Component 1: Global Geographical Issues

Hazardous Earth – Tectonics (earthquakes)

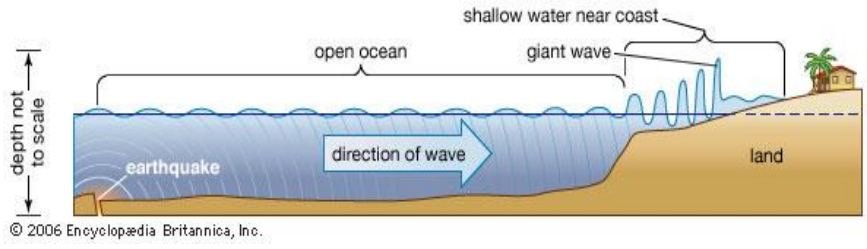
Skills:

- Compare effects and responses to tectonic hazards in a developed and developing country

Plate Boundary	Example	Earthquakes	Volcanoes
Conservative 	San Andreas fault, USA	Destructive, up to magnitude 8.5	None
Divergent 	Mid-Atlantic ridge, Iceland	Small, up to magnitude 6.0	Not very explosive or dangerous Occur in fissures
Convergent 	Andes mountains, Peru	Very destructive, up to magnitude 9.5 Tsunamis can form	Very explosive and destructive Steep-sided cone shapes
Collision Zone (type of convergent)	Himalayas	Destructive, up to magnitude 9.0 Can trigger landslides	Very rare

Tsunamis

Earthquakes beneath the sea bed can cause Tsunamis When it hits land it can cause huge floods.



Developed country case study: Japan

When: 11 March 2011

Magnitude: 9.0

Plates involved: North American and Pacific

Main effects:

- 18,000 died
- 6,000 injured
- 500,000 homeless
- Economic cost = $360 billion

Developing/ emerging country case study: Haiti, Caribbean

When: 12th January, 2010

Magnitude: 7.0

Plates involved: North American and Caribbean

Main effects:

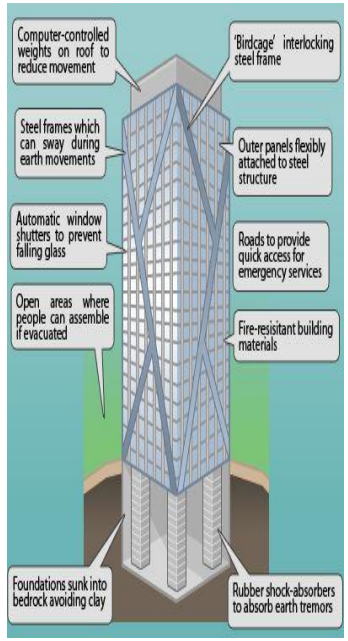
- 230,000 died
- 300,000 injured
- 1.2 million homeless
- Economic cost = approx. $40 billion

The 3 P's

Predicting – It is nearly impossible to predict when an earthquake will strike, although countries who lie on or near tectonic plate boundaries know that they are likely to have a large earthquake at some point.

Planning – This is the secret to survival during an earthquake. Every year in Japan, earthquake drills are held where emergency services practise rescuing people. People also keep emergency kits at home.

Preventing – Some countries try to prevent damage, injury and loss of life through earthquake proof building techniques and building tsunami walls to reduce flooding



