



Dr. Blosa Science

Sponsored by
The Science Foundation College
Uganda East Africa
Senior one to senior six
+256 778 633 682, 753 802709
Based On, best for science

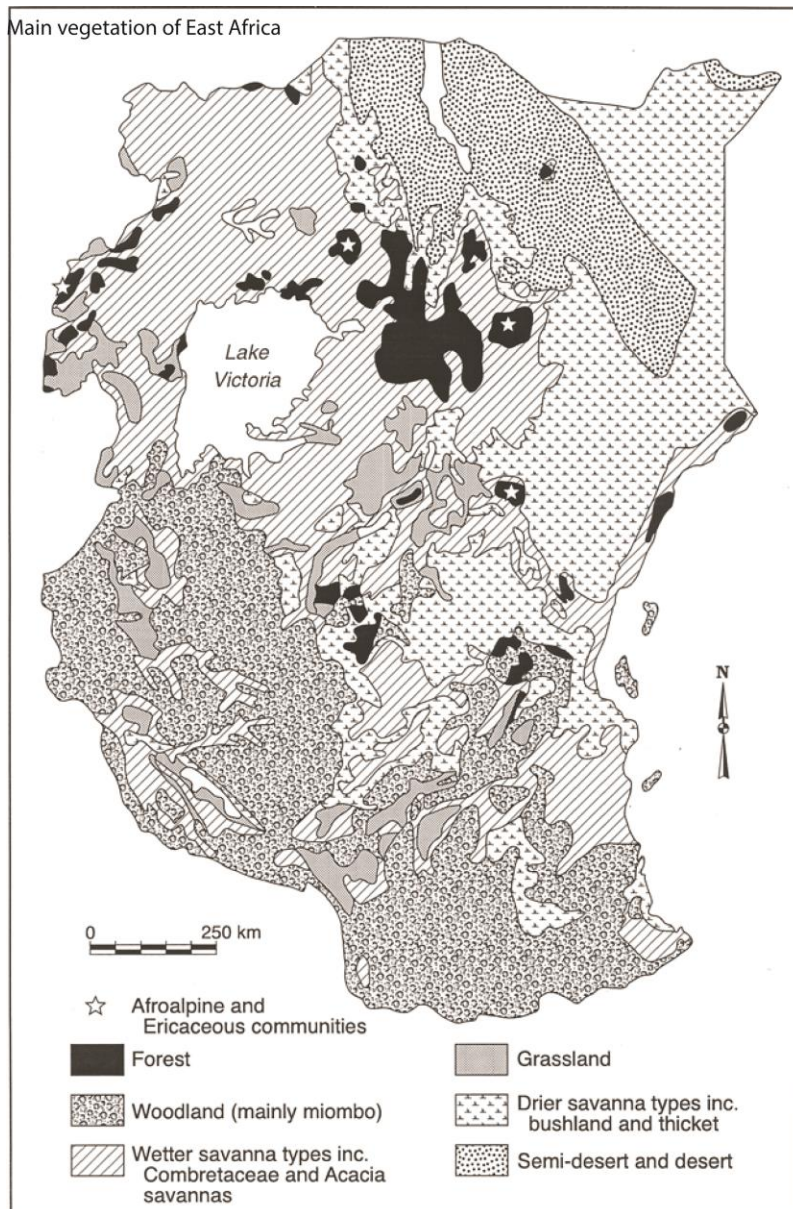
digitalteachers.co.ug



Nurture your dreams

Physical geography Chapter 14: Vegetation in East Africa

Vegetation is a continuous plant cover.



