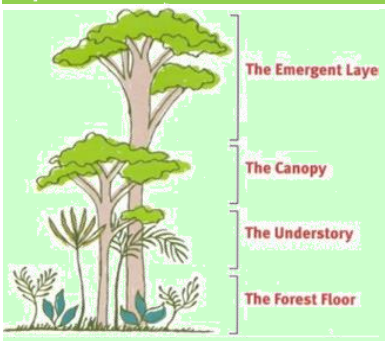
## Ecosystem - Key terms

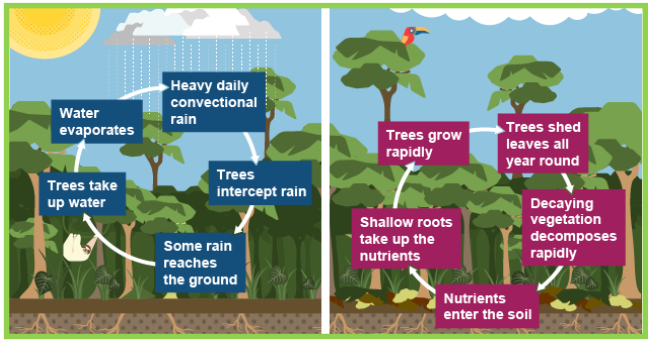
| Key term | Definition |
|---|---|
| Ecosystem | A community of plants and animals that interact with one another and their physical environment. |
| Abiotic | Relating to non living things. |
| Biotic | Relating to living things. |
| Producer | An organism or plant that is able to absorb energy from 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

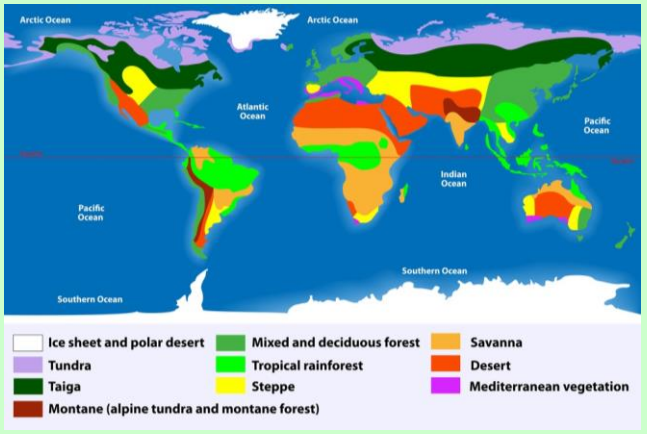



- Competition for light causes trees to grow fast. They are tall and straight. Buttress roots support these tall trees.
- Plants on the forest floor are shade tolerant and able to cope in the darker conditions.
- Epiphytes grow high up on the branches of trees to gain access to the light.
- Lianas wrap 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 250mm 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 mmm 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 the Amazon

**Economic development**

•Brings in jobs and income. •Destroys resources in the long term. •Livelihoods of locals destroyed. •Rubber tappers lost jobs. •Mercury from gold mining poisons fish.

**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** –The Amazon rainforest is home to 1 in 10 known plant and animal species on Earth. If deforestation takes place then these plants, plus other undiscovered plants will be destroyed.

## Causes of deforestation in the Amazon

| | |
|---|---|
| Commercial farming | Farming to sell produce for a profit. Cattle and crops. Responsible for 80% of Amazon deforestation. Ruins soil and nutrients |
| Logging | The business of cutting down trees and transporting the logs to sawmills. Selective logging and clear felling. Teak and Mahogany worth the most. |
| 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. |
| Resettling | Since 1970 1 million people have been encouraged to move away from shanty towns and into the rainforest. They have been given land which has been cleared to allow farming. |
| Roads | The 4000km long Trans Amazonia Highway built 1970s. Opened up rainforest, but allowed loggers in. |

## Protecting the Amazon

- **Selective Logging and Replanting** – This was introduced in Malaysia in 1977.
- **Conservation and Education** – Rainforests can be preserved in conservation areas, such as national parks and nature reserves. These can be used for education, scientific research and tourism.
- **Ecotourism** – Aims to introduce people to the natural worked, to benefit local communities and protect the environment for the future.
- **International Agreements** – Hardwood Forestry (products sourced sustainably carry the FSC label) and Debt Reduction (recently countries have reduced debts in return for agreement that rainforest will not be deforested).

# Unit 1b

AQA

# The Living World

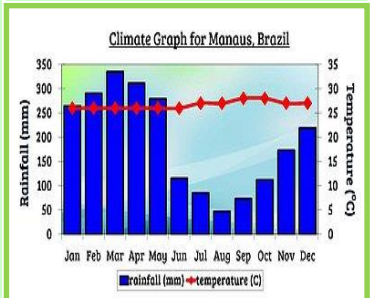
## Tropical Rainforest - Animals

- 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.



## 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 - Bradgate Park

Bradgate Park is a country park to the north west of Leicester. It covers 850 acres and has a wide range of flora (plants) and fauna (animals).

The park attracts almost 1 million visitors each year.

The park has a wide range of trees including oak trees, and small areas of pine trees. There are large areas of bracken. Deciduous trees and bracken provide leaves that decompose and enrich the soil as well as providing leaf litter for insects.

The bracken provides cover and nesting areas for birds such as skylarks, yellowhammers and meadow pipits, as well as cover for the deer in the park. Kingfishers and reed buntings live alongside the River Lin as it flows through the park.

The park is managed by annual deer culls to keep deer numbers at sustainable levels. In the autumn the bracken is rolled flat to encourage nutrients back into the soil and stop the bracken spreading over the grass on which deer graze.

## 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

## 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.

## 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.

## Desert - Opportunities

**Mineral Extraction** – The desert region has valuable reserves of minerals which are used all over India and exported across the world.

**Tourism** – In recent years it has become a popular tourist destination with tens of thousands visiting the desert each year, many from neighbouring Pakistan.

**Energy** – The Thar Desert is a rich energy resource. There are extensive lignite coal deposits and a thermal energy plant has been constructed at Giral. Recently their has been a focus on win power. The Jaisalmer wind park was constructed in 2001.

**Farming** – commercial farming has been made possible by irrigation. The construction of the Indira Ghandi Canal in 1958 has revolutionised farming and crops such as wheat and cotton now thrive.

## Desert challenges

**Extreme Temperatures** – The Thar desert suffers from extremely high temperatures, sometimes exceeding 50 degrees C in the summer. This presents challenges for people, animals and plants living in this environment. Working outside in the heat of the day can be very hard. High rates of evaporation lead to water shortages.

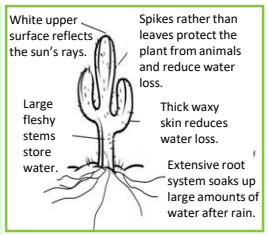
**Water Supply** – As the population has grown and farming and industry have developed, demand for water has increased. Water in this region is a scarce resource. This desert has low annual rainfall, high temperatures and strong wind. This causes high rates of evaporation.

**Accessibility** – there is a very limited road network across the Thar desert. This high temperatures can cause the tarmac to melt and the strong winds can often blow sand over the roads. Many places are accessible only by camel, which is a traditional form of transport in the region. Public transport often involves seriously overladen buses.

## 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.