

CHAPTER 7 VEGETATION

Objectives

After studying this chapter, students should be able to:

- define some basic concepts relating to vegetation;
- describe the types of vegetation;
- highlight the factors affecting the growth of vegetation;
- describe the various vegetation zones of the world.

7.1 Definition

Vegetation is a collective term that simply refers to all aspects of plant cover in a particular place of different species and types. It is the collection of different kinds of species of plants growing together as a community in an area with their respective general physical appearance. The vegetation of an area is largely defined by two important aspects: the types of plant species and their spatial arrangement within a specific area.

Vegetation is therefore made up of the different plant species and plants having different growth characteristics of life-forms. In this respect, three major plant life-forms can be recognized: *trees, shrubs and herbs*. In this way, the concept of **PLANT COMMUNITY** can be recognized. A plant community is the collection of different plants growing together in a particular place. Every plant community has the following characteristics or properties.

- (i) a plant community consists of plants that are capable of growing in the same place or environment;

- (ii) every plant community is well organized with distinct composition and structure; and
- (iii) each plant community is alive and functions on the basis of the interaction among the different plants and also between the plants and their physical environment.

At this juncture, there is the need to identify the basic types of vegetation. There are basically two types of vegetation: *natural vegetation* and *semi-natural vegetation*. A natural vegetation is a group or community of plants that grow naturally in a particular place which has been totally unaffected by human activities whether directly or indirectly. In other words, a natural vegetation is that plant community that grow in a particular place without man's influence or contribution. This type of vegetation is very rare to come by in the world given the rate at which man has influenced his environment in view of increasing world population and intensity of land use. Semi-natural vegetation on the other hand are those group of plants that have been largely influenced by human activities. Most types of vegetations in the world today belong to this category, since they have been influenced to a large extent by human activities. Infact, man has grown a substantial part either through farming, afforestation or beautification schemes. Hence, cultivated farmlands and tree plantations today stand as ready examples of semi-natural vegetations and a significant component of the vegetation cover of the Earth. Indeed, farmlands, forest reserves and protected areas serve as distinct plant communities with different plant species.

7.2 Concepts Associated with Vegetation

There are some concepts associated with vegetations particularly as it relates to the major attributes of vegetation as found on the Earth's surface.

These concepts include:

(i) Succession (ii) Association

Succession

This refers to a series of processes that involves the replacement of a particular vegetation by other ones. This is so because no vegetation is static as it is continually changing with time. Every habitat changes with time including that of vegetation as it generates changes within itself. Changes in vegetation often come in the way a set of plants replaces itself either wholly or in part by another group. The change may be in the form of a variation in the composition of plants and its structures.

There are two types of vegetation or plant succession: *primary succession* or *prisere* and *secondary succession* or *subdere*.

Primary succession or prisere is the emergence of a vegetation on a completely new surface that has never carried an organic life before. For instance, a lava flow or a newly emerged coastland, a lake bed which has a new set of plants growing on it naturally is called a primary succession. A primary succession that occurs in a wet area or a waterlogged area is called *hydrosere* while the one that occurs on a dry land or a well drained land surface is called a *xerosere*. Plant succession on bare or exposed rock surfaces is called *lithosere*. Plant succession occurs in stages as there is not vacuum in the replacement of plants by another group at any time.

Secondary succession or subdere is a process whereby a vegetation develops or grows in a particular site which was formerly filled by a different set of plants. It is common in areas whose original vegetation have been disturbed or interfered with by man through his numerous activities

such as farming, lumbering. A typical example is that vegetation that results after crops might have been harvested from a farmland which is left to fallow.

As mentioned earlier on, primary succession occurs in stages and they include *ecological void*, *colonization*, *competition*, *consolidation* and *climax*.

Ecological void is the initial stage of plant succession. This begins when the land surface is basically inorganic as a result of the absence of organic matter. This perhaps may be due to the non-availability of dead plant materials such as leaves, etc. There is equally an absence of soil, leaving only a bare rock surface or a layer of weathered materials. The exposure of the rock surface to certain species of microscopic plants is collectively known as **MICROFLORA** which prepares it for the sprouting of plants. This stage is often referred to as the **PIONEER STAGE** in plant succession. The microflora are small plants that can grow anywhere with little requirement in terms of sunlight and water. These plants by their physical structure can endure very difficult environmental conditions. Most of these microfloras obtain nutrients directly from the rock materials.

The growth of the pioneer plant marks the beginning of the second stage and the process of soil formation. The second stage is known as **COLONIZATION**. This is a stage when plants begin to grow on the surface due to the formation of soil. Soils, being the medium for plant growth, and its availability, triggers the growth of more plants such that the plants are said to *colonize* or *dominate* the entire surface. These plants provide litter (remains of their leaves) which is later transformed into humus which is needed to serve as nutrients that will encourage further

plant growth. In addition, the roots of the plant help in opening up the weathered materials. Following these activities, the soil body becomes built up which further encourages the growth of higher plants. The growth of these plants is a further stage in the colonization of the surface by bigger plants. The growth of these plants is supported by active dispersal of their seeds by agents such as wind, birds and ocean water. These plants may initially appear as herbaceous species which may later transform into bigger ones like trees due to improved soil conditions. The increase in plant cover leads to the emergence of other species which will create more space for new plants to spring up.