Natural vegetation types of East Africa include

- **Tropical evergreen/Equatorial rain forest** is found around the Lake Victoria shores, and the island areas such as Kalangala, the coastal strip of Kenya and Tanzania, and the highland areas of East Africa.
- **Savanna woodland** is most distinctly found in Miombo, Tanzania
- **Savanna grassland** is most wide spread type of natural vegetation in East Africa found on the interior plateaus of Kenya, Uganda and Tanzania
- **Dry bush thicket (semi –arid) vegetation** is found in dry parts of East Africa
- **Montane (mountain/highland) vegetation** is found on high mountains of East Africa which include Rwenzori, Muhavura, Elgon and Kilimanjaro
- **Wetland (swamp) vegetation** is found along river/valleys and on shores of lakes and on the mudflats forming the mangrove forests.

Savanna g vegetation

Savanna vegetation lies between the tropical forest zone and desert areas. It is classified into:

Tropical woodland/savannah wood land

It lies near tropical rain forests. Very common in parts of western and south western Tanzania (Miombo woodland), some parts of Northern Uganda, parts of Rift valley region like the lake George and Albert flats, parts of South and Eastern Kenya etc.

Characteristics

- Continuous cover of trees
- Trees are of moderate height (8-16m high)
- Trees are umbrella shaped
- There is dense growth of grass, bushes and shrubs (dense undergrowth).
- Trees are intermingled with xyrophytic thorny lianas, cacti and a few hardy shrubs.

Savannah grassland

This lies between woodland and dry thicket bushes. Very common in the Nyika plains of Kenya, rift valley floor of western Uganda, northern Uganda and also areas around Bukoba in Tanzania etc.

Characteristics

- The dominant vegetation are grasses that grow up to height of 1m high.
- The dominant grass species include elephant and spear grass.
- There are scattered short trees.
- The grass cover turns brown during dry seasons and green during wet seasons.

Dry bush and thicket/scrub dry savannah vegetation

Very common in Northern, Western, North-Eastern and North Western Kenya. (Turkana land), North-Eastern Uganda (Karamoja,) some parts of Ankole - Masaka corridor, parts of central Tanzania etc.

Characteristics

- Have thorny -bushy trees with scrub growing in between.
- Very short grasses more tufted with bare land between the scattered thorny bushes.
- Stunted trees with woody stem.
- Less than 8 meters in height

NB: *General characteristics that cut across all the forms of savannah vegetation include:-*

- Umbrella shaped trees
- Deciduous trees (shed off leaves during dry seasons).
- Dominant tree species include Acacia, baobabs, cacti etc.
- Trees have gnarled trunks (twisted) with thick barks.
- Trees have tiny leaves to restrict transpiration.
- Trees tend to be drought resistant i.e. have thick barks, swollen trunks and long tap roots.
- Trees are fire resistant.
- Most trees develop branches close to the ground
- Trees have waxy barks and leaves

Conditions that favoured the growth of savan vegetation

- Climate: moderate rainfall distributed in seasonal pattern i.e. 760- 1000mm favors woodland, 500 – 760mm for grassland and 250-500mm for dry bush thicket.
- High temperature approximately 24°C for woodland, 27°C for grassland and 30°C for dry bush thicket.
- Relief: savanna vegetation is favored by flat surfaces or gentle slopes while lowlands favor dry thicket.
- Soils: fairly fertile soils with a low retention capacity favor woodland, moderate fertility, latosols for grassland, poor soils for dry bush.
- Drainage: limited surface drainage lead to growth of shrubs and short trees resulting in woodland
- Biotic: overgrazing by wild and domestic animals, bush burning, deforestation by man, action of pests like termites, locust change the character of the vegetation

The factors for the decline of savannah vegetation in East Africa with illustrations

Human activities which include:

- Over stocking which has led to over grazing, changing grassland to dry thicker

- Uncontrolled bush burning for fresh pasture has changed grassland to dry savannah.
- Tree cutting for building materials has destroyed woodland turning it into grassland.
- Clearing of woodland savannah vegetation to create land for cultivation and settlement has changed woodland into grassland. Very common in Kayunga district.
- Mining/quarrying activities have led to the destruction of wood land changing it into savannah grassland common in Busia, Mubende etc.
- Increased demand for fuel wood e.g. firewood and charcoal has led to wood land changing into grassland common in Nakasongola.
- Construction of transport routes like roads, railway lines has led to clearing of wood land savannah turning it into grassland.
- Industrialization in E.A has led to the destruction of savannah woodland due to a wide demand of land and firewood. E.g. Hima and Tororo cement factories have changed the woodland into grassland.
- Borehole drilling that lowers the water table has transformed the grassland into dry savanna.

