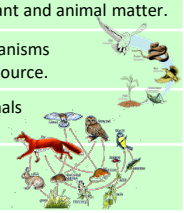
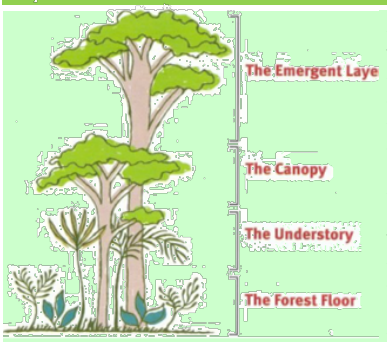
Ecosystem - Key terms

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.

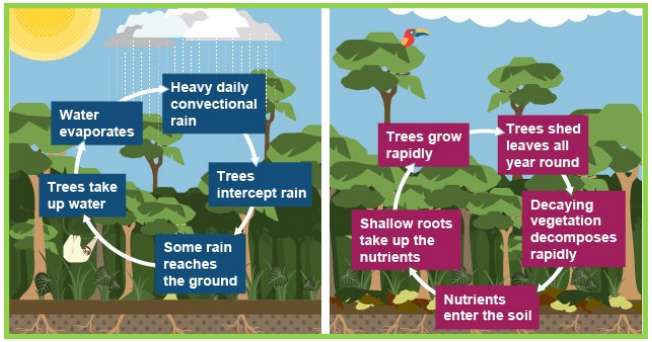


Tropical Rainforest - Vegetation

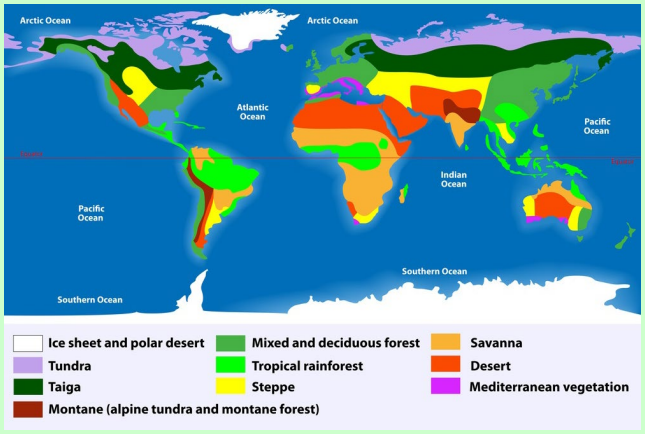


- Competition for light causes trees to grow fast. They are tall and straight. Buttress roots support these tall trees.
- Plants on the forest floor are shade tolerant and able to cope in the darker conditions.
- Epiphytes grow high up on the branches of trees to gain access to the light.
- Lianas wrap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

Economic development
• development of land for mining, farming and energy and lead to jobs directly (construction, farming) and indirectly
• companies pay taxes to government which can be used for education, health, etc.
• improved infrastructure can benefit areas and open up tourism

Others
•Land left unprotected from heavy rain leads to landslides and flooding.
•Soil Erosion: Nutrients are washed away decreasing nutrients in the soil..
•Loss of biodiversity - 137 species a day.
•Loss of indigenous tribes (90 since 1990). •Tribal people moving to towns and cities and have drugs and alcohol issues. •Conflicts between developers and indigenous people.

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).

Economic losses
•number of tourists could decrease
•plants that bring medical benefits and profits may go extinct
•rising temp. could devastate some forms of fruits, flowers and tea

Malaysia is a country in South East Asia. 67 % of the land is covered in rainforest.

Causes of deforestation in the Malaysia

Commercial farming	Malaysia is the largest exporter of palm oil in the world. During the 1970's, large areas were converted to palm oil plantations.
Logging	Malaysia became the world's largest exporter of tropical wood in the 1980's. **Clear felling** (where all trees are cut) was common. Recently this has been replaced by **selective logging.**
Mineral extraction	Mining (tin and smelting) is common in some areas of Malaysia. Rainforest has been cleared for mining and building roads.
Subsistence farming	Tribal people living in rainforest use this. It is where the clear small pockets of forest to grow crops. One method of clear is **slash and burn** where fire is used to clear land. This can create nutrients for plants but could cause issues if the fire gets out of control.
Population pressure	In the past, poor urban people were encouraged by government to move intro countryside from the rapidly growing cities (called **transmigration).** This led to 15 000 hectares of land cleared for settlers. Many then set up plantations.