Revision Websites

BBC Bitesize

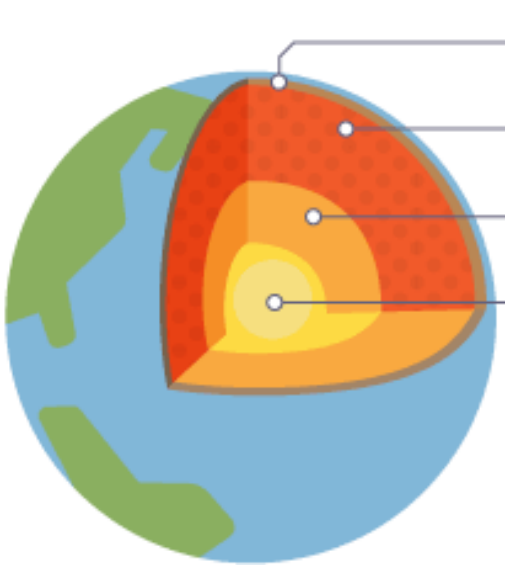
Revision world

Component 1: Global Geographical Issues

Hazardous Earth – Tectonics

Key word	Definition
Lithosphere	The uppermost layer of the earth.
Asthenosphere	Part of the earth's mantle. Hot, semi-molten layer that lies beneath the tectonic plates.
Continental crust	The part of the earth's crust that makes up the land.
Oceanic crust	The part of the earth's crust that is below oceans.
Subduction	Oceanic crust sinking into the mantle at a convergent plate boundary
Magnitude	The strength of an earthquake (how much the ground shakes)
Epicentre	The point on the ground directly above the focus of an earthquake
Focus	The point of origin of an earthquake
Hot spot	Columns of heat in the mantle found in the middle of plates

Structure of the Earth



Crust- Solid, made from granite and Basalt

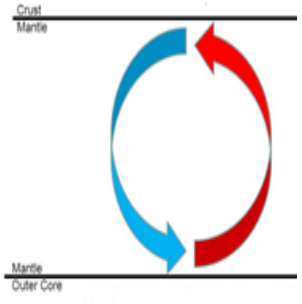
Mantle- Partially molten, made from peridotite

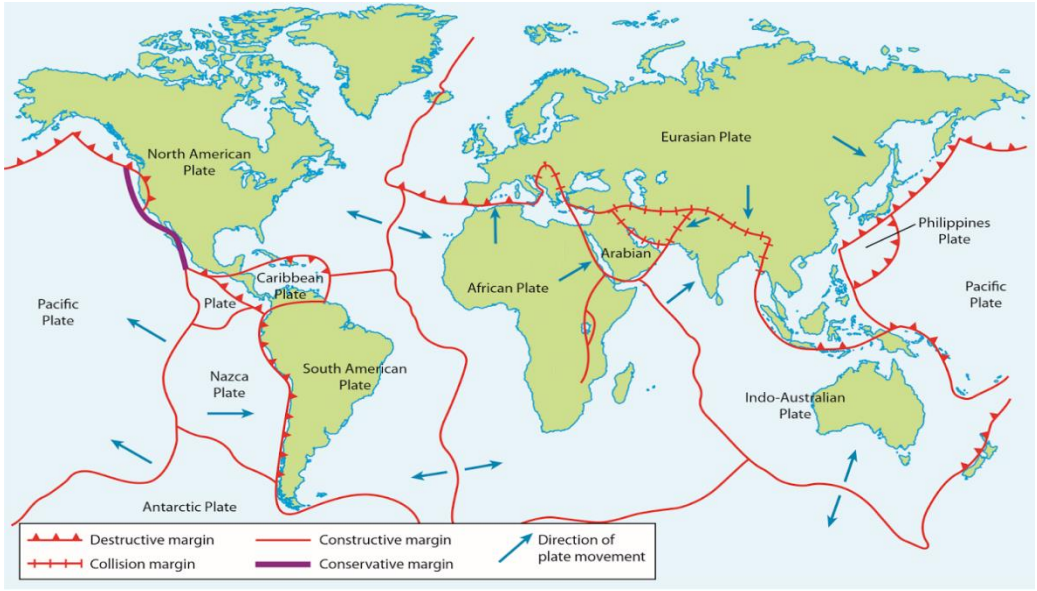
Outer core- Liquid, made from Iron and Nickel

Inner core- Solid, the hottest part of the earth

Convection currents

Heat rises from the core as it is less dense. As it nears the earth's surface, it cools and starts to fall again as it is denser. This creates convection currents in the mantle which causes the tectonic plates to move a few CMs every year.