Other factors:

- Prolonged dry seasons that have led to desert conditions e.g. in Eastern Uganda, Eastern Kenya changing the grassland into dry bush and thicket
- Pests and diseases e.g. termites, caterpillars, harvester ants have destroyed savannah grassland vegetation changing into dry bush and thickets. Common in Nakasongola, Katakwi district etc.
- Natural fires during prolonged dry seasons have destroyed savannah grassland changing it into dry thickets. E.g. in Northern Kenya.
- Use of savannah grasslands as game parks has led to over grazing of grass and browsing of trees by wild animals e.g. elephants turning it into dry bush and thickets e.g. Murchison fall national park.
- Influence of the dry prevailing winds which further intensify the drying effect has led to the degeneration of grasslands to dry bush and thickets. E.g. North Eastern Kenya etc.

Semi desert vegetation

The semi desert vegetation has the following characteristics

- The vegetation has bush thorny trees with scrubs growing in between.
- Many plant have deep /tap penetrating roots that enables them to draw water from underground
- Many plants have tiny thorny leaves that help them to reduce the rate of water loss e.g. cacti, acacia etc. and to deter animals which may wish to eat them
- Some trees have swollen trunks in which they store water for use during the long dry seasons e.g. Baobab.
- Some desert plants particularly those in the cactus family have stems that swell up with water only to contract later as moisture is slowly lost through transpiration.
- In some desert plants e.g. the cacti transpiration takes place through the stems but is reduced by the stomata closing during the day and opening it at night to control loss of water.
- Stems of some desert plants e.g. Australian eucalyptus have a thick, waxy cuticle / bark to control loss of water through transpiration.
- Plants such as creosote bush, desert holly, sage and saltbush have roots that spread out over wide areas near to the surface to take advantage of any rain or dew to support their growth due to limited rainfall.

- Some desert / semi-desert plants for example the cactus in the Sahara, Namib desert have very long roots that may exceed 15metres deep to tap underground water supplies.
- Desert plants such as cactus, desert holly and creosote are widely spaced to avoid congestion and competition for water.
- Some desert plants e.g. the cactus have bulbous roots for storing water for use during the long periods of drought which may be more than 10 metres.
- Seeds of deserts plants have a thick case that protects the inner centre. This enables them lie dormant for months or even several years until the next rainfall. The thick case provides protection against pests and animals.
- Some desert plants e.g. salt bush in the Sahara and Namib Desert are halophytic and can survive in salty depressions while others like date palm survive where water table is near enough to the surface to form Oases.
- Many of them can complete their life cycles in two or three weeks during periods of short lived rains. These are termed as ephemerals. An occasional downpour produces a short lived burst of plants grown where shrubs and herbaceous plants like sunflower primroses, poppies, lupines exotically for a brief season and a carpet of grass springs up, soon to be scorched by the heat.

The conditions that have influenced the distribution of semi - desert vegetation in East Africa include

