

Strand	Physical Geography
Sub strand	Vegetation
Content Learning Outcome	Explore the factors that produce and control each biome.

Biogeography

- Study of the distribution of plants and animals over the Earth’s surface.
- **Natural vegetation** can be defined as plants that have not been grown by humans. Some types of **natural vegetation** are Forests, tundra, grass lands and rainforests.
- The Earth’s natural vegetation can be three main types – **forests, grassland and desert** vegetation.

The Ecosystem

- A natural unit in which life cycles of plants, animals and other organisms are linked to each and non - living community
- The **community** consists of all the different species within a habitat/ecosystem.
- An **ecosystem** depends on two basic processes: the **flow of energy** and the **recycling of nutrients**.

Energy Flows

- The main source of energy is the sunlight which is absorbed by green plants and converted by the process of photosynthesis. Energy is then able to pass through the ecosystem in the **food chain**.

Recycling of nutrients

Certain nutrients are continually circulated within the ecosystem. Plants take up nutrients from the soil; the nutrients are then used by plants or by animals which consume plants. When the plants/animal die, they decompose the nutrients that are released and returned to the soil ready for future use.

Copy: The Nitrogen Cycle Diagram-page 140 (Integrative Geography)

Primary Vegetation and Secondary Vegetation

Primary Vegetation – refers to untouched, unspoiled forest that exists in its original condition.

Secondary Vegetation – refers to forest that has been disturbed in some way, naturally or unnaturally. Areas with secondary vegetation have fewer varieties of plants.

Types of Natural Vegetation

There are many types of natural vegetation and they can be grouped into three main major types:

1. FORESTS

Forests refer to large areas of land that consist mainly of trees and a variety of other plants.

Distribution	Climate	
	Temperature *C	Rainfall (mm)
Between latitudes	-12 to 30*	300mm to 2000mm

Benefits of forests

- Natural Resources - Medicinal Value - Recreation - Natural Habitats
- Prevents soil erosion

Factors that produce and control each biome

Climatic

- **Precipitation** - most forests grow in areas with high rainfall (above 1000mm a year). Areas receiving little summer rainfall, trees and shrub growing there have to be **xerophytic (drought resistant)** in order to survive. Places where rainfall is limited throughout the year have either a desert biome, where **ephemerals (plants with very short life-cycles)** dominate the vegetation, or a **tundra biome, where precipitation falling as snow**
- **Temperature** - affects vegetation because if it is too cold (less than 6degrees C), few plants can grow. On the other hand, warm temperatures (above 20degreesC) allow abundant plant growth. In areas with moderate precipitation of between 200mm and 1000mm, grasslands are more common. In areas with less than 200mm of rain, deserts are found.
- **Light intensity** – affects the process of photosynthesis. Tropical ecosystems receiving most incoming radiations have higher energy inputs than do ecosystems nearer to the poles. Where the amount of light decreases as on the floor of the tropical rainforests, or with increasing depth in the ocean, plant life decreases.
- **Wind** – increase the rate of evapotranspiration and the wind chill factor. Trees are liable to bend if exposed to strong prevailing winds.

Natural vegetation is influenced mainly by climate. A climate -vegetation relationship exists because rainfall and temperature determine the type of vegetation found in a place.

- **High rainfall – forests**

- **Moderate rainfall – grassland**

- **Low rainfall – desert vegetation**

Topographic

- **Altitude** - as it increases, there will be fewer species; they grow less tall and therefore less dense cover. Relief could also bring about a rain shadow effect.
- **Slope angle** – influence soil depth, acidity (ph) and drainage. Steeper slopes have thinner soils, are less water logged and less acidic than gentler slopes.
- **Aspect** – affects sunlight, temperatures and moisture. South facing slopes in the northern hemisphere are more favorable to plant growth than those facing north because they are brighter, warmer and brighter.
- **Edaphic** – variation in vegetation is due to soil and underlying parent rock. Plant growth is affected by soil texture, structure, acidity, organic content, depth, water and oxygen content, nutrients.
- **Biotic factors** – includes the element of competition between plants for light, root space and water and competition – increases with density of vegetation.

