost horizontal.

Aridity :

The condition of dryness or very less moisture, where the plants cannot grow because of scanty rainfall.

Autumn :

The third season of the year, in the Northern hemisphere, which is observed after summer and before the winters, from 21st September to 21st December.

B

Barchan:

A crescent shaped heap of sand, having the horns projecting towards wind caused by blowing of the wind. It is mostly found in sandy deserts.

Biosphere:

The biosphere is the part of the earth's surface and atmosphere where there are living things.

Breeze:

The word 'breeze' refers to that current of wind force, which is measured on the Beaufort scale that ranges between force of 2 (Light breeze 5 knots) and force of 6 (strong breeze 28 knots). The current of wind is too light to be known as wind.

C

Caldera:

It is a large basin-shaped 'Crater' that is bound by steep cliffs, generally formed due to lava-eruption and subsidence of the top of volcanic mountain.

Chinook:

These are dry warm south-west wind blowing down the eastern slopes of Rockies in Alberta W. Saskatchewan and Montana. During the spring it causes increase in temperature and the snow melts rapidly.

Cirque:

It is a deep, rounded hollow having steep sides, usually found in the glaciated regions, formed through the erosional work of glacier. It has many names like 'corrie'.

Clay:

A fine grained substance, that can retain moisture and become plastic on being mixed with water, many types of clays contain aluminium silicate, which are formed by the process of decomposition and weathering of different types of rocks.

Cliff:

A high and extremely steep rock face that approaches the vertically, either inland or along a coastline.

Climate:

The total complex of weather conditions, its

average characteristics and range of variation over on large area of the earth for a longer period of time. Usually these conditions are result of weather conditions and are considered for many years and are mainly caused by rainfall, temperature, atmospheric pressure humidity, clouds and other elements of weather.

Cloud:

The tiny visible particles of water, or sometimes ice (0.02-0.06 mm in diameter) which are formed by condensation around a nuclei, such as dust, smoke particles or salts.

Condensation:

The physical process by which a substance is changed from the vapour to the liquid or solid state.

Cone:

A volcanic peak having a broad base tapering in form of a summit is called cone.

Continental drift:

The hypothesis that proposed that the continental masses have changed their relative positions, because of fragmentation and moving apart of an original larger mass. This hypothesis was proposed by Alfred Wegner (1910).

Corrasion:

The mechanical erosion or the frictional wearing down of a rock surface by material moved under gravity or transported by running water, ice, wind and waves.

Corrosion:

It refers to the wearing away of the rocks by chemical actions like solution, hydrolysis, oxidation and hydration

Cumulus cloud:

A cloud having vertical development, usually having a flat base and are round or dome shaped and sometimes reaches to greater heights.

Current:

The distinct and well defined movement of water in a river. The vertical motion of air in an airmass. A permanent or seasonal movement of surface sea-water.

Cycle of erosion:

A complete series of changes or stages through which a landmass passes from the inception of erosion on an exposed surface to the final stages (youth, mature and old) when its worn down to the sea level or a featureless plain.

Cyclone:

A small tropical low pressure system with a diameter of 80 to 400 kms, occurring in the Arabian Sea and Bay of Bengal between 6º to 20º North.

Cyclone Rain:

It refers to rain associated with cyclone or depression and is usually caused by a warm, moist air mass that is moving upwards over colder or heavier air.

D

Degradation:

It refers to the lowering of the earth's surface due to natural processes, specially by the river. The transportation of the eroded material is also included under this.

Delta:

A fan-shaped triangular alluvial tract formed at the mouth of a river.

Denudation:

The wearing away of the outer cover of the rocks by various natural agents, as water and snow.

Deposition:

The accumulation of the eroded material at a particular place by the natural agents like running water, wind, snow and sea waves.

Desert:

A region characterized by scanty rainfall and very less vegetation.

Dew:

The accumulation of tiny water droplets near the earth's surface and the objects near it is called dew.

Dew point:

It refers to a critical temperature at which the air is being cooled, and becomes saturated with water- vapour and below which the condensation causes the formation of tiny droplets of water, provided that some nuclei for condensation are present.

Doldrums:

The equatorial belt of low atmospheric pressure where the North-East and South East trade winds converge, which lead to the formation of calm and light surface winds and a strong upward movement of air.