- **Climate;** Hot temperature above 30°C with dry winds and high rates of evaporation favour growth of short grass and scattered trees.
 - Prevalence of rainfall ranging from 250mm- 625mm which is unreliable that cannot support luxuriant vegetation cover. Under such circumstances plants have a short cycle of germination, leafing, flowering and fruiting as well as seed dispersal.
 - Very low level of humidity due to absence of big water surfaces have led to the growth of drought resistant vegetation.
- **Soil/edaphic factors:** Desert vegetation grow in alkaline sandy soils with limited moisture and humus content for example in Chalbi desert of Kenya, parts of Eastern Somalia, Kalahari and Sahara desert. Infertile, sandy, skeletal soils with limited humus content discourage the growth of luxuriant vegetation thus the growth of semi desert vegetation in areas like Albert flats etc. Highly porous soils with a low moisture retention capacity in North Eastern Uganda and N. Western Kenya have encouraged growth of trees and grass clusters
- **Drainage:** In Oases areas, date palms and other relatively luxuriant plants such as creosote bush grow for example in the Quattara depression in Egypt. In areas of salty depressions halophytic plants such as Salt bushes grow. In areas of extreme limited surface drainage dwarf prickly, small brittle heath-like plants grow in scattered haphazard patterns.
- **Relief:** This is the general appearance of the landscape. Desert/ Semi-desert vegetation generally grow in areas of low-lying relief (with less than 1200m above sea level) with hot temperatures and limited rainfall such as much of the Sahara or in the leeward side of high mountains such as the Atlas mountains in Algeria, Tunisia, growth of stunted short bushes.

The leeward *side* of mountain has led to growth of drought resistant trees in Turkana land, Kotido due to limited rain fall, humidity and hot temperatures.
- **Altitude:** This is the height of land above sea level. Much of the hot desert vegetation grow in areas of low altitude not exceeding 1200m above sea level for example the Namib desert near all the Atlantic

ocean, Sahara desert in Northern Africa near the Atlantic ocean and the Red and Mediterranean seas (near sea level). Such areas are characterized by hot temperatures which lead to growth of drought resistant vegetation.

- **Biotic factor** such as the influence of wild animals, camels, pests such as locust, caterpillars affect growth of luxuriant desert vegetation. Locusts destroy much of the vegetation in the Sahara desert leaving only a few species such as the thorny cactus and dried-Like tree stumps surviving.
- **Human activities** have influenced growth of desert vegetation both positively and negatively. Positively conservation policies of desert vegetation in countries like Libya, Chad and Egypt have encouraged its growth. In contrast, activities such as settlement and cultivation along the Nile valley in Egypt, Quattara Oases, Okavango basin in Namib Desert have led to deterioration/ destruction of desert vegetation.

Tropical rain forests

Tropical rain forests are the natural forests within the tropics. They can be classified into Mangrove, Riverine, Montane and Tropical low land forests.

Characteristics of tropical rain forests

- Trees are tall up to a height of 60m and above due to competition for sun light.
- Trees have/ are of hard wood nature/ species e.g. mvule, musizi, Mahogany, Teak, Rose wood, Red heart, Iron wood etc. due to long gestation period.
- Trees are ever green, shading off leaves at different intervals throughout the year because of constant supply of rainfall hence continuous growth.
- Trees form a dense canopy which is usually in three layers /tiers i.e. the bottom layer, middle and top layers due to growth of trees at different intervals or age and sprawl to form canopies.
- Tropical rain forests have little or no under growth due to thick canopies which prevent sunlight from reaching the ground.
- Trees have broad leaves that allow evaporation to get rid of excess water.
- There are a variety of tree species i.e. trees grow in mixed stands, growing abundantly due to ample water supply e.g. palms, mvule, Mahogany etc.
- There are numerous climbing trees like Lianas, epiphytes etc. that get support from the tall and huge trees. Trees have long gestation period/take long to mature i.e. 60 years and above due to their great height and the size.
- Trees have straight and big trunks due to ample supply of water.
- Most trees have buttress roots that give support to the tall and huge trees etc.