The third stage is called **COMPETITION** and **CONSOLIDATION**. The stage comes up due to the increase in the number of plant species that are existing together within the area. With the increase in plant species, the vegetation structure becomes complex and so different that plant species begin to compete for the available land space and the available resources within their habitat. In the process of competition, the more aggressive plant species will survive and become the **DOMINANT SPECIES** such as trees in a forest area. Due to their dominances, they will now affirm or **CONSOLIDATE** their position in the community while the weaker species will be eliminated and become extinct.

The final stage in plant succession is referred to as **CLIMAX**. The essence of competition and consolidation is to ensure that the number of plant species and population of plants within a community are brought within the level that the resources of the environment can conveniently support. The plant community that emerges at this stage is referred to the **CLIMAX COMMUNITY** or **VEGETATION**. The character or nature of this vegetation is largely determined by the climate of the surrounding region.

However, there may be slight or minor variations within the climax vegetation which can be attributed to differences in parameters such as soil, relief and ground drainage.

Association

This is a plant community that has numerous species growing together in a particular place. It contrasts sharply with a **CONSOCIATION** which is a plant community that is dominated by one specie. Types of consociation include forest which is a group of plants dominated by tress, grassland, group of plants dominated by grasses. Associations are not found within a particular place, they are often scattered all over the globe but their intensity is influenced by geographical, local and climatic factors.

7.3 Types of Plant Species or Life-Forms

There are three types of plant species or life-forms on the basis of the relative proportions of the different plant life forms, namely:

- (a) Forests
- (b) Grasslands
- (c) Deserts

- (a) **Forests:** This is a group of plants in which trees are the commonest life forms or dominant species. Forests are largely made up of trees, although there may be a combination of other plants such as woody shrubs, grasses and smaller plants which may form the undergrowth. There are several types of forests but the characteristics of the trees found in that area often determine the name given to the forest. However, three types of forest may be recognized: *evergreen forests*, *deciduous forests* and *woodlands*. Evergreen forests are those that look green throughout the year due to the availability of water and

sunlight that sustain plant growth. Examples include tropical rain forest, mediterranean forests and coniferous forests. Their growth is all year round. Deciduous forests are those forests whose trees shed their leaves at a particular season in order to adapt to weather changes either it is cold or hot such that the rate of evaporation is high. In such a situation, the trees are unable to get enough water from the soil for survival and has to shed their leaves for them to withstand the harsh weather conditions. Deciduous forests are found both in temperate and tropical lands. They usually possess broad leaves. Woodlands are forests but with less tall or dense trees and with a proportion of grasses as undergrowth.

- (b) **Grasslands:** These are plant communities composed mainly of herbaceous species especially grasses, in which case grasses constitute the dominant species. Grasslands are found in both temperate and tropical areas. Generally, there are three types of grasses, annuals, biennials and perennials. Annuals are those grasses that complete their life cycle in one year or season. Biennials are grasses that grow late in the season of one year and flower and seed in the following year, while perennials are grasses that grow from one year to the other. In tropical lands, grasslands are mixed with trees especially along water courses. The trees in this grassland are more that those in temperate grasslands. In tropical areas, grasslands are found in West Africa and are known as **SAVANNA**. In Brazil they are called **CAMPOS**. In the Caribbeans, they are known as **LLANOS**. In temperate areas, grasslands are found in Argentina, where they are known as **PAMPAS**. In North America, they are known as **PRAIRIES**. In South Africa they are called **VELDT**. In

Europe they are referred to as **STEPPES** while in Australia they are called **DOWNS**.

In tropical grasslands, the trees are mixed with grasses. These trees are big in trunk and possess bulb roots where they store water for use during the dry season. Examples of these trees include baobab, cactus and acacia which belong to the family of drought resistant plants known as **XEROPHYTES**. The grasses are tall having a height of 2m and above. In temperate grasslands, the trees are very few and the grasses are short due to low rainfall of less than 25cm and a prolonged period of drought. However, where there is ample supply of water, the grasses are more nutritious and good for animal husbandry. Trees found in temperate and tropical grasslands are deciduous in nature in that they shed their leaves in order to adapt to weather changes. The grasses also change colour and dry up during the dry season although their roots are dormant waiting for the onset or coming of the wet season.

- (c) **Deserts:** These are areas which experience dry conditions with very limited vegetation. Deserts occur as a result of high temperature which makes the land too hot and dry. It could also be due to cold conditions particularly in temperate areas which make the land frozen for a greater part of the year, a condition universally referred to as **PERMAFROST**. In both cases, only few plants can survive under such conditions and they have to adapt themselves to the harsh weather conditions. There are two types of deserts: *hot* and *cold deserts*.

The hot deserts exist within the tropics where it is hot all year round due to the effects of the sun which is vertically overhead. The hot deserts are mainly found on the western margins of the continents, between latitudes 15° and 30° north and south of the Equator. These regions are noted for offshore winds and the prevalence of cold currents along the coasts. This results in cloudlessness and less or scanty rainfall. Examples of hot deserts are the Sahara (biggest hot desert in the world), the Namib desert in South Africa and the Atacama desert in South America. Plants in hot deserts adapt themselves to long periods of scanty rainfall. The plants develop long and big roots that go down in search of water. Also, some of the plants have thorny or needle-shaped leaves which minimizes transpiration while others have stems or trunks where water is stored. Examples of these plants are baobab and cactus which belongs to the family of drought resistant plants known as xerophytes.