Drainage:

The discharge of water from any area or a region through system of natural streams.

Drumlin:

An elongated hill or a ridge of boulder clay, usually oval in shape found in the glaciated region. Its long axis is parallel to the direction of the flow of ice.

Drainage area:

A catchment area where the surface water flows in form of single stream in a specific direction.

E

Earthquake:

The sudden movements of the rocks (within the rocks) of the earth that generates elastic shock waves which spreads in all directions.

Ecology:

The science that deals with the study of living organisms and their inter relations with their environment.

Ecosystem:

An organic community of plants and animals within its physical environment.

Environment:

The whole sum of surrounding external conditions within which an organism or a community lives.

Epicentre:

A point on earth's surface that is vertically above the point of origin of seismic focus of an earthquake.

Equator:

The 0º latitude, therefore great circle which is located both midway from both the poles and is perpendicular to the earth's axis. Its total length is 40069 kms.

Equinox:

It refers to that time of the year when the sun appears vertically overhead at noon at the equator. It is the time when all the places on the earth have equal day and night. The sun rises exactly in the east and sets exactly in the west. There are two equinoxes per year, one on March 21 (Vernal equinox) and the other on 22nd September (Autumn equinox.

Erosion :

The process of the wearing way of the earth's surface through natural agents like sea, rivers and rain. Ice in form of glaciers, frost and melting snow also contributes in the process of erosion.

Eruption:

It is a process during which the solid, liquid or gaseous material gushes out of the interior of the earth towards its surface.

Esker:

A term that is broadly used to describe, a long, narrow ridge of sand or gravel that is usually found in glacial regions.

Evaporation:

It is the process through which the substance changes from liquid to the vapour state. The evaporation of the surface water by the heat of sun, from the oceans, lakes, rivers etc. is the cause of water vapour in atmosphere. As the atmosphere is never completely saturated, the evaporation continues all the time, the rate of evaporation depends on the air temperature, the amount of water vapour already present in the atmosphere, the nature of the water, surface the wind.

Eye of the storm:

The term is used to describe the central area of a Hurricane or a tropical storm, where the atmospheric pressure is 96 mb with atmost negligible wind velocity.

F

Flood plain:

A plain that borders a river, which has been formed by the deposits of the sediments carried by the river. During floods the river deposits fresh layer of alluvial soil over it.

Fog:

The invisibility developed in the layers of the atmosphere due to the condensation of water-droplets, together with particles of smoke and dust held in suspension According to the International Meteorological Code, the term is defined as a visibility of less than 1 km.

Front:

The line of separation at the earth's surface formed between cold and warm air masses. Generally, it is formed by the horizontal movement of these air masses that have formed in the widely different regions like tropical and polar air. Both the types of air masses comes in contact with each other at

this line of separation.

Frost:

When the temperature of the air is below 0ºC or even lower than this, the water vapour present in the air freezes in form of minute ice crystals termed as frost.

G

Geodesy:

It is a science of the measurement of the shape and size of the earth, including its density and its weight and is also used for surveying of large portions of the earth's surface in which the curvature of the earth has to be considered. It is actually a branch of mathematics.

Glacier:

A mass of ice that moves slowly down a valley, from its source of its origin towards the lower margin, under the impact of gravity. It is also called mountain glacier, valley glacier or Alpine glacier.

Granite:

It is a coarse-grained plutonic rocks that always contain Quartz and Feldspor, along with other minerals. Its structure is so coarse that the different mineral grains can be easily seen and can be clearly distinguished from one another.

Great circle:

A circle on the earth's surface whose plane passes through its centre and bisects it into two different hemispheres is known as great circle. Two opposite meridians together form a great circle, the equator is a great circle. The shortest distance between two points on the earth's surface is the arc of the great circle that passes through them.

Greenhouse effect:

A phenomena related to insolation because of earth's atmosphere, it allows the short wave solar energy to reach the earth's surface and gets heated, but the earth also absorbs the long wave radiation from the earth when its cloudy. Therefore the temperature at the earth's surface remains more than average. Thus our atmosphere acts like the glass of greenhouse.

Grid:

A network of horizontal and vertical lines that cut each other at right angles on any map series. The location of any point or place is calculated with the help of the grid.

Ground water:

The water that exists inside the earth's surface in the saturated zone of rocks. It percolates from pores on the earth's surface. It is also called underground water.

