

O Level Elective Geography

Chap 3: Types of Natural Vegetation

	Tropical Rainforests	Tropical Monsoon Forests	Mangrove Forests (Mangroves)	Coniferous Forests
Distribution in the world	• Between 10° N & S of the Equator	• Between 10° to 25° N & S of the Equator	• Between 23.5°N & S of the Equator	• Between 60° & 70° N of the Equator
	• Tropical equatorial climate: high temp (27°C) & high rainfall (1500mm)	• Tropical monsoon climate: high temp (26°C) & high rainfall (1500mm), with distinct wet & dry seasons	• Tropical climate, especially along sheltered coastal regions & places where rivers constantly deposit clay & silt.	• Cool continental climate experiencing the 4 seasons, low temp (-40°C to 21°C) and low precipitation (300mm to 635mm)
	• Amazon Basin, Congo Basin, SEA (Singapore)	• SEA (India), southern China, northern Australia		• Alaska, northern USA, northern Canada, Russia
Structure	5 vertical layers: -Emergent -Canopy -Understorey -Shrub -Undergrowth	3 vertical layers: -Canopy -Understorey -Undergrowth	• 3m to 40m • 3 horizontal layers: -Coastal zone -Middle zone -Inland zone	No distinct layers: trees grow uniformly in height (20m to 30m) in pure stands
Diversity of plant species	Largest biodiversity of all biomes: year-round high temp & rainfall enables itself to support large variety of plants	High biodiversity , but lower than TR due to inconsistent rainfall (lack of water in dry seasons)	4 main halophytes (salt-tolerant plants) -A... -S... -R... -B...	Low biodiversity - pure stands of single species: few plants can adapt to climate/ the low temp & precipitation climate does not support growth & survival of most plant species
Density	• Extremely dense: tropical equatorial climate encourages dense, abundant vegetation growth.	• Dense plant growth (but less than TR): -Dense during wet season -Slightly sparse during dry season	• Dense canopy: continuous canopy formed to compete for sunlight • Sparse undergrowth: canopy blocks sunlight from	Not dense: low temp/rainfall does not support dense/abundant vegetation growth

		<ul style="list-style-type: none"> • Crowns of close trees interlock forming a continuous canopy • Sparse undergrowth: continuous canopy blocks out most sunlight from reaching the ground 	<ul style="list-style-type: none"> • Dense undergrowth: sunlight is able to pass through gaps in canopy 	reaching the ground	
Characteristics and adaptations	Leaves	<ul style="list-style-type: none"> • Evergreen: high rainfall throughout the year • Large and broad leaves for maximum SA for photosynthesis • Waxy, drip tips to allow rainwater to drain off, preventing bacteria growth 	<ul style="list-style-type: none"> • Deciduous: shed leaves during dry season to minimize water loss through transpiration • Waxy drip tips to allow rainwater to drain off, preventing bacteria growth 	<ul style="list-style-type: none"> • Evergreen: no seasonal changes • Broad leaves with drip tips • Thick leathery surfaces to reduce water loss through transpiration • Salt secretors • Ultrafiltrators 	<ul style="list-style-type: none"> • Evergreen: to allow photosynthesis when temp > 6°C • Needle-like leaves to reduce water loss through transpiration • Leaves store water for use in winter
	Flowers & fruits	<ul style="list-style-type: none"> • Flowering & fruiting all year round • Colourful & sweet smelling fruits for insect pollination/seed dispersal 	<ul style="list-style-type: none"> • Flowering & fruiting during dry season 	<ul style="list-style-type: none"> • Colourful to attract insects for pollination • Buoyant fruits elongated with sharp tips to anchor itself in soft muddy soil 	<ul style="list-style-type: none"> • Female cones produce seeds • Male cones produce pollen
	Bark and branches	<ul style="list-style-type: none"> • Thin, smooth bark (no protection needed) • Branches found on uppermost 1/3 portion of trunks for maximum sunlight 	<ul style="list-style-type: none"> • Thick coarse barks to protect trees from heat & dryness, to withstand extreme heat from forest fires • Branches located around middle of trunks 	No adaptation	<ul style="list-style-type: none"> • Thick barks to protect against long cold winters • Downward sloping flexible branches to allow snow to slide off

	Roots	<ul style="list-style-type: none"> • Shallow roots which spread widely • Buttress roots to support the incredibly tall trees which compete for sunlight 	<ul style="list-style-type: none"> • Deep tap roots for tapping underground water during dry season, due to inconsistent rainfall 	<ul style="list-style-type: none"> • Aerial roots: exposed to take in oxygen, an adaptation to the O₂ deprived soil caused by waterlogged conditions • Prop & kneed roots: provide firm support in muddy soil 	<ul style="list-style-type: none"> • Shallow, spreading roots to absorb water from soil surface when snow melts
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Structure of the TR and TMR

	Tropical Rainforest	Tropical Monsoon Forest
Emergent 30-50m	<ul style="list-style-type: none"> • Emergents reach a height of up to 50m and their crowns appear above the canopy • They have tall, straight trunks as they compete for sunlight 	
Canopy 15-30m	<ul style="list-style-type: none"> • The wide crowns of tall trees interlock to form a continuous canopy • It prevents sunlight from penetrating into the lower layers • Presence of plants, epiphytes and other parasitic plants 	<ul style="list-style-type: none"> • Crowns of trees do not interlock to form a continuous canopy as they do not grow as closely as TRs • More sunlight is able to pass through gaps of canopy • Presence of plants, epiphytes and other parasitic plants
Understorey 6-15m	<ul style="list-style-type: none"> • Trees have narrower, oval-shaped crowns and grow under gaps of the canopy where sunlight can pass through 	<ul style="list-style-type: none"> • Trees in the understorey are about 15m in height
Shrub 5-6m	<ul style="list-style-type: none"> • Tree saplings & woody plants growing up to 6m are found • Presence of shrubs, ferns and plants which require less sunlight 	
Undergrowth 0-5m	<ul style="list-style-type: none"> • Dark and damp as very little sunlight reaches this layer • Plant growth is sparse due to lack of sunlight in the undergrowth • Mainly grasses, fungi and leaf litter which decomposes quickly to release nutrients into soil 	<ul style="list-style-type: none"> • Bamboo thickets and grasses grow densely during the wet season • The undergrowth is less dense during the dry season when rainfall is insufficient