The cold deserts with little shrubs are known as **TUNDRA** and are found in very cold temperate regions (along the Arctic and the Antarctic region) where the sub-soil is permanently frozen. During the coming of the summer, shallow-rooted plants sprout as a result of thawing (melting) of some layers of the top soil. Examples of such plants are lichens, mosses and sedges.

7.4 Factors Affecting the Growth of Vegetation

The vegetation of a place does not come by accident, there are some factors that influence its growth and appearance in a particular place. The factors include physiographic or geomorphic, edaphic, climatic, biotic and human or anthropogenic factors. These factors do not act independently of one another rather, they act together to influence vegetation.

Climatic Factors

This is the most important and far-reaching control on the growth of vegetation. Climatic factors include temperature, rainfall or precipitation, humidity, light intensity and winds, but the most important are temperature and precipitation especially their seasonal distribution. For instance, abundant rainfall is capable of producing a forest and so determines the type of vegetation in particular. Light rainfall on the other hand causes grasslands, while a meager or scanty rainfall results in desert vegetation. Moisture is an important requirement for every plant since it is from the water absorbed through the root that plants receive the food they need. Low temperature often results in lower plant growth and smaller size while higher temperature produces more growth since light is an essential ingredient needed in the manufacture of food required by plants. The amount of light available for plant use, its daily and seasonal pattern are very essential to their growth. Where available light is not much, growth is slow and stunted. Where there is large supply of light, growth is rapid and substantial. However, it must be stressed here that too much light or high temperature is capable of causing excessive transpiration in plants which will lessen the rate at which plants produce chlorophyll which is the green matter in plants that show growth and nourishment. Winds are capable of aiding excessive transpiration by aiding the removal of water from plants. In all, it must be noted that it is not the amount of climatic elements that affect vegetation but that portion of it that is directly available to the plants. This is because after the occurrence of this climatic elements, be it rainfall or temperature, some of them are lost through several avenues of disposal, hence it is only those available for plant use and these are the ones that directly affect vegetation.

Geomorphic or Physiographic Factors

These are factors that relate to the relief or physical state of the land where vegetation grows. The important aspects of relief include altitude, slope form and angle, slope aspect and the depth of the water table. For example, on hilly ranges, there are abundance of vegetation due to rapid changes in the climate, soil aspect and ground drainage. This explains why on mountains and hills, vegetation changes as altitude increases. This factor is particularly evident in the sense that hilly slopes tend to have more run-off than in flat areas. Hence, the steeper the slope, the more rainfall that is wasted or run-off and the more the top soil that is eroded. This is the reason why a flat area will have more vegetation than a sloppy area.

Edaphic Factors

These are factors that relate to the soil in a particular place. The type of soil affects the rate at which water percolates or moves down the soil layers. For example, sandy soils which are loose in nature tend to be porous as they allow much water while clayey soils do not allow water to pass through easily. In essence, sandy soils require more rainfall to sustain a forest vegetation. Indeed, the type of soil determines the type of plants that grow in a particular place.

Biotic Factors

These factors have to do with the influence of organisms such as micro-organisms, insects and rodents especially in the dispersal of seeds which later sprout as plants. For example, the activity of bacteria which consume the dead tissue of larger plants provide avenues through which the seedlings of these plants can later germinate into plants that will collectively form the vegetation of a particular place. Insects and herbivorous animals also assist in the dispersal of seeds which later germinate into plants, and in the pollination of plants. This is in addition to the competition for space and

resources by different plant species which prepares the ground for the growth of several plants.

Human or Anthropogenic Factors

These factors relate to the influence of man on the growth of vegetation. Man has been known to be the most dominant factor influencing vegetation all over the world today. Man has influenced the growth and distribution in the following ways:

- (i) He has grown vegetation in the form of forest reserves aimed at producing more vegetation.
- (ii) He has encouraged the dispersal and transfer of plant seedlings through diffusion and spatial movement, for examples the spread of plant seedlings such as Gimelina, Arborea etc. from Asia.
- (iii) He has destroyed natural vegetation through his numerous activities such as construction, mining, agriculture, lumbering, etc. which involve the destruction of vegetation to give way to cultural structures.
- (iv) The planting of trees as 'wind breakers' or shelter belts in places with low rainfall and unconsolidated soil cover as a measure against soil erosion.

7.5 World Vegetation Zones

The major vegetation zones of the world can be categorized into:

1. Tropical forests
2. Temperate forests
3. Tropical grasslands
4. Temperate grasslands
5. Desert and semi-desert vegetation

Tropical Forests

These are divided into two: tropical rain forest and tropical monsoon forest.

Tropical Rain Forest or Selvas

Location: These forests can be found in Amazon Basin (South America), Zaire Basin, the Guinea coast of West Africa (Africa), Malaysia, Burma, Cambodia, Vietnam, Indonesia, Papua New Guinea, Java, Sumatra, East India Islands of Borneo (Asia). These forests are best developed in the lowland areas between latitude 5° and 10° north and south of the Equator.