Gulf stream:

It is a warm ocean current that originates in the Gulf of Mexico and moves along the eastern coast of North America and touches the south-eastern coast of Newfoundland and reaches Scandivania.

H

Hanging valley:

When the main valley has been over deepened by a glacier, as a result a stream flowing down a hanging valley suddenly falls as rapids into the main valley. This type of valley is mostly formed in glacial regions.

Hemisphere:

The half of the earth's surface produced when a plane through its centre that bisects the earth. The earth is generally divided into northern and southern hemisphere. Sometimes the earth's surface is also divided into water hemisphere. Water hemisphere is used for North and South America.

Horizon:

The line at which the earth's surface and the sky appears to meet.

Horse latitude:

The sub-tropical belts of the high atmospheric pressure over the oceans, in both the hemispheres between the Trade Winds and Westerlies (in the mid of 30ºN - 35ºN and 30ºS-35ºS). These belts shift north and south with the sun and regions of calms and light variable winds.

Hurricane:

It is an intense tropical storm in Western Islands and Gulf of Mexico, mostly occurring in the months of August and September. High velocity winds and storms causes heavy rainfall. Here wind comes down and anti-cyclonic conditions are produced.

I

Inselberg:

It is an isolated hill, ridge, or small mountain that abruptly protrudes out from a virtual level of the surrounding plains. It's height may be upto 325 meters from the surrounding plain.

Insolation :

The energy received by the earth's surface in the form of short waves is termed as Insolation. The sun is celestial body of hot gases where the surface temperature is 5700 degree Celsius and that of the centre is 450 million degree Celsius. It keeps on releasing its radiant energy in the form of waves.

Ionosphere :

The layer of the atmosphere which is just above the stratosphere that reflects electromagnetic waves back to the earth is called as ionosphere. Polar lights (aurora) is also visible in this part. The ionosphere is also called as thermosphere.

Isobar :

It refers to a line on a map or chart, which connect places with equal atmospheric pressure. In order to make the pressure readings comparable with one another they are corrected by reducing to mean sea level.

Isoneph :

It refers to a line on a map that connects the places with equal average cloudiness over a certain period.

Isotherm :

A line on a map that connects places with the same temperature over a certain period. The temperature is normally reduced to mean sea level so as to remove the differences on account of altitude.

J

Jet stream :

A strong wind blowing horizontally at the speed of 50 to 60 knots at the altitude of 12000 meters.

K

Kame :

A mound of gravels and sand that is formed by the deposition of the sediments brought by the stream. Mostly they are formed by sand and gravel in glacial regions.

Karst:

1. A name given to an area of rugged limestone plateaus and ridges near Adriatic coast of Yugoslavia.
2. Area of limestone topography, which is usually barren. Mostly of the entire drainage pattern is underground.

L

Landform:

The particular shape or form and nature of any feature on the earth's surface.

Landscape :

The sum of all the aspects of any region, which may be rural or urban.

Landslide :

The movement of a mass of rock or debris on earth down a slope due to gravity or increase in moisture.

Limestone :

A type of rock, which consists 50% of calcium carbonate.

Longitude :

The angular distance of a place either east or west of main meridian (0° or Greenwich) measured along the equator between the meridians that runs from east to west. It can be measured in any of these two directions upto 180 degrees.

Long profile :

The profile of a river, from its source to its mouth.

M

Magma :

The molten material that exists inside the earth's crust, having very high temperatures and contains gases and volatile material.

Magnetic pole :

The two poles of earth's magnetic field, that are situated in North America and Antarctica and are depicted by free swinging magnetic needle in a horizontal plain.

Mantle :

The layer of ultra basic rocks with the thickness of 2900 kilometres and density 3'3 to 3'3 found between crust and core.

Meander :

The curve in the course of a river. It is derived from a river named Meander in Turkey.

Mid latitude :

A latitudinal region that extends between 23 to 26 degree in northern and southern hemisphere. It is now being used in place of temperate latitude.

Millibar :

A unit to measure the pressure, which is equal to 1000 of a bar. It is used to depict the distribution of atmospheric pressure on synoptic charts. The registered pressure at 45 degree north and south latitudes is 1013.2 millibar the mean sea level.

