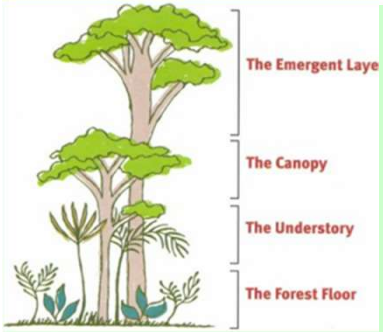
Ecosystem - Key terms

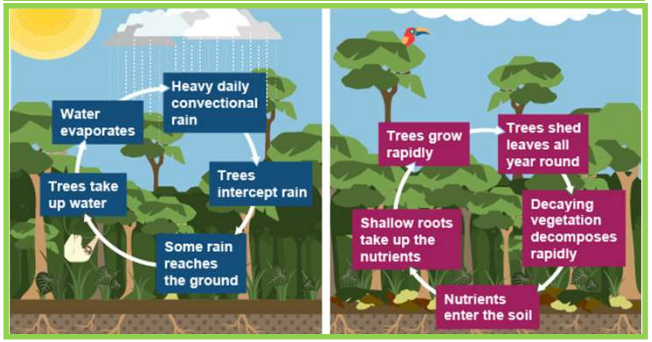
Key term	Definition
Ecosystem	A community of plants and animals that interact with one another and their physical environment.
Abiotic	Relating to non living things.
Biotic	Relating to living things.
Producer	An organism or plant that is able to absorb energy from the sun through photosynthesis.
Primary consumer	Creature that eats plant matter. Also known as a herbivore.
Secondary consumer	Creature that eats other animals. Also known as a carnivore.
Decomposer	An organism that breaks down dead plant and animal matter.
Food chain	The connections between different organisms that rely on one another as their food source.
Food web	A complex hierarchy of plants and animals relying on each other for food.
Biome	A large global ecosystem with flora and fauna adapting to their environment.

Tropical Rainforest - Vegetation

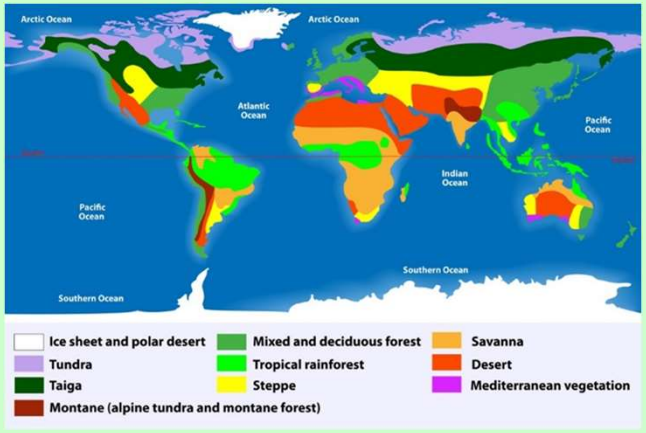


- Competition for light causes trees to grow fast. They are tall and straight. Buttress roots support these tall trees.
- Plants on the forest floor are shade tolerant and able to cope in the darker conditions.
- Epiphytes grow high up on the branches of trees to gain access to the light.
- Lianas wrap themselves around other trees to gain access to light.
- Plants have drip tips.

Water and Nutrient Cycle



Distribution of Biomes



Biome	Key Characteristics
Tropical Rainforests	•Along equator (Asia, Africa / South America). •6% of earth's surface. •25°C – 30°C and over 250 mm rain per month.
Tropical Grasslands (Savanna)	•Between equator and tropics. •20 – 30°C and between 500 - 1500 mm of rain per year. •Wet and dry seasons.
Deserts	•Tropics (Sahara and Australia). •Over 30°C and less than 300 mm per year rain. •20% of land's surface.
Deciduous forests	•Higher latitudes (W Europe, N America, New Zealand). •5 – 20°C and between 500 – 1500 mm rain per year. •4 distinct seasons. •Lose leaves in the winter to cope with the cold.
Coniferous forest (Taiga)	•60°N (Scandinavia / Canada). •Cone bearing evergreen trees. •No sunlight for part of the year.
Tundra	•Above 60°N (Arctic Circle). •Less than 10°C and less than 500mm per year rain. •Cold, icy and dry means 2 month growing season.

Effects of deforestation in Malaysia

Economic development

•Mining, farming and energy lead to jobs •Companies pay taxes to government. •Hydro-electricity provide cheap energy • Minerals like gold are valuable
•Pollution of water sources • Tourist numbers decrease • Medical plants go extinct

Soil erosion

•Land left unprotected from heavy rain leads to landslides and flooding.
•Nutrients are washed away decreasing nutrients in the soil. •Rivers silt up.