Component 1: Global Geographical Issues

Hazardous Earth – Tectonics (volcanoes)

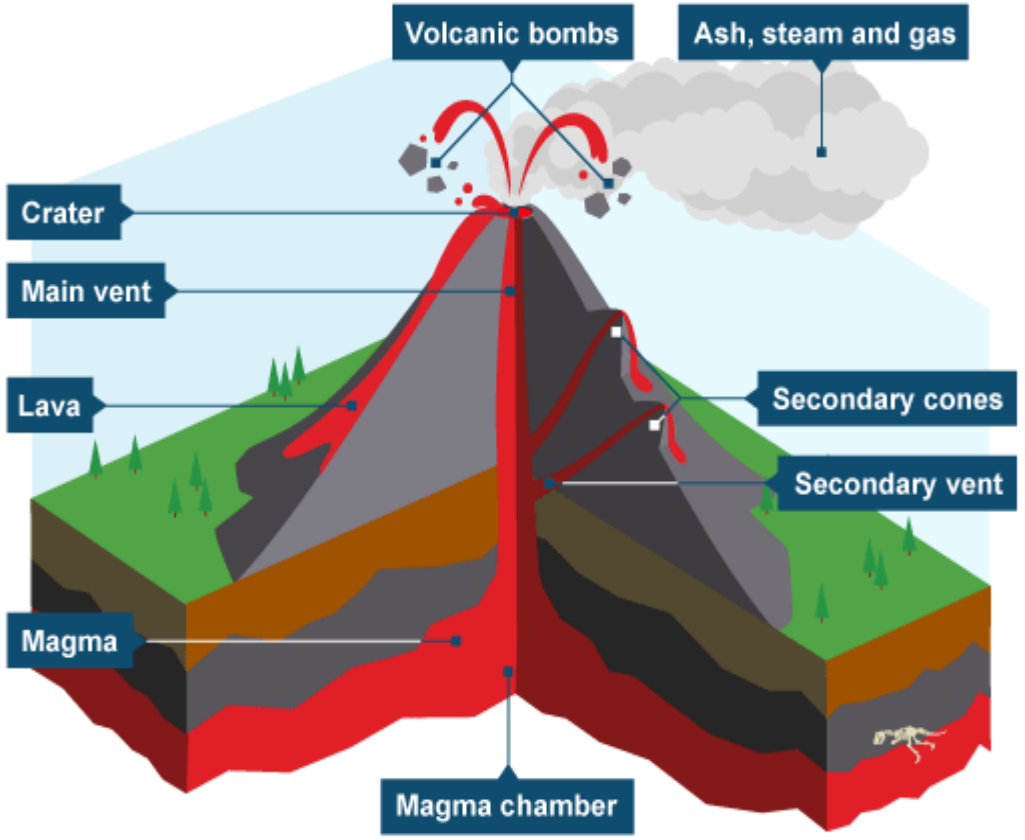
Key word	Definition
Active volcano	A volcano that has erupted recently
Dormant volcano	A volcano which is not erupting but is predicted to erupt again
Extinct volcano	A volcano which hasn't erupted for over 10 thousand years and is not expected to erupt again
Composite volcano	A volcano which is made up from layers of lava and ash. Very explosive. Found at convergent boundaries.
Shield volcano	A volcano which is made up from layers of lava. Found at divergent boundaries. Relatively gentle explosions.

Measuring volcanic eruptions

- Volcanic Explosivity Index (VEI) measures destructive power on a scale of 1-8.
- Ancient eruptions are determined by the volume of deposits.
- Modern eruptions are determined by the observed column height.

BBC Bitesize

Time for Geography



Advantages of volcanic eruption	Disadvantages of volcanic eruptions
• Nutrient rich soil is good for growing crops • Tourism creates jobs and brings in money for the area • Precious metals and gems can create money for the area • Geothermal energy can provide electricity for the area • New land can be formed	• Homes and businesses destroyed • Loss of life • Damage to infrastructure • Poisonous gasses can harm people, animals and plants • Ash clouds can prevent aircraft from flying • Mudflows (lahars) an bury whole towns

Eyjafjallajökull eruption, Iceland

When: March-April 2010

Why: Iceland lies on the Eastern Volcanic Belt, where divergent plates are moving apart. Iceland experiences an eruption about once every five years.