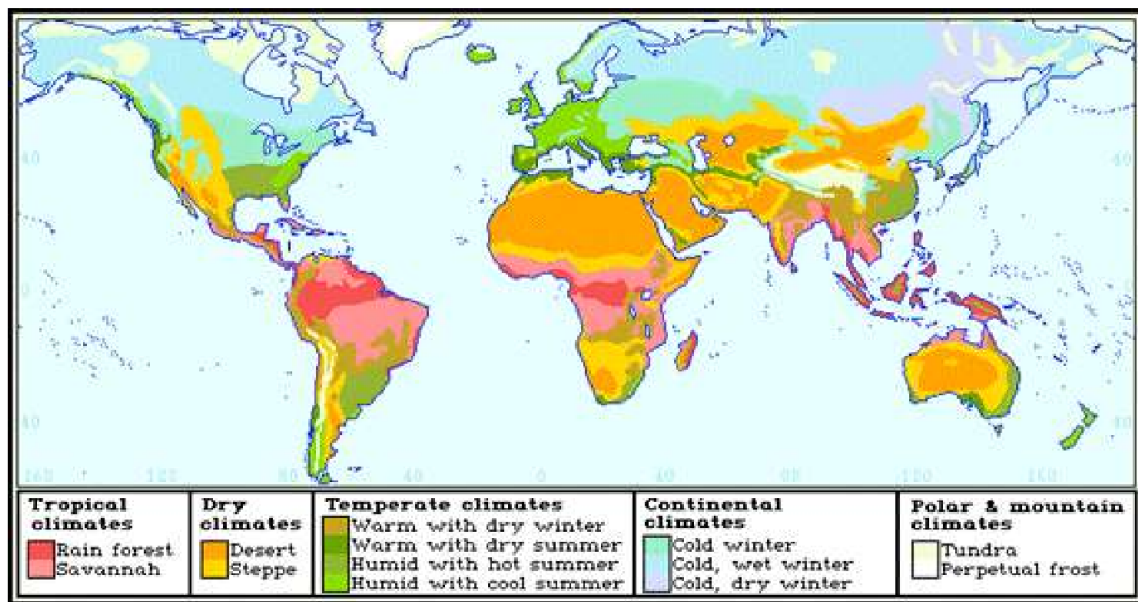


Fig. 7.1: Major Vegetation Zones of the World

Factors Affecting Distribution

The factors which account for the distribution of the vegetation include:

- (i) Heavy rainfall of more than 1,500mm (150cm) spread over the year.

- (ii) High temperatures of 27°C and above throughout the year with each month having at least 20°C (68°F). These temperatures allow for the tropical characteristics of the vegetation.
- (iii) Constant high sunshine due to intense solar energy throughout the year.
- (iv) A general lowland topography.
- (v) High humidity throughout the year with each month having more than 60%.

Characteristics

1. The forest contains a great variety of plants which are close together and they form a dense canopy. This prevents sunlight from getting to the ground. There is therefore little undergrowth.
2. The forest contains large trees, having heights of approximately 40 to 50 metres.
3. The number of species per unit area is large following the great variety of closely spaced plants in the forest.
4. The forest consists of three distinct layers: top layer of tall emergent trees ranging in height of 30 and 50 metres with large buttress roots. The middle layer consists of trees forming a closed canopy at a height of 10-30 metres and a lower layer below 10metres. The undergrowth consists of a wider variety of tree ferns, lianas, epiphytes, saprophytes and herbaceous plants.
5. The forest has broad leaves which are evergreen due to the absence of a distinct dry season and constantly high temperatures and rainfall.
6. The plants exist in different stages of growth as some plants are in flower or in fruit while others are in leaf-fall at the same time.
7. The trees provide a lot of litter that serve as organic substance to the soil.

8. The forest also has a distinct internal climate (micro-climate) different from the surrounding areas.
9. Due to the huge and tall trees found in the forest, most of the trees possess buttress roots which help them to withstand the effects of winds and hence maintain balance.
10. The forest contains a lot of tree species as there may be 200 or more species in a square kilometre.
11. The trees are not found in **PURE STANDS**, that is, similar species do not exist together as they are rather mixed with other species.
12. There is the presence of large undergrowth when there is intense or torrential (copious) rainfall such that it prevents a distant view and makes it extremely difficult to penetrate the forests for lumbering activities.
13. There is hardly any accumulation of rotten vegetation on the ground as dried leaves are turned into organic matter due to rapid decomposition. This further enriches the soil which later promotes luxuriant growth of the forest.
14. When a part of the forest is cleared either for agriculture or lumbering, a less luxuriant forest growth takes over. This is called **SECONDARY FOREST** and it consists of short trees and dense undergrowth.
15. The forest could have mangrove trees where it is near the coast. Such mangrove trees possess tilts or prop roots that are usually found in coastal swamps and lower valleys of tidal rivers.
16. The trees are valuable sources of hardwood. Examples of the trees include mahogany, iroko, ebony, obeche, African walnut, rosewood, iron wood, green heart, etc.

Economic Importance

1. Many of the trees are grown for commercial timber production.

2. The forest is a source of hardwood that is useful for construction purposes, furniture making and boat making.
3. The wood is a valuable source of domestic fuel in the form of firewood or charcoal.
4. The vegetation zone is suitable for the cultivation of tree crops like coffee, cocoa, oil palm and rubber.
5. Many citrus fruits such as oranges, palm produce, oranges etc are grown in the zone which are used for both domestic and industrial purposes and for export.

Tropical Mansoon Forest

Location: This forest is mostly found in Burma, Pakistan, Bangladesh, Laos, Thailand, Cambodia, northern Vietnam, parts of India, east Java, islands to the east (Asia) and northern Australia.



Fig 7.2: Rain Forest

Factors Affecting Distribution

- (i) Heavy annual rainfall of about 1,500mm or more.
- (ii) Seasonal distribution of rainfall such that most of the rains fall during the summer which is the wet period.

- (iii) High temperature throughout the year with each month having more than 18⁰C (64⁰F).