Contribution to climate change

•Trees cut down change the water cycle and make it drier. •Rainforests are the lungs of the earth and so when deforested there is more carbon dioxide in the air and less oxygen. •Burning also releases carbon dioxide into the air (Greenhouse effect).

Others

•Loss of biodiversity. •Loss of indigenous tribes). •Tribal people moving to towns and cities and have drugs and alcohol issues. •Loss of indigenous knowledge. •Conflicts between developers and indigenous people.

Causes of deforestation in Malaysia

Commercial farming	Largest exporter of Palm oil. During 1970s, large areas of palm oil were converted to plantations. Owners get tax incentives
Logging	World's largest exporter of tropical wood since 1980s. Clear felling takes place (All trees cut down). Only recently selective logging has happened
Mineral extraction	The removal of mineral resources from the earth. Gold, Bauxite, Oil and gas. Pollutes rivers and air. Trees above the mines and quarries are removed.
Subsistence farming	A type of agriculture producing food and materials for the benefit only of the farmer and his family or community. Small scale, often slash and burn.
Hydro - electricity	Dams have been built and large areas of rainforest destroyed by flooding.
Population pressure	Poor urban people were encouraged to move to the countryside from rapidly growing cities. Between 1956 – 1980s, 15000 hectares of rainforest was felled (cut down) for settlers
Roads	Roads constructed to provide access to new mining areas, settlements and energy projects

Protecting Tropical Rainforests

- Selective logging. Only fell fully grown trees. Mark sustainable trees for sale.
- Conservation & education. WWF (NGO) educate and train conservation workers. Buy threatened areas.
- Ecotourism. Minimises damage to the environment and benefits locals. This creates incentive to protect the forest.
- International agreements. International Tropical Trade Agreement restricts trade in hard woods.
- Debt reduction. Debts have been reduced in return for agreement that rainforests will not be deforested. This is called 'debt-for-nature swapping

The Living World

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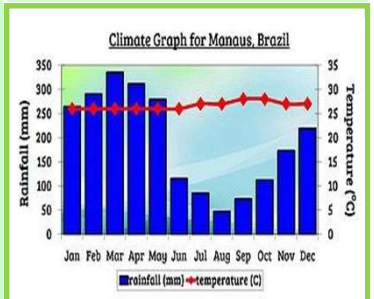
Tropical Rainforest - Animals

- Jaguars have spotted fur. This camouflages them in the dappled shade of the forest floor.
- Parrots have strong, sharp beaks to help them crack open nuts.

- Spider monkeys have a prehensile tail that allows them to cling to branches. Sharp nails allow them to peel bark.
- Poison dart frogs are a bright colour to warn predators away.

Rainforest Climate

Temperatures are high all year (around 28°C).
Rainfall is around 250mm per month.



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Trophic levels

Trophic Level	Source of Energy	Examples
Producers	Solar energy	Green plants, photosynthetic protists and bacteria
Herbivores	Producers	Grasshoppers, water fleas, antelope, termites
Primary Carnivores	Herbivores	Wolves, spiders, some snakes, warblers
Secondary Carnivores	Primary carnivores	Killer whales, tuna, falcons
Omnivores	Several trophic levels	Humans, rats, opossums, bears, racoons, crabs
Detritivores and Decomposers	Wastes and dead bodies of other organisms	Fungi, many bacteria, earthworms, vultures

At each (trophic) level of the food chain the number of individuals declines. This is because not all individuals in any trophic level are consumed (eaten). This means not all energy is passed up to the next trophic level.

Changes within ecosystems

If any component within an ecosystem is changed it will have a knock on effect on the rest of the ecosystem.
An example of where this happened was in Yellowstone National Park in the USA when they reintroduced wolves in 1995.

16 packs of grey wolves introduced. Each pack kills one elk a day.

Elk population falls from 20,000 to 10,000 in 8 years.

Competition from wolves results in decrease in coyote population.

More kills by wolves = more food for scavengers.

Reduction in grazing pressure. Aspen and cottonwood regenerate. There is more tree cover.

Reduction in predation from coyotes leads to increase in mice and voles.

Increase in populations of grizzly bears, cougars, ravens, magpies and eagles.

Increase in bank side trees stabilises river banks so there is less erosion. More woody debris in rivers creates pools and trout habitats.

Beavers create ponds and flooded areas, which promote growth of aspen.

Regeneration of aspen attracts beavers, which begin to recolonise Yellowstone.

Increased tree cover provides habitats for birds.

Populations of predators of small rodents e.g. red foxes and birds of prey, increase.

Ecosystem - A question of scale

Ecosystems can be any size.
- Local e.g a pond or under a dead log. Also called a habitat.
- Regional e.g. the upland moorland of the Pennines in the north of England.
- Global e.g. tropical rainforest. Also called biomes.