Effects:

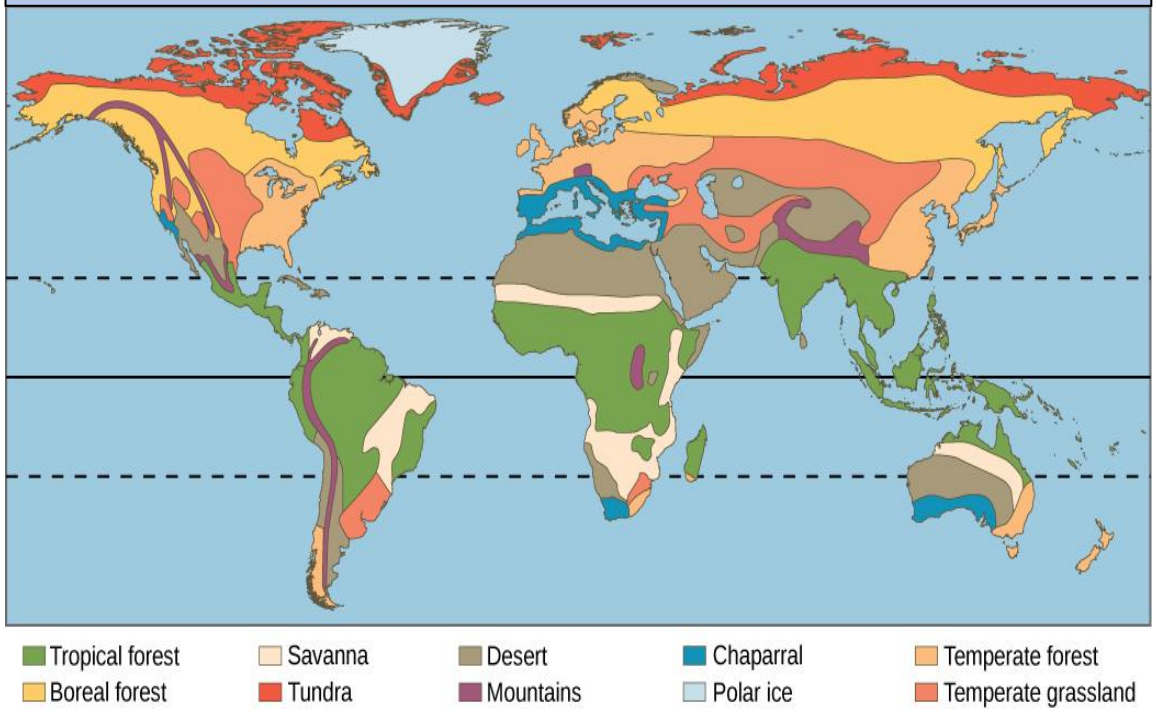
- Areas were flooded because of the glacier melt water which lay above the volcano.
- Agricultural land was damaged, and farms were hit by heavy ash fall.
- The ash fall poisoned animals in nearby farms.
- Some roads were destroyed.
- People were asked to stay indoors because of the ash in the air.
- Travel was severely disrupted as many flights were cancelled between 14 and 21 April 2010.
- Businesses lost trade.
- Air operators lost millions of pounds each day.

Component 3: People and Environment Issues

People and the Biosphere

Key word	Definition
Biosphere	The living layer of the earth where all plants and animals are found.
Biome	A large-scale ecosystem with a specific climate.
Latitude	How far north or south somewhere on the earth's surface is from the equator.
Altitude	Height above sea level.
Biotic	The living part of a biome.
Abiotic	The non-living part of a biome.
Goods	Physical materials we can gain from an ecosystem.
Services	Functions that are controlled/ regulated by an ecosystem.
Carbon sinks	Natural stores for carbon containing chemical compounds
Malthusian theory	The view that the population will grow so large that the planet will run out of resources leading to a crisis.
Boserupian theory	The view that as population grows, humans invent new technologies to allow more resources to be provided.