Characteristics

1. The variety of species found in this forest are less than that of the tropical rainforest.
2. It consists of tall trees usually 30metres high and above.
3. Most of the trees are deciduous losing or shedding their leaves during the hot, dry season which serves as a period of rest for the trees.
4. Trees are not as closely spaced as in the tropical rain forests.
5. Undergrowth is more dense in this forest since there is more space for light to penetrate and reach the ground.
6. Monsoon forests are sources of valuable hardwood e.g. teak
7. The forests are less evergreen, the trees are shorter than those found in the tropical rainforest.
8. The tree trunks are large, usually with thick and rough barks.
9. The forests merge into equatorial forests in regions where the dry seasons becomes short or non-existent and into grasslands in regions where the wet season becomes short with less heavy rainfall.
10. The undergrowths are composed of bamboo and thickets.

Examples of trees include teak, bamboo, sandalwood, eucalyptus, casuarina, ilanas, gmelina, acacia etc.

Economic Importance

1. The hardwood derived from the forests are used as timber.
2. The tree products are used as sources of local or domestic fuel.
3. The forests are usually cleared for the practice of plantation agriculture.

4. Economic plants like coffee, tea, sugarcane, manila hemp are cultivated.

Temperate Forests

Temperate forests consist of temperate deciduous forests, Mediterranean forests, cool temperate deciduous forests and coniferous forests.

(i) Temperate Deciduous Forest

Location: These forests are located in areas characterized by the cool temperate western margin and some parts of the cool temperate interior (continental climates). The main areas include North and Central Europe and Western Russia, Western Canada (British Columbia), Southern Chile, Tasmania, South islands of New Zealand, eastern USA.

Factors Affecting Distribution

1. In most of the regions, winter temperature falls below 6.1°C (43°F) which is the minimum temperature for plant growth which results in most of the trees shedding their leaves and becoming deciduous.
2. There is a fairly even distribution of rainfall (650-1530mm) throughout the year.
3. The climate is marked by hot summer (26°C) and mild winters (6.5°C).
4. There is constant high sunshine in the summer.
5. There is a lowland topography.

Characteristics

1. The forest is a mixture of deciduous and evergreen trees.
2. Plant growth occurs throughout the year.
3. The forest is denser than the Mediterranean forest.

4. The evergreen trees are mainly softwood while the deciduous trees are hardwood.
5. The leaves are thin and delicate.
6. The vegetation is less luxuriant than the tropical rainforest and contains less species and is more open with sparse undergrowth.
7. Many of the trees occur in pure stands and they are of great economic value.
8. Leaves of deciduous trees are thin and delicate and require no protective devices against drought and adverse weather conditions.
9. The forest is open with sparse undergrowth which makes penetration easier.
10. Where they are destroyed, the forest is replaced by conifers, plants that can survive under a higher altitude, a lower temperature with poorer soils.

Examples of trees in this forest include oak, beech, hazel, elm, chestnut, poplar, walnut, maple, hickory, cedar, larch and spruce.

Economic Importance

1. The hardwood provides timber while the softwood is used for making paper pulp and newsprint.
2. The trees provide fuelwood for domestic consumption.
3. The economic crops include corn, cotton, rice, tea, mulberries, sugar cane, etc.
4. The hardwood are used for building wooden houses and furnitures.

(ii) Mediterranean Forest or Evergreen Temperate Forest

Location: Coastlands of the Mediterranean Sea, central California, southern Japan, central Chile, Cape province of South Africa and South

West Australia. The forest occupy subtropical areas generally found between approximately Latitudes 20° to 35° north or south of the equator.

Factors Affecting distribution

1. Light, moderate or moderately heavy rainfall usually between 700mm to 1,400mm or more.
2. Rainfall is well distributed throughout the year, although it is more concentrated in the summer.
3. Generally, high summer temperature (more than 21°C) and cool winters (temperature usually between 10°C and 15°C).

Characteristics

1. The vegetation is luxuriant due to heavier rainfall.
2. The forest is a mixture of evergreen broad leaved trees and deciduous trees which are very similar to those of the monsoon forests.
3. On higher grounds, there are various types of conifers or trees with needle like (leaves) e.g. pines and cypresses which are important softwoods.
4. The forests contain a lot of plant life such as ferns, lianas, bamboos and palms.
5. The trees are evergreen because there is rainfall throughout the year.
6. The wetter regions have evergreen forests while the drier parts have scrubs vegetations known as marquis or chappanal.
7. Many plants are adapted to withstand the long summer drought by storing water which have been obtained during the winter rains.
8. The trees are short and have small leaves while many other plants have waxy and spiny leaves which help to reduce transpiration.
9. Trees are relatively few and are widely scattered.

10. The vegetation in this forest are mainly trees which have been cut down and the rest ravaged by livestock, the leftover being a woodland type of vegetation.
 11. Due to hot and dry summers, plant growth is difficult, but the plants have adapted well to the summer drought.
 12. In the drier parts, the vegetation becomes scrubs and consists of sweet-smelling herbs such as lavender, rosemary, thyme, curry and oleander.
- Examples of trees found in this forest include evergreen oak, cork, eucalyptus, jarran, cypress, sequoia or redwood, conifers, karri and pine.