Activity Questions:

1. Describe how the climatic factor such as precipitation and temperature influences the vegetation of an area.
2. Briefly explain how altitude influences vegetation growth.

3. Define: a.) Xerophyte b.) Ephemeral c.) Primary vegetation d.) Secondary vegetation

Strand	Physical Geography
Sub strand	Vegetation
Content Learning Outcome	Explore the factors that produce and control each biome.

Biome

A biome is a large global ecosystem and gets its name from the dominant type of vegetation formed within it.

1. Tropical Rainforest

Distribution	Ferrallitic soils (latosols)	Climate		Location
		Temperature	Rainfall	
Between latitude of 23.5°C N and 23.5°C S of the equator which has a tropical climate	Result from the high annual temperature and rainfall causing rapid chemical weathering of bedrock, Red in color because heavy rainfall causes the release of iron and aluminum from the parent material	High between 20° and 30°C and constant through-out the year. Annual temperature range under 30°C. Insolation evenly distributed through-out the year.	High 1000 mm to 2000 mm due to the convergence of the trade winds at the ITCZ Rapid evapotranspiration from rivers, swamps and trees Violent storms with heavy rain, accompanied by thunder and lightning.	Amazon Basin Malaysia and Indonesia in Southeast Asia. The Congo Basin in Africa

2. Tropical grassland

Location – located further away from the equator than the tropical rainforest biome in the central part of Africa and in South America. Examples include Llanos (Venezuela), the Campos (Brazil), central Africa surrounding the Congo Basin, parts of Mexico and northern Australia.

Tropical Continental Climate		Ferruginous soils
Temperature °C	Rainfall (mm)	
High throughout the year There is a short slightly cooler season May drop slightly at the onset of the rainy season Cloud amount is Limited	Alternating wet (occurs when the sun moves overhead bringing with it the heat equator, the ITCZ and equatorial low pressure belt) and dry season (ITCZ moves, leaving the area with strong steady trade winds)	Tend to be soft unless exposed at the surface Harden to form a cemented crust known as laterite Hold few nutrients

3. Desert Vegetation

Location	Features	Influence of soil and climate on its growth and distribution
Found at the lower latitudes between the tropic of cancer and the Tropic of Capricorn Examples. Sahara Desert in Africa is 3.5 million square miles and Atacama Desert in Chile which gets about ½ inch precipitation annually.	-very hot and dry - 20% of the earth falls in this category - Extremely hot in the day and cool at night - Fauna – very little animal survives. Those that survived have learnt to live with very little water and food. Most are nocturnal, meaning; they sleep during the heat of the day and active during the night. - Flora – plants that survive in the biome have learnt to survive with little water	Soil - because of the dry weather, there is no significant weathering of bed rock or the accumulation of organic material. In the relatively few places where the water table is near to the surface, soil moisture is likely to be drawn upwards by capillary action. Desert soils are unproductive mainly because of the lack of moisture and humus, but not particularly infertile especially when irrigation is use Climate - Hot and dry which makes it very hard for too many types of plants and animals to survive in such biomes.

4. Mediterranean vegetation

Location – found on the west coast of continents between 30° and 40° north and south of the equator.

Climate		Soils
Temperature	Precipitation	
Hot, dry summers and warm, wet winters Mediterranean areas are less warm in summer Diurnal temperature ranges are often high because many days, even in winter, are cloudless	The combined effects of orographic and frontal precipitation give high seasonal totals Annual precipitation 501mm	Are transitional between brown earths on the wetter margins and desert soils at the drier fringes Formed under broadleaved Coniferous woodland There are often sufficient roots and decaying plant material to provide a significant humus layer.