Protecting the rainforests in Malaysia

- 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. In 2010 the USA converted $13.5 million from Brazil and used to protect forest.

Unit 1b

AQA

The Living World

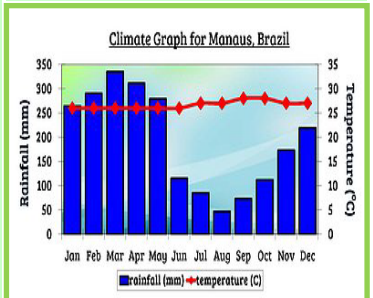
Tropical Rainforest - Animals

- 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.

Cold Environments

To be defined as a cold environment, there must be:
-temperatures at or 0 degrees Celsius for long periods of time.

Cold Environment - Challenges

Extreme Temperatures Temperatures are at or below 0 degrees C for long periods of time. People have serious risk of frostbite in Svalbard

Inaccessibility – Svalbard is remote and can only be reached my plane or ship

Services – services like water, electricity and sewage need to be in pipes OFF the ground as they could thaw permafrost if not.

Construction – Working outdoors in extreme temperatures in little land is very difficult. Most construction has to be done in the short summer period. The frozen ground (permafrost) can provide good solid foundations but it needs to be protected from melting or it could lead to roads and buildings cracking and collapsing.

Cold Environments under threat

Extremely fragile and van be easily damaged by human activity.
•Off-road vehicles: popular tourist activity but can damage the surface making soil very soggy. This can also leave tyre tracks through the area and destroy land that will take decades to recover.
•To extract oil and gas, roads must be built through forests and sometimes over glaciers. There can also be oil spills which can destroy an entire ecosystem.

Svalbard is a Norwegian territory and the most northern place where people live. The population is about 2700.

Cold Environment - Opportunities	Specific Detail
Mineral resources - mineral resources from the earth can be used by industry or sold for export.	Svalbard has rich reserves of coal but mining here in controversial as burning coal releases greenhouse gases. However it's the main economic activity and employs over 300 people.
Energy Development – the future needs to rely on sustainable sources of energy such as **geothermal energy** (tapping into heat of the earth).	Svalbard is located on a constructive plate margin. This means the earth's crust is thin and hot rocks are close to the surface. This allows people to use energy that is clean and sustainable to heat their homes and have hot water.
Fishing – locations near to oceans and seas often rely on the fishing industry for some income as fish may be exported to various countries.	The sea south of Svalbard is one of the richest fishing grounds in the world! Aside from cod, there are over 150 species of fish. This provides jobs for the residents of Svalbard and contributes to their economy.
Tourism –cold environments are remote, and exotic locations for tourists – especially those who like adventure!	Tourism has grown in Svalbard recently as people are attracted to new and exciting environments. People like to see polar bears and the Northern Lights. Tourism provides around 300 jobs for local people tourist spending

Managing cold environments

Technology – planning appropriate ways and places to lay pipes so that ecosystems are not impacted. (Warm pipes could damage permafrost) so pipes are raised and to allow animals under as well.

Action by Governments – Policies are created to protect people, animals and areas.

International Agreements – Antarctic Treaty – signed by countries to enforce protection of the natural environment. (Controls tourism to minimise disturbance to animas, etc.)

Conservation Groups – WWF – a group that helps protect Arctic environments in Canada by working with communities, supporting scientific research and working with oil companies to enforce sustainable ways for the future.

Cold Environment plants

Plants are low-growing and cushion-like to protect and insulate them from strong dry winds.
Thin and waxy leaves reduce water loss in a dry environment.
Hairy stems help to keep the plants warm.
Bright berries are eaten by birds to help distribute their seeds.

Cold Environment Animals

Animals in Polar regions have thick fur and an insulating layer of fat to keep them warm. They have a black nose, and foot pads to absorb the heat from the sun. (Polar Bears)

Animals in Tundra regions have more food options and a less extreme climate. There are more species here than in Polar, such as Arctic Fox, Arctic hare, birds, etc.