Economic Importance

1. Some of the trees are sources of timbers e.g. pine, oak and redwood.
2. It has promoted the practice of orchard farming which is practiced on a large scale for the cultivation of oranges, lemon, limes, grapefruits and vines all used in making special wines.
3. Wine production is a major feature of the Mediterranean forest.
4. The forest is often cleared to cultivate grains and cereals particularly wheat.

(iii) Coniferous Forest or Taiga

Location: This forest is the most extensive in high latitude and on high mountains even though it does develop on sandy soils in warmer regions. There are two major belts of this forest: (i) across Euroasia extending from the Atlantic Ocean (Norway) to the Pacific Ocean (Kamecharka) and (ii) across North America extending from coast to coast, that is, from Western Alaska to Newfoundland.

Factors affecting distribution

1. There is generally low rainfall between 385 and 640mm with winter precipitation falling as snow.
2. Low temperature of about 6°C for a greater part of the year.
3. Inadequate supply of sunshine which limits the growth of the trees.
4. Continuous and indiscriminate felling and replanting of trees for timber by man.
5. The presence of poor and highly acidic soils e.g. podsoles.

Characteristics

1. The vegetation is composed mainly of coniferous forests with trees with needle – shaped leaves called CONIFERS.
2. The forest is the richest source of softwood
3. The forest grows in pure stands, that is, the same species cover a wide area.
4. The trees grow straight and may reach up to 30 metres, in height but in the colder regions e.g. Sibena, the trees are very short and scattered.
5. The leaves of the evergreens are shaped like needles.
6. The branches of the trees bend downwards to allow the winter snow slip-off.
7. There is sparse (little) undergrowth due to the acidic nature of the soil and because the subsoil is permanently frozen for many months of the year and are heavily leached.
8. The trees have less species unlike in the tropical forests.
9. The leaves are thick and leathery with a tough thick skin which protects them from cold winter and excessive transpiration in summer.
10. The trees have widely spaced shallow roots for collecting water from the top soil above the permanent layers.
11. The trees are well spaced and are of medium heights, usually about 30m (100ft).

12. The trunks store food and the bark is thick which protects the trunk from excessive cold.

Examples of trees found in this forest are spruce, pine, fir and larch, hamlock, cypress and cedar.

Economic Importance

1. The forest is rich in softwood which is in great demand for making paper, especially newsprints, matches, furniture and synthetic fibre such as rayon.
2. Little forms of agriculture are practised due to its subarctic climate that is characterized by long cold winters, frozen soils and low temperature with the exception of few areas such as sheltered valleys where agriculture is practised. Crops grown include cereals (barley, oats and dry and root crops which are consumed locally).
3. There is the practice of hunting and gaming in the forest which is a home for animals like beaver, polar bear, fox, wolf, mink, muskrat and stoat, all of which are hunted for because of their fur (the hairy skin).

(iii) Cool Temperate Deciduous Forest

Location: This forest can be found in North West Europe, British Columbia (Canada), Southern Chile, Tasmania and New Zealand (Oceania).

Factors affecting distribution

1. Rainfall is high and well spread throughout the year.
2. Total annual rainfall is light and relatively moderate (about 500mm-1100mm) during the summer, but concentrated during the winter.
3. Summers are warm or hot. Winters are generally cool which allows for the steady growth of plants.

Characteristics

1. The vegetation is mainly deciduous as the trees shed their leaves during the cool winter season.
2. The leaves are thin and delicate due to harsh weather conditions.
3. The vegetation is not as lush or luxuriant as the tropical rainforest.
4. It contains less species and experiences sparse or little undergrowth.
5. The trees are short with thinner trunks and thick barks to help adapt to cold weather conditions.
6. Trees are relatively few and are widely scattered.

Examples of tree species include oak, cork, cedar, cypress, redwood, eucalyptus, jerrah, karri and pine.

Economic Importance

1. The forest is an important source of hardwood that is cut for timber as it has more trees and less undergrowths that allow for more penetration into the forest and lessens operation costs of lumbering.
2. It is an important source of domestic fuel as the wood is used for warming houses during winter.
3. There are lots of economic plants which serve as food and cash crops.
4. The forests are cleared for the practice of agriculture where a lot of cereals, root crops and fruits are cultivated.
5. It also promotes animal husbandry since the undergrowths serve as pastures for the animals.
6. The forest favours hunting and trapping of animals for game.
7. The climatic condition of the forest favours the cultivation of fruits.

(v) Tropical Grassland

Location: These are located mainly in the continental regions of tropical latitudes where the rain falls in the hot season which lasts for months. The places include the north and south of the Zaire Basin, West African and East

African Plateau, parts of Brazil, the Guiana Highlands, north and east of the Australian Desert and Parts of the Indian Deccan Plateau.

Factors Affecting Distribution

1. Light to moderate annual rainfall usually less than 1500mm but mostly between about 500mm to 1000mm.
2. All the rain falls during the rainy season. The dry season is normally without rainfall. The rainy season varies between three and eight months depending upon the location of the rain bearing winds.
3. Temperatures are high throughout the year with each month having more than 18⁰C (64⁰F). These temperatures allow for the tropical characteristics of the vegetation.
4. Humidity is high during the rainy season usually more than 60%. It is lower during the dry season, usually less than 40%.
5. There is uniformly high intensity of solar radiation and sunshine.