Activity Questions. (refer to pages 150 -153 Integrative Geography)

1. Identify and explain the four layers of a mature tropical rainforest
2. Describe two adaptive features of tropical rainforest and desert vegetation.
3. Explain two features of tropical grassland vegetation.

Strand	Physical Geography
Sub strand	Vegetation
Content Learning Outcome	Explore the factors that produce and control each biome.

Mediterranean vegetation features

- ✓ Vegetation mostly xerophytic (drought resistant) is described as ‘woodland and sclerophyllous scrub’.
- ✓ Sclerophyllous means ‘**hard leaved**’ and is used to describe those evergreen trees or shrubs that have small, hard leathery waxy or even thorn like leaves and which are efficient at reducing transpiration during the dry summer season.
- ✓ Trees such as olive and eucalyptus have long tap roots to reach groundwater supplies; in some cases have bulbous roots to store water.

5. Temperate deciduous forest

Location – found on the west coasts of continents between approximately latitudes 40° and 60° north and south of the Equator. Examples: north-west Europe, north-west of the United States of America, British Columbia, southern Chile, Tasmania and South Island, New Zealand.

Cool temperate western margin Climate		Brown earth Soils
Temperature °C	Rainfall (mm)	
<ul style="list-style-type: none"> • Summers are cool, warmest months between 15°C and 17°C because of the low angle of the sun in the sky and cloud cover mean monthly temperature a few degrees above freezing 	<ul style="list-style-type: none"> • Often exceeds 2000 mm annually • Falls throughout the year • Snow is common in mountains 	<ul style="list-style-type: none"> • Due to the decomposition of leaf litter, organic matter is incorporated as mull into the A horizon • Tend to be free-draining; they do not have a hard pan • Deeper than podsol because tree roots can penetrate and break up the bedrock

Features

- ✓ Deciduous forest means a forest in which the leaves fall off the trees when the winter comes. Epiphytes often grow on tree trunks
- ✓ Forest floor has a reasonably thick leaf litter which is readily broken down by the numerous mixing agents living in the relatively warm soil; there is a rapid recycling of nutrients although some are lost through leaching.

6. Coniferous forest/taiga

Location – Coniferous forests occurs in cold climates to the pole ward side of 60°N in Eurasia and North America as well as at high altitudes in one temperate latitudes and in Southern Chile. Examples: Japan, China, Europe and North America.

Cold Climate		Podosols
Temperature °C	Rainfall (mm)	
<ul style="list-style-type: none">• Minimum mean monthly temperature 25°C• Snow is frequent• Summers are shortstrong winds (high wind-chill factor)	<ul style="list-style-type: none">• Light throughout the year because the air can only hold limited amount of moisture	<ul style="list-style-type: none">• Develop in areas where precipitation exceeds evapotranspiration• Usually occur in places with a cool climate

Coniferous forest, vegetation composed primarily of cone-bearing, needle-leaved, or evergreen trees, found in regions of the world that have long winters and moderate to high annual precipitation.

The northern Eurasian coniferous forest is called the **taiga**, or **the boreal forest**. Both terms are used to describe the entire circumpolar coniferous forest with its many lakes, bogs, and rivers.

Features

Cone shaped tree (think Christmas tree) - allows snow to slide of the tree branches easily and prevents increase weight of the branches which can cause them to break

- Trees are evergreen
- they adapt to extreme conditions instead of shedding their leaves
- Forests have only one variety of trees in each area, e.g. pine, fir, spruce.
- Very little undergrowth except for mosses, lichen and leaf litter on the forest floor.
- The leaves are small, needle-shaped, waxy and leathery to minimize water loss and prevent the accumulation of snow
- Roots – shallow roots which enable them to absorb water from the surface during the short warm months. Roots do not go deep as the ground may be permanently frozen, even during the summer.

Activity Questions (Refer to Integrative Geography pages 150-155)

1. State a climatic feature of temperate grassland and tundra vegetation.
2. Outline two features of temperate grassland vegetation.
3. Describe an adaptive feature of tundra biome.