The conditions which favoured the growth of tropical rain forests in Africa

- **Climate:** Tropical rain forests require heavy rainfall which is well distributed throughout the year of over 1500mm e.g. The Congo Basin forests, Mabira forests etc.
- They also require hot temperature ranging between 22°C- 28°C which increase humidity in air, hence rainfall for tree growth.
- Existence of high humidity level of about 80%. This promotes luxuriant tree growth

- Presence of adequate sunlight for plants/trees to manufacture their food through photosynthesis which promotes plant growth.
- **Soils:** Tropical rain forests require deep fertile soils along mountain slopes, gently sloping areas, alluvial soils that exist along river valleys e.g. along river Niger in Nigeria, R Congo promotes riverine forests and along lake shore such as L. Victoria.
- **Relief:** Tropical rain forests are found along slopes of mountains e.g. Rwenzori forest on Mt Rwenzori and plateaus.
- Low lands e.g. along the East African coast where there are Mangrove forests and along river valleys favor riverine forests such as Katonga forest.
- **Drainage.** Tropical rain forest require well drained areas especially along the gentle slopes of mountains e.g. Mt Kenya, Marsabit and low laying areas such as Buikwe where Mabira forest have grown.
- Water logged areas especially the East African Coast have favored the growth of mangrove ever green forests at Mombasa, and Dare es Salam and along the West African coast of Nigeria, Ghana.
- **Altitude:** Tropical rainforests are found at a low altitude of between 1000m - 2000m above sea level on slopes of mountain/ highlands e.g. Mt Kilimanjaro, M t Kenya and low laying areas where forests such as the Congo basin forests, Budongo have grown.
- **Government policy** of gazatting/ conservation of forest reserves has led to the growth of tropical rain forest e.g. Mt. Kei forest reserve in Uganda etc.

Mangrove forest vegetation

Mangrove forests grow in valleys, lake shores and mudflats in areas along the coast of East Africa between 5^oN and 5^oS of equator, around Mombasa, Dar-es-Salaam, Tanga, Lamu, the lower valleys of Rufigi and Ruvuma etc.

The characteristics of Mangrove forests include:

- The trees are evergreen because of high rainfall received throughout the year.
- Trees have broad leaves to get rid of excess water.
- Trees have aeri¹/silt roots to support the stout trunks and keep them grow above the water level for respiration.
- They are hard wood trees because they take long to mature.
- Trees have dense bushy stands because of hot- wet conditions and ample supplies of nutrients.
- Have belts of various species that grow parallel to the shore.
- Have grey leathery foliage that appears to float on the water.
- Trees have short stumpy trunks in low tidal waters.
- Trees have medium height due to ample supply of sunlight

The conditions that have influenced the distribution of mangrove forests in East Africa

- **Climate.** Heavy rainfall of over 1000mm, high humidity levels of over 80% and hot temperatures of 24°C- 30°C leads to the growth of luxuriant mangrove forest.

- **Soils.** They grow in impervious clay soils, peat soils. Mud flat alluvial soils, deep saline/coral soil facilitate, luxuriant growth of mangrove forests.
- **Altitude.** Found at low altitude of below 200m which is associated with high temperatures and heavy rain fall
- **Relief** Found in coastal lowlands and broad valleys/creeks which favours accumulation of silt, mud, alluvial soils that support mangrove forests.
- **Drainage.** Mangrove forests grow in poorly drained/soggy/water-logged and saline water conditions.
- **Presence of barrier reefs/coral reefs** along the coast that prevent the alluvial soils from being swept away by wave action.
- **Presence of low Tidal range of water** that creates marshy conditions which favour the growth of mangrove forests.
- **Government policy.** Governments have gazetted mangrove forests leading to their continuous existence (conservation).

However on the other hand, man is encroaching on the mangrove forests for extracting building materials/poles cultivation of water loving crops etc. hence reducing the area covered by these forests.