Characteristics

1. The vegetation is made up of large grasses with trees and shrubs scattered all over.
2. Tall grasses dominate the plant life of these regions even though trees are common especially near water courses (rivers) and in the more humid areas where the region merges with the equatorial forests.
3. The height of the grasses are usually 2 metres (approximately 6 feet) high or more and they grow in compact tufts but vary from about 2 – 3 metres near the tropical rainforests to less than 1 metre near the desert.
4. The grasslands usually contain scattered trees. These are fairly tall about 10 – 20 metres or more near the forest and less than 10 metres near the deserts. The scattered nature of the trees give rise to less transpiration than in the forests.

5. The trees and a lot of the grasses usually have long roots which can be used to draw up water during the dry season. During the dry season the leaves of the grasses turn yellow and die but the roots remain dormant (sleeping). These grasses are deciduous in nature.
6. The trees are also deciduous. They shed their leaves in the dry season. This reduces transpiration from the trees.
7. The character of the vegetation varies with the proportion of woody trees and shrubs. Hence, different structural types of savanna are recognized: guinea (woodland) savanna, trees savanna, shrub savanna, grass or park savanna and scrubs.
8. Some of the trees e.g. baobab store water in their big trunks for use during the dry season. In addition they possess thick barks which help reduce transpiration.
9. Many of the trees have umbrella shape or canopy which shield their roots from the heat of the sun.
10. The trees are shorter than trees in the rainforest. They have a height of 5 – 15 metres along the forest margins.
11. The trees are resistant to drought and fire.
12. The vegetation is sometimes characterized by gallery forests along river banks since the ground is moist.
13. The vegetation contains useful economic trees such as the locust bean tree and the shea butter tree.
14. Where the grassland merge with the hot deserts, the vegetation changes greatly as there is no longer a continuous vegetation cover, instead clumps of scrubs-like plants scatter the surface to depict the change in climate and vegetation.

Economic Importance

1. The trees provide useful wood for timber.

2. The grasses are used for grazing and animal husbandry.
3. There are lots of economic plants which provide food and cash crops such as shea butter and locust bean tree.
4. When the vegetation is cleared, the tropical grasslands provide useful areas for crop cultivation.
5. When burnt, the ashes of the vegetation provide useful fertilizer that nourishes the soil.
6. Trees are cut for fuel to meet domestic consumption.

(vi) Temperate Grassland

Location: This vegetation are best developed in the continental interior of temperate latitudes e.g. the hearts of Asia and North America. Less extensive areas occur in South Africa, South America and Australia.

Factors Affecting Distribution

1. The areas have generally light rainfall of between 450mm and 650mm.
2. The temperatures are high in summer usually more than 25⁰C (77⁰F) and cold in winter normally below freezing point.
3. Evaporation is high in summer when the regions are exposed to high insolation and sunshine.

Characteristics

1. These grasslands are almost treeless and they contrast sharply with the tropical grasslands.
2. The grasses are shorter and less luxuriant than those of the tropical grassland, generally sparse and often in discontinuous clumps.
3. During the heat of summer, the grass begins to wither and most of it dies in the autumn or fall. The roots become dormant and do not die.

With the coming of the spring, new leaves form and the land is once again covered with a green mantle. The grasses can grow steadily with very little moisture.

4. A few trees, such as poplars, willows and alders, grow in the damper soils flanking or close to water courses.
5. On the poleward side, the temperature grasslands often merge with coniferous forest, while towards the equator, they merge with scrub vegetation found in some semi-deserts.
6. The few areas found in this vegetation are deciduous in nature.
7. The grasses in this vegetation zone are more nutritious than those of the tropical grassland.

Economic Importance

1. The grasses are used for feeding and fattening livestock, as this vegetation zones serve as one of the major pastoral zones of the world.
2. Temperature grasslands are good for large cultivation of grains such as wheat and corn in the Prairies of North America, Downs in the Murray-Darling lowlands of Australia, etc.
3. The sheep and goats raised from livestock farming are reared to provide valuable wool for export.
4. The area is also rooted for the practice of mechanized agriculture where crops such as wheat, barley, etc are cultivated.

Desert Vegetation

Desert vegetation is divided into two: hot desert vegetation and cold (Arctic) desert vegetation.

(a) Tropical Desert Vegetation

Location: This vegetation can be found between latitudes 15°N and 30°N and latitude 15°S and 30°S . They lie on the western sides of land masses

except for Africa where they extend from coast to coast linking up with the Asian deserts. The chief regions having desert vegetation are: Sahara (North America), Arabia, Part of Iran, Iraq, Syria, Jordan and Israel, Part of Pakistan, central Australia, the Namib Desert (South West Africa), Atacama (coastal Peru and Northern Chile) and southern California, northern Mexico and parts of Arizona (North America).

Factors Affecting Distribution

1. There is little or no rainfall throughout the year.
2. There is relatively high temperature in the afternoon and low temperature at night through the year. This often results in high range of temperature.
3. The sky is cloudless throughout the year as a result of low moisture.
4. The location of deserts within the subtropical high pressure belts from where winds and air masses diverge which makes the formation of clouds and rain virtually impossible and hence the absence of tangible vegetation.
5. Along the coast, the presence of cold ocean currents cause winds blowing from the coast to be stable and dry and not rain – bearing or moisture laden.
6. There is excessive transpiration resulting from intense insolation and sunshine.
7. The abundance of poor, infertile, immature or saline soils that do not promote plant growth

Characteristics

1. The vegetation consists mostly of a ground cover of some shrubs such as lichens and mosses.

2. There are few tree species such as stunted cactus and baobab and they belong to the group of drought resistant plants known as xerophytes.
3. Most of the deserts are devoid of vegetation except for areas receiving rainfall of 200 to 250mm which supports the growth of thorny shrubs or rough pasture.
4. Some of the plants have waxy or needle – shaped leaves which help reduce the loss of moisture through transpiration.
5. Most of the plants possess dormant roots which only sprout until the rain which makes them germinate fast.
6. The grasses are coarse and tough.
7. This vegetation occurs in places where water exists in deserts known as *oases* and a typical species found is the date palm.
8. Most of the plants have thick bark bloated stems. and Water is stored during dry periods that will help withstand drought and hot temperature.
9. The common plants include cactus, thorn bushes, date palms and coarse grasses.
10. Most of the plants are shortlived as rain do not last long enough to sustain their continuous growth.