Global Distribution of Biomes



Factors affecting biomes

- Climate (temperature and precipitation. These are controlled by the proximity to the equator (latitude)
- Rock and soil type
- Water availability and drainage
- Altitude

Skills:

- Comparing climate graphs for different biomes
- Using maps to show locations of global biomes
- Using and interpreting line graphs
- Comparing contrasting views on resource use.

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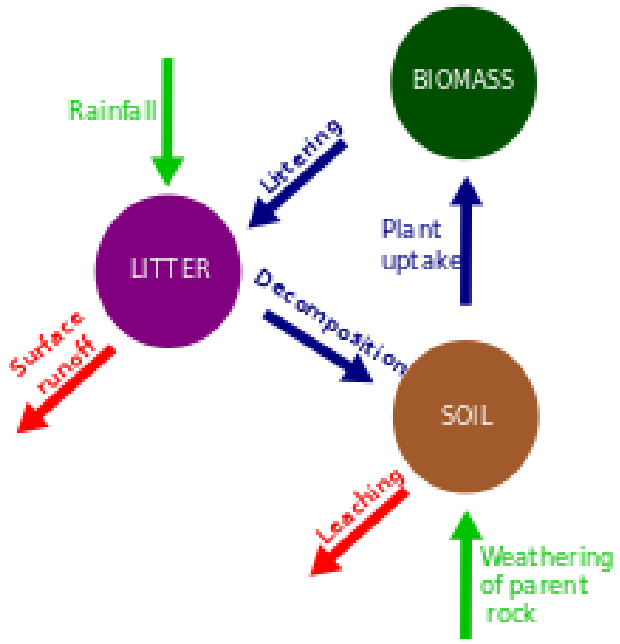
Component 3: People and Environment Issues

People and the Biosphere

Nutrient Cycle



Why is the demand for resources increasing?

- Rising population, especially in Asia
- Rising affluence – people have more money to spend on resources
- Industrialisation
- Increased urbanisation

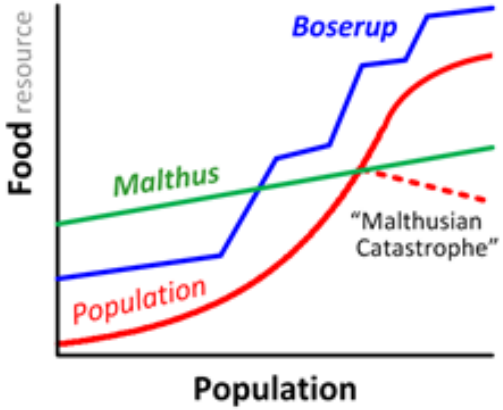
All these factors mean that there is more pressure on biomes as they are exploited for resources and space.

Provisioning services (goods)	Supporting services
Products obtained from ecosystems: • Food • Fuelwood • Timber	Keep ecosystems healthy: • Nutrient cycling • Photosynthesis and food webs • Soil formation
Regulating services	**Cultural services**
Link to other systems and keep the planet healthy: • Storing carbon and emitting oxygen • Purifying and regulating water	The benefits people get from living or visiting ecosystems: • Recreation and tourism • Education • Scientific research

Population vs Resource Theories

Malthus

- Pessimistic view
- Population increases geometrically by doubling each generation.
- Food production increase arithmetically.
- Therefore, population will outstrip food supply leading to a crisis.
- These crises would eventually balance the population.



Boserup

- Optimistic view
- As population increases, technology will invent new ways to produce more food e.g.
  - ✓ GM crops
  - ✓ Fertilizers
  - ✓ Machinery
- This means food supply will increase and keep the two balanced.