Influence of altitude on vegetation zonation of the highlands of East Africa

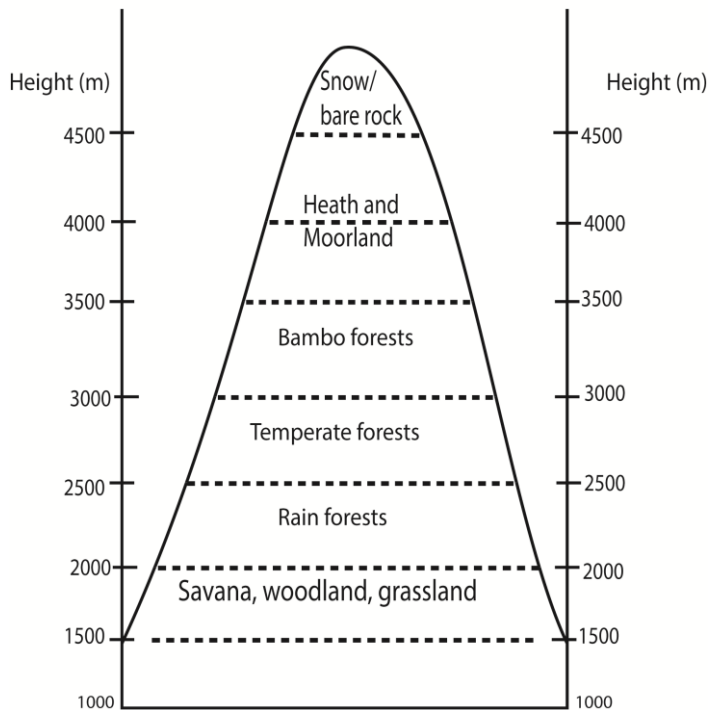
Vegetation changes from the bottom to the top of highlands in such a way that the types of vegetation can be identified.

Highlands of East Africa include Mt. Kenya, Mt. Rwenzori, Mt. Kilimanjaro, etc.

Role of altitude on vegetation zonation on highlands of East Africa

Vegetation zones on the above highlands can be illustrated as follows.

Altitudes on vegetation in East Africa



Attitude influences the above vegetation zonation in the following ways:

- At the height of between 1000m-1800m above sea level, there is savanna vegetation i.e. grassland vegetation and woodland.

Savanna grassland is characterized by:-

- Tall grass e.g. elephant grass
- scattered trees
- grass dries during the dry season
- there is a lot of scrub, bush and thickets with stunted vegetation.

This is because at this altitude there is:

- low rain fall of less than 750mm
- low humidity of less than 40%
- hot temperatures of about 29°C
- Fairly fertile soils
- human interference like mining cultivation, settlement etc,

This is followed by savanna woodland characterized by :

- More trees which are umbrella shaped
- Trees are deciduous,
- Trees are drought resistant with swollen trunks , small leaves to control water loss etc.

This is due to the following conditions:

- moderate rain fall of about 1000mm

- Hot temperatures of about 27°- 29°C moderate humidity
- fairly fertile soils and well- drained soils
- At an altitude of between 2000m- 2500m above sea level, rain forests exist.
 - This is characterized by:**
 - tall trees of about 50m,
 - evergreen trees with broad leaves
 - buttress roots , climbing plants like lianas etc.
 - This is due to the following conditions:**
 - heavy rain fall of between 1500 -2000mm
 - hot temperatures of about 27°C
 - deep and fertile soils
 - less human interference
 - well drained soils .
- At an altitude of between 2500m-3000m above sea level; temperate forests exist although not common to all highlands of East Africa
 - They are characterized by:**
 - soft wood trees like pine, camphor trees
 - have small leaves
 - trees are evergreen
 - trees are conical in shape
 - needle shaped leaves etc.
 - This is due to:**
 - reducing rain fall totals
 - cool temperatures
 - shallow/ thin soils
 - well drained soils.
- At an altitude of 3000m 3500m above sea level, bamboo forests exist.
 - These are characterized by:**
 - segmented stems that are hollow
 - small tough pointed leaves, evergreen trees
 - have prop roots
 - appear in single layers etc.
 - This is due to the following conditions**
 - cold temperatures /cool temperatures
 - reduced rainfall
 - thin soils
 - well drained soils

- Between 3500m -4500m above sea level. Heath and moorland exists.