A small scale ecosystem – Haldon Forest

Haldon Forest is a woodland area south west of Exeter, Devon. Haldon Forest consists of different zones or layers from the bottom to the top of the ecosystem:

1. **Forest floor** – a zone of roots, soil and leaf-litter beneath the trees. Here decomposers such as fungi, bacteria, woodlice, and earthworms feed off last year's leaves and return nutrients to the soil in the form of an organic substance called humus.
2. **Shrub layer** of holly and hazel at five metres, overlying a field layer of grasses, brambles, ferns and flowering plants; 34 butterfly species live in the forest and are supported by this layer.
3. **Canopy**. Haldon consists of a large number of deciduous and coniferous tree species including oak, elm, beech and pine.
4. Many mammals (including dormice) and bird consumer species are supported.

Hot deserts

To be defined as a Hot Desert, there must be:
-Less than 250mm of rain a year.
- Diurnal temperatures ranging from 50°C during the day to 0°C at night.

NOT hot desserts

Desert - Challenges

Extreme Temperatures Temperatures are over 40 degrees during the day and drop below freezing at night.

Inaccessibility – The Sahara is huge making travel difficult and expensive.

Water Supply - low rainfall makes water for drinking, washing and agriculture difficult to supply.

Desertification - Causes

Desertification is where land is gradually turned into desert, usually on the edge of a desert. It is caused by overgrazing by cattle or trees being cut down for firewood.
Population growth is a key factor. Climate change will lead to more droughts that kill vegetation and cause the problem to spread.
In the area to the south of the **Sahara**, known as the **Sahel** heavy rainstorms can wash away the exposed soil in a couple of hours.

Desert - Opportunities

Mineral resources - mineral resources from the earth can be used by industry or sold for export.

Energy- oil is trapped in huge aquifers deep underground. It is an extremely valuable resource.

Solar energy - with 12 hours of cloudless sunshine every day, deserts are ideal locations for this form of electricity generation.

Tourism – deserts are remote, romantic and exotic locations for tourists.

Farming - only possible where there is access to water through irrigation.

Specific Detail

Thar desert produces gypsum (used in construction) feldspar (used to make ceramics) phosphorite (used in fertiliser) and kaolin (used in paper)

Thar has large oil and coal deposits. It laso makes use of wind and solar energy as forms of renewable energy. The Jaisalmer wind park (2001) is India's largest wind farm.

The Bhaleri solar plant produces energy which can be used in water treatment. This can therefore allow a higher yield from farming, improving income, and also improves peoples' health.

You can see the amazing landscape of the Thar desert along with going on safari on a Camel or could go on a 4x4 adventure. In Dubai, you can also go on dune buggies.

Most farming in the Thar is subsistence farming however with the Gandhi canal being completed in 1958, more crops can be grown improving incomes.

Desertification - Solutions

Irrigation - Water from aquifers used to grow crops / vegetation.

National Parks - Conserve areas at risk, protect wildlife.

Afforestation - Green wall being planted across the Sahel.

Crop rotation - Keeps nutrients in the soil by avoiding monoculture.

Appropriate Technology - Use of suitable crops, magic stones, terraces.

Case Study – The THAR desert – NW India / SE Pakistan

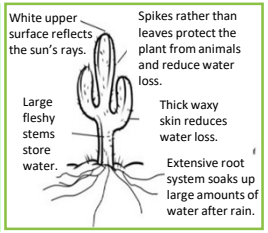
Opportunities •Commercial Farming using water from Gandhi canal. •Mineral extraction e.g. gypsum, feldspar, kaolin. •Energy. The Bhaleri Project produces energy for water treatment. •Tourists from Pakistan visit to have a safari on camels along with a desert festival.

Challenges •Temperatures reach up to 50°C. •Lack of roads meant limited access. •Water is limited and is found in a few rivers (River Luni) •Over-extraction leads to conflict.

Desert plants

High temperatures should lead to rapid growth but this is not possible due to the lack of moisture. Vegetation is sparse and usually confined to water holes.

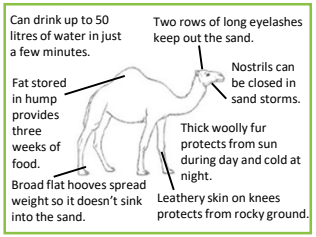
Lack of rainfall is the main limit on plant growth. Plants have thin leaves or spines to reduce water loss and long roots to reach deep underground water. The Cactus is a common desert plant.



Desert Animals

The limited number of producers means the number of consumers is also low.

Animals need to be able to tolerate the range of temperatures in the desert. Many do this by staying underground during the day. They also need to find ways to cope with the limited availability of water. Some gain enough water from their food. Others extract water from air.



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