Component 3: People and Environment Issues

Forests Under Threat – Tropical Rainforests

Key Term	Definition
Biodiversity	The number of different plant and animal species in an area
Biomass	The total quantity or weight of organisms in a given area (e.g. leaves, branches etc.)
Leaching	When nutrients are washed out of the soil by water
Deforestation	The deliberate cutting down of trees to exploit forest resources
Direct Threat	The deliberate destruction of biomes/ecosystems
Indirect Threat	Long term problems that happen as a result of another issue (e.g. climate change)
Sustainable Forest Management	The conservation of forests by ensuring they are not used faster than they can be renewed

Rainforest Location and Climate

Location:

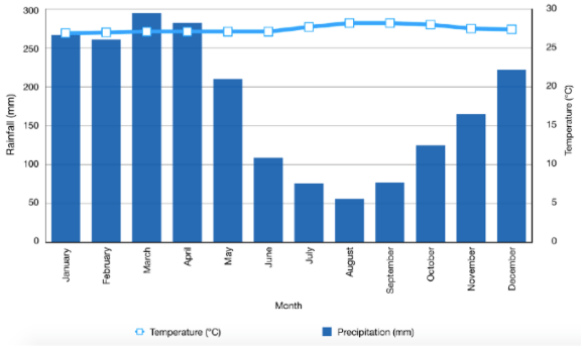
Rainforests are located in the tropics, between 30^{o} north and south of the Equator.

Because of their low latitude, rainforests experience year-round sunshine and high temperatures, because the angle of the sun's rays results in high sunshine intensity.

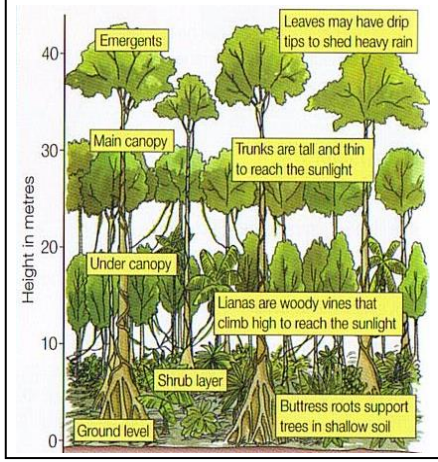
Climate:

In general, tropical rainforests have hot and humid climates where it rains virtually every day. The level of rainfall depends on the time of year. Temperatures vary through the year - but much less than the rainfall.

Rainforests are influence by low pressure from the Hadley cells, which is one reason why they get year-round rainfall.



Rainforest Layers



1. Emergent Layer
2. Canopy
3. Understory
4. Forest Floor

All rainforests have a 'stratified' structure. Multiple layers of plants are found from ground level right up to 45m above the forest floor – much taller than any other forest biome.

Rainforest Adaptations

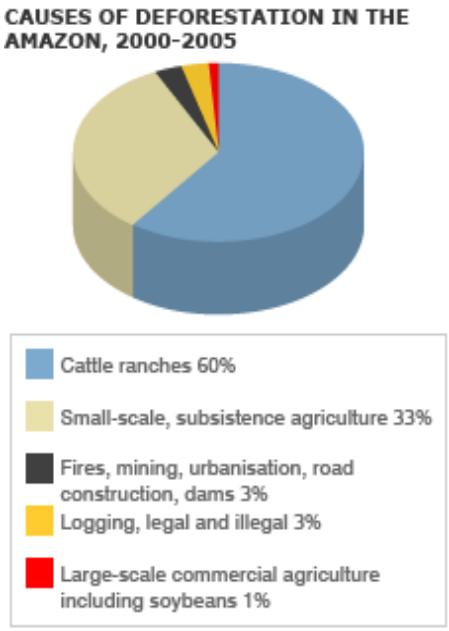
Plants and animals have evolved over time to fit into the unique rainforest environment.

Sloths – claws to hang upside down. Green algae grows in fur for camouflage.	**Epiphytes** – live on trees in the canopy and get their nutrients from water and the air.	**Big cats** – jaguars, tigers and leopards are camouflaged as their dark and light fur blend in with shade and sunlight.
Drip-tip leaves – Most rainforest plants have waxy leaves with drip tips to stop them from rotting.	**Birds** – often have loud calls to hear a mate through the dense canopy. Powerful beaks to break open nuts.	**Primates** – long tails used for balance and strong claws to grip branches.