These are characterized by short grass

- Alpine shrubs /bushes
 - Everlasting green flowering plants.
 - Plants like groundsel, lobelia
- At an altitude above 4500m above sea level mosses, lichens exist

This is due to the following conditions

- cold/ cool temperature
- extremely low rain fall or no rain fall
- very thin soils
- Poorly drained soils due to melting of snow

Modification/destruction of natural vegetation in East Africa

Natural vegetation has undergone destruction (hence modification) in several areas of East Africa mainly due to human activities and natural factors

Human activities have led to destruction of natural vegetation include.

- Agriculture which requires/involves opening up large tracts of vegetation cover/land either for commercial or subsistence cultivation such as Lugazi sugar works, Kenya highlands, Kigezi highlands etc.
- Forestry activities such as lumbering, harvesting fuel wood for domestic and industrial use, building and construction etc.
- Clearing of forests/grassland for settlement
- Urbanization which involves both increased settlement and industrial development, construction lines, etc.
- Animal grazing in nomadism, ranching and dairying etc.
- Mining and quarrying
- Bush burning
- Swamp reclamation
- Dumping and pollution

Natural factors that leads to destruction of natural vegetation include

- Wild animal that feed on grasses and tree leaves e.g. elephants, zebra, cob etc.
- Wild fires
- Floods
- Vulcanicity

Measures to protect natural vegetation

- the government should put in place organs to protect the environment such as NEMA, NFA, LCs etc.
- the government should formulate and implement environment protection policy.
- Public education on environmental protection should be intensified
- The number of wild animals should be controlled in the national parks
- Public is urged to control their animals in ranches and traditional grazing land
- Afforestation is carried out by communities and NFA
- Selective harvesting of vegetation/trees should be carried out to allow natural rejuvenation
- Communities should be encouraged to practice rotational grazing
- Communities should be encouraged to control stock animals in ranches and traditional grazing land.
- Provide alternative source of energy such as using solar energy and rural electrification to minimize destruction of vegetation.

Mediterranean vegetation

Mediterranean vegetation occurs on the West coast of the continents in the mid-latitudes i.e. the Mediterranean Basin, California, Central Chile, South west Australia and the Western cape province of South Africa.

Characteristics of the Mediterranean vegetation

- Composed of broad leaf ever green trees such as oak, eucalyptus, redwood due to wetter winters and resist dry summer conditions
- Much of the woody vegetation in Mediterranean is sclerophyll/hard leaved. Vegetation generally has small dark leaves covered with a waxy outer layer to retain moisture in dry summer months.
- Plants like grapes vines have long tap roots which reach down the moist rocks
- There are sweet-smelling herbs and shrub e.g. lavender, rosemary, thyme and oleander.
- Mixed type of vegetation with coniferous, tough grass and dwarf trees.
- Short grass is common especially in the Mediterranean grassland of California central valley
- Many shrubs have strong scent.
- Shrubs are widely spaced to reduce competition for water
- In the drier margins there are quick sprouting plants that complete their life cycle short period that completes in a short period.

Factors which favored the growth of Mediterranean vegetation

Climate

- Hot dry summer of about 25°C
- Cool and moist winter with about 12°C
- Annual rainfall of between 500mm – 700mm

Soils

- The ashy Mediterranean residual soils support Mediterranean vegetation
- Limestone soils are porous which drain easily hence deep root system of plants
- Mediterranean regions are semi-arid often with poor soils hence scrubs.

Altitudes

- Mediterranean vegetation is mainly found along the coastal area with low altitude, except for the atlas mountain e.g. scrubs

Latitude

- Mediterranean vegetation is mainly found between 30° and 45° north or south of the equator
- Areas with Mediterranean vegetation are located mainly on the western sides of the continents because of maritime conditions.

Influence of human activities

- Human activities such as logging, overgrazing, agriculture, urbanization have extensively reduced Mediterranean vegetation
- Many of Mediterranean vegetation plants are easily destroyed by fire

Thank you
Dr. Bbosa Science