Economic Importance

1. Irrigation farming is practised in the oases and along river courses where cash and food crops are produced e.g. Nile valley in Egypt.
2. Few economic trees are grown in the zone especially date palms.
3. Some ethnic groups found in the deserts are traditional hunters and fruits gatherers e.g. the Bushmen in the Kalahari Desert and the Aborigenes in Australia.

(b) Temperate Desert Vegetation or Tundra

Location: This type of vegetation is largely confined to the Northern Hemisphere especially areas fringing the Arctic Ocean in the continents of Eurasia and North America and Antarctica.

Factors Affecting Distribution

1. Precipitation distribution is low and is mostly in the form of snow.
2. Temperatures are extremely low below freezing point for a greater part of the year.
3. The surface soils are thin, poor, infertile and permanently frozen.
4. There is general absence of heat throughout the year due to reduced insolation.

Characteristics

1. The vegetation consists mainly of a group or groundwater of scrubs like lichen and mosses.
2. Stunted willows and birches are usually the only tree-like plants that are often found.
3. The plants bloom or sprout during the onset of the brief summer.
4. The growing season is very short lasting about two months during which the surface soil melts but the subsoil remains frozen, a situation that encourages waterlogged conditions which clears as winter rolls in.
5. Where the tundra meets the coniferous forest, stunted willow and birches emerge.

Economic Importance

1. The area is used for semi-nomadic life where few livestock are raised.
2. Other human activities such as hunting, fishing and fruit gathering is practised.

Summary

- Vegetation is a collective term that refers to all aspects of plant life and cover in a particular place.
- The most important factors that affect the growth and distribution of vegetation types are climatic factors (rainfall, temperature), soil and man.
- There are three forms of plant life: forests, grasses and deserts.
- Plant replace themselves within a particular place passing through some stages.
- Forests grow where there is heavy rainfall throughout the year or for most part of the year. Forests could be tropical or temperate.
- All grasslands contain grasses and trees but the height, number and types depend largely on the amount of rainfall received in each region.
- Tropical forests contain mainly hardwood while temperate forests are made up of softwood.
- Plants have different ways of adapting to harsh conditions within the environment.
 - When an original vegetation is cleared and other plants emerge or are planted by man, the vegetation is often referred to as man-made or artificial vegetation.

Objective Questions

1. The term 'natural vegetation' means
 - A. any food that grows.
 - B. crops grown by man.
 - C. plants and trees which need cultivation in order to grow.
 - D. plant and trees which grow without any interference or assistance.
2. Natural vegetation is least influenced by
 - A. altitude.

- B. climate.
 - C. soil.
 - D. distance from the sea.
3. Sparse vegetation growing in a very cold area is called
 - A. coniferous vegetation.
 - B. deciduous forest.
 - C. grassland.
 - D. tundra.
 4. Vegetation over most of the coastal areas of West Africa is
 - A. equatorial forest.
 - B. tropical rainforest.
 - C. coniferous forest.
 - D. Sudan savanna.
 5. In Western European climate areas, the natural vegetation is
 - A. coniferous forest.
 - B. temperate grassland.
 - C. tundra.
 - D. savanna.
 6. Which of the following types of vegetation is not found in West Africa?
 - A. Cool desert.
 - B. Semi-desert.
 - C. Sahel savanna.
 - D. Tropical rainforest.
 7. The name given to the forests of the Amazon Basin is
 - A. Selvas.
 - B. Prairies.
 - C. Pampas.
 - D. Savanna.
 8. Which of these trees are found in the Taiga?

- A. Oak and ash
 - B. Teak and Sapele
 - C. Pine and fir
 - D. Beech and elm
9. Which of the following is a tropical grassland?
- A. Pampas
 - B. Prairie
 - C. Steppe
 - D. Campos
10. The cactus is adapted to desert conditions by
- A. possessing fleshy leaves
 - B. possessing leaves that hang down
 - C. shedding leaves during storms
 - D. possessing lateral roots

Essay Questions

- 1a. Describe the characteristics of temperate vegetation.
- b. Suggest the economic value of this vegetation type of the inhabitants of the region.
- 2a. Choose any TWO of the following vegetation types:
- (i) Coniferous forest
 - (ii) Deciduous forest
 - (iii) Tundra
 - (iv) Mediterranean forest
- b. (i) For each, describe the vegetation characteristics.
- (ii) State how the vegetation has been influenced by climate.
- 3a. Define vegetation.
- b. Describe the factors affecting the growth of vegetation.
- 4a. Give two similarities and two differences between coniferous forest and tropical rain forest.
- b. Give any three ways in which tropical grassland are important to man.

- 5a. State four ways of preserving deciduous forests.
- b. Identify four human practices that affect the growth and distribution of vegetation.