Direct Threats to the Rainforest

The main threat to rainforests is deforestation, which occurs due to a number of reasons:

1. **Poverty** – In LICs people cut don small areas of forest for farm land in order to make a living.
2. **Debt** – countries are driven to cut down forests, export timber or grow cash crops to clear debt.
3. **Economic development** – forest is sacrificed in place of roads, expanding cities and to build HEP dams in order to earn more money for the country to grow.
4. **Demand for resources** – rainforests contain many raw materials such as timber, oil, gas, iron ore and gold. To extract these, forest has to be destroyed. As population grows the demand increases so more forest is cleared.



Indirect Threats to the Rainforest

Indirect threats are hard to manage. As a result of rising populations and resource consumption, more greenhouse gases are being added to the atmosphere. This leads to global warming which could lead to species extinction. Global warming is happening too quickly for many species to adapt.

Temp. rise	Impact on species	Impact on biome
1°C	10% face extinction	Alpine, mountain and tundra biomes shrink
2°C	15-40% face extinction	Biomes shift to poles, breeding times change, extreme weather events
3°C	20-50% face extinction	Forest biomes stressed by drought, increased risk of forest fires, increased risk of flooding, pests and disease thrive

Drought as a result of climate change can lead to:

- decomposers dying out which affects the nutrient cycle
- Leaves in the canopy dying so less food for animals and food webs altered
- With less trees, there is less evaporation and transpiration which results in even less rain

Protecting Tropical Rainforests

- CITES: The main aim is to prevent the trade of endangered animal and plant species across the world. There are currently 35,000 species listed under CITES protection. Countries must agree to monitor trade across their borders and punish people importing or exporting products from endangered species if they sign up to CITES.
- REDD: This is a UN scheme that advises governments on how they can reduce deforestation and promote afforestation. Remote sensing is used to monitor deforestation rates. It receives funds from sources such as the World Bank to help with the schemes it promotes.

	Advantages	Disadvantages
CITES	181 countries have signed up to it.	Illegal trade is increasing as demand is high.
REDD	International expertise is on hand to help tackle deforestation. Funding is attractive to governments	Deforestation is still happening at a rapid scale in South Asia. Allows crop plants to be grown instead of native plants.

- **Sustainable Rainforest Management:** This aims to prevent damage to the rainforest so that it benefits local people. This, combined with ecotourism, can create jobs for locals as guides and in hospitality which means locals do not illegally log or trade in animal or plant species. The scheme also educates locals on how to live more sustainably such as higher yielding crop use so less land needs to be used.

Skills:

- Using and interpreting nutrient cycle diagrams and food web diagrams.
- Using GIS to identify the pattern of forest loss.

Revision Websites

World Wildlife Fund

Component 3: People and Environment Issues

Forests Under Threat – Taiga Biome

Key Term	Definition
Net Primary Productivity (NPP)	A measure of how much new plant and animal growth is added to the biome each year
Strip Mining	Digging large holes in the ground to extract ores or minerals that are close to the surface
Wilderness	Isolated, hard to reach places with little human interference. In the USA and Canada, it is an official land use.
Selective Logging	Only removing large, valuable trees or those that are diseased in order to leave some of the forest intact.
Intact Forests	Original forests, not those that have been replanted.

Taiga Biome Adaptations

Cone shaped trees: helps to shed snow in winter

Flexible branches: bend downward to shed snow in winter so they don't break

Waxy, Needle-like leaves: prevents damage by frost and limits water loss in dry periods

Shallow, wide tree roots: support the tree but avoid the frozen ground below

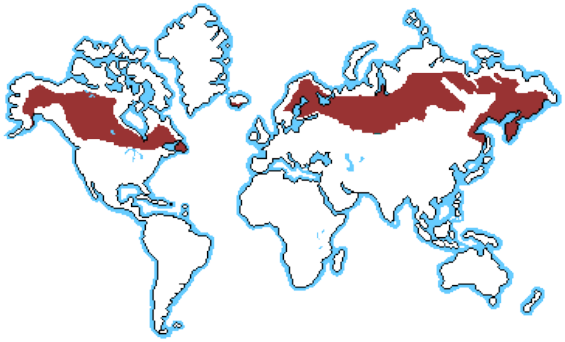
Many animals either hibernate or migrate during the winter due to the cold temperatures and lack of water.

Some animals such as bears and wolves also have thick, oily fur to help retain body heat and provide waterproofing.

Taiga Location and Climate

Location:

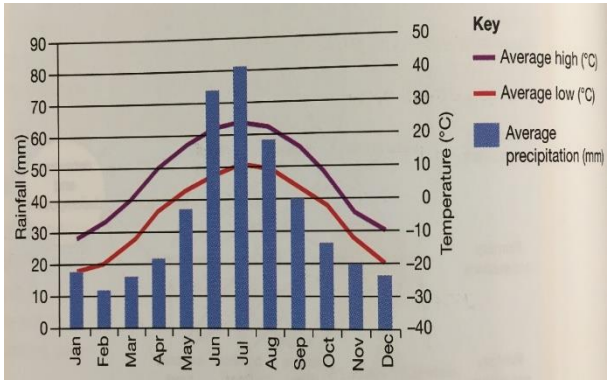
It is found between 50° and 70° latitude, mostly in the Northern Hemisphere. Taiga forest stretches across Canada, Alaska, Sweden, Finland and Norway, Russia, northern Kazakhstan and northern Mongolia.



Climate:

It has an extreme subarctic climate with short, wet summers when temperatures can reach 20°c and long, cold, dry winters with several months below freezing. Temperatures can reach as low as -20°c.

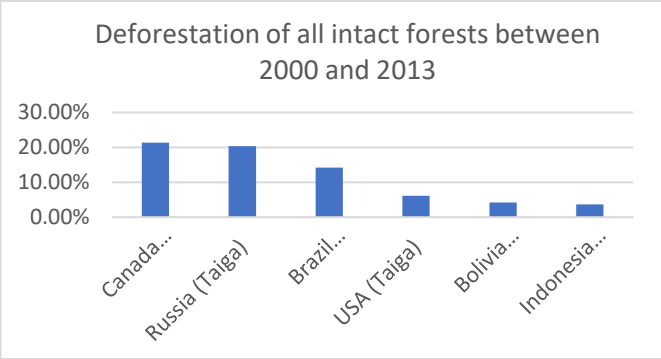
There are low levels of precipitation – maximum of 750mm per year.



Direct Threats to the Taiga Biome

The main threat to the Taiga Biome is deforestation, which occurs due to a number of reasons:

1. Softwood trees such as pine are used to make resources such as paper, construction timber and furniture.
2. Tar Sands exploitation – a mixture of oil and sediment that can be mined and heated to separate the oil. This is a huge issue in Athabasca, Canada, which holds about 1.7 trillion barrels of oil.
3. Hydroelectric Power – forests are cleared to make way for huge hydroelectric dams that are used to generate electricity. The James Bay HEP project in Canada flooded 11,000km^2 of Forest in its construction.



Indirect Threats to the Taiga Biome

- **Wildfires**: Hot, dry summers mean that layers of pine needles are left on the floor. Combined with the sticky resin in the trees, lightning strikes can lead to huge wildfires spreading. Although not always bad (they can help to regenerate some plants), wildfires are becoming more frequent due to droughts caused by global warming. This can reduce biodiversity and stop trees from regenerating properly as they do not have time to mature between fires.
- **Pests and Diseases:** The long, cold winters normally prevent overpopulation of insects and fungus. However, warmer winters has meant that there has been an increase in the number of pests and diseases. This can lead to trees dying out and so food webs being altered and can also reduce the commercial value of timber.
- **Acid Rain**: sulphur and nitrogen dioxide that is released when fossil fuels are burnt react with the water in clouds and form sulphuric and nitric acid. This then goes back to the earth as rain and can damage tree roots so they cannot grow properly, make soil more acidic and make trees more vulnerable to insect attacks.

Protecting the Taiga Biome

Wilderness:

- USA 