Moon :

The satellite of the earth, that revolves around it. It is the only celestial body which revolved around the earth. In cosmology this word is used for satellite of a planet. The moon completes its one revolution around the earth in 29.5 days. The diameter of the moon is slightly more that 1/4th of the earth.

N

Nunatak :

A rock peak that projects prominently above the surface of the ice sheet. It is mostly found in Greenland and Antarctica.

O

Ocean Current :

An ocean current is a continuous, and directed movement of sea water generated by prevailing winds, different temperature and variation in salinity distribution.

Orbit :

The path of the heavenly body through space in relation to some selected point.

P

Peninsula :

A stretch of land which is surrounded by water on three sides. For example, peninsula of India and Italy.

Perihelion :

The nearest point of any celestial body in its orbit, around the sun. The earth comes in this position on January 3, when it is 14.73 crore kilometres away from the sun.

Planet :

The solid heavenly bodies, smaller than sun revolving round the sun is called Planet. There are presently 9 planets in our solar system including earth. The planets do not reflect heat and light.

Plateau :

An extensive uplifted land mass with a flat top with one or two stiff slopes.

Pole :

One of the two points at the northern and southern extremes of the earth.

Pole star :

The star that is generally seen in the zenith at the north pole and therefore used to find the true north from any point on the earth's surface.

Precipitation :

Any form of the deposits of water present in the atmosphere,which reaches the earth in liquid or solid form.

R

Radiation :

The process in which a body releases its heat energy in the form of waves. In climatology it means the energy released from short wave radiations from the sun.

Rapid :

When the current of the river is flowing with more than normal swiftness it is called rapid. This may be due to stiff slope or successive rocks at the bottom of the river.

Relative humidity :

A ratio of amount of water vapour actually present in the air having definite volume and temperature to the maximum amount of air can hold.

S

Satellite :

A relatively small body that revolved round the planet. For example moon is the satellite of the earth.

Seasons :

The distinct period into which the year may be divided in terms of duration of day light and of climatic conditions because of changes in duration and intensity of solar radiation. In temperate latitude there are 4 seasons of 3 months each. For example spring season March, April and May, summer season in June, July and August, autumn season in September, October November, and winter season in December, January and February. The seasons are totally opposite in Southern Hemisphere.

Seismic Focus :

The point below the earth's surface where

the earthquake originates and from where the vibrations spread in all the directions. It is now believed that focus is generally to several kilometres in a linear pattern rather than a single point.

Seismology:

The science of the study of earthquakes.

Sirocco :

The southerly wind blowing in north Africa, Sicily and southern Italy and upto Sahara of Africa. As they are originated in desert they are mostly arid. But it becomes moist as it reaches southern Italy.

Snow :

The precipitation which is in the form of ice crystals. These crystals may join together and may form snowflakes.

Solar system:

A group of celestial bodies which include sun and planets, satellites that revolve round the planets, asteroids, meteoroids, comets.

Solstice :

It is the period during summer and winter season when the sun is vertically above equator (23½° north and 23½° south.) When the sun is at its maximum declination the sun shines vertically over tropic of cancer on June 21 and on tropic of Capricorn on 22nd December.

Spring :

1.The season following winter, reckoned astronomically to the last in northern hemisphere from the spring equinox (about 21st March) to the summer solstice (about 21nd June) during February, March and April.

2. A continuous flow of water from the ground.

Standard Time :

The time that is referred to the mean time of certain meridian and is fixed over a wider area for example 82° is taken as standard meridian for India.

Stratosphere :

The layer of the atmosphere that lies just above the troposphere extending upward to the height of 90 kilometre up to ionosphere. It is about 18 kilometres at the equator, 9 kilometres at 50° north and south latitude and 6 kilometres at the pole. Its height varies according to the changes in the season.

Sunrise; Sunset :

The time at which the sun appears to rise above and set below the horizon due to the rotation of earth.

Syzygy :

The position when the sun, moon and earth are in the same line, either in conjuction or opposition. It happens on full moon day or no moon day (Amavasya).

T

Tarn :

A small lake among the mountains in the cirque basin. Sometimes the stream also originates from it.

Temperate zone :

The zone between torrid and frigid zone, in the northern hemisphere between tropic of cancer and arctic circle and in the southern hemisphere between tropic of Capricorn and Antarctic circle. The sun is never overhead in the zone and the sun rays always slanting. This zone is also called as mid latitude.

Temperature :

The degree of heat of a body measured by thermometer usually expressed degrees in Celsius and Fahrenheit.

Time zone :

When the mean time of meridian near the center of zone is adopted as a standard for the whole region.

Tornado :

A violent storm near the Mississippi basin that whirlwind around low pressure center. The winds blow with the speed of 320 km/hr and causes heavy rainfall and thunder. It takes place most frequently during spring and early summer almost always in the afternoon when the surface temperature is maximum. Its diameter is less than 100 meter. It is also called hurricane, typhoon and willy-willy. It causes economic loss.

Torrid Zone :

It refers to the warmest of the three latitudinal temperature zone that means burning or hot. Hence torrid zone, the others being temperate and frigid zone. It lies on both sides of equation in the form of broad belt.

Trade wind :

The wind that blow from subtropical belts high pressures towards the equatorial region of low pressure from north east in the northern hemisphere and south east in the southern hemisphere.

Tropical cyclone :

A region of low atmospheric pressure relatively small in area but accompanied by violent storm conditions that originate in tropical regions. The winds of hurricane strength circulate round the center and is often called eye of the storm. The velocity of the wind ranges from 112 to 128 kilometers or 70 to 80 miles per hours but sometimes it reaches upto 160 kilometers (100 miles) per hour. The regions that come under this cyclone may observe 5 inches of rainfall in just 24 hours. These cyclones cause loss of lives and property. It is known by different names in different regions. For example hurricanes in Atlantic ocean, Typhoon in west pacific ocean, hurricane in south pacific ocean and willy-willy in north, west of Australia and cyclone Indian Ocean and Bay of Bengal

Tropic of cancer :

The parallel of latitude 23½° north, showing the northern position at which sun shine vertically at noon. This situation occurs on 21st June.

Tropic of Capricorn:

The parallel of latitude 23½° south, indicating the southern position where the sun shines vertically. This condition occurs on 21st of December.

Tropics :

The zone between the tropic of cancer and tropic of Capricorn, where the sun shines vertically two times in a year and the climate often remain warm.

Troposphere :

The lower layer of atmosphere ,which is at the height of 10 to 16 kilometres. It is below stratosphere. Tropopause is found between these two layers. The entire water vapour and clouds are found in this layer.

Typhoon :

A small, intense vertical tropical storm in China sea characterized by winds of terrific force, heavy rains and thunderstorms. It is very similar to the storms observed in the Bay of Bengal and Arabian sea.

V

Valley :

A long narrow depression surrounded by mountains on both sides on the earth surface having a downward slope through which a river or glacier flows

Visibility :

1. The distance that an observer can see depending on first his height above sea level with which is involved the curvature of the earth's surface.
2. The amount of invisible ground.
3. The clarity of the atmosphere.
4. The time of day and night.

Vulcanology :

The science of the study of volcanoes.

Volcanism :

The process in which, hot molten magma gushes out on the earth's surface.

W

Water fall :

A sudden fall of water, generally due to a bed of hard rock in the course of the river, overlying the other softer rocks.

Weather :

The condition of the atmosphere at a certain time over a certain short period which includes atmospheric pressure, temperature, humidity, rainfall and wind speed and its direction.

Weathering :

The decay or disintegration of rocks on the earth's surface by the processes of denudation.

Westerlies :

The winds that blow with great velocity, in the regions on the poleward sides of the subtropical high pressure areas (35° to 65° in north and southern hemisphere). They blow in the south west direction in the northern hemisphere and north west direction in southern hemisphere.

Wind :

The movement of air, parallel to the surface of earth which do not have definite direction or speed.

Windward :

The side or a direction that faces the wind. Its opposite side is called leeward.

Year :

The time period during which the earth completes its one revolution around the sun, which is of 365 days 5 hours 48 minutes and 46 seconds. Generally, the duration of the year is considered to be 365 days for the sake of convenience and the fourth year is of 366 days, which is also known as leap year.

Young Mountain :

It is referred to the fold mountains that are created during the last period of folding as Alps and Himalayas.

Zone:

A term generally used to describe general (Similar) conditions of a region specifically it refers to three belts in both the hemisphere which are formed on the basis of latitude. For example torrid zone, temperate zone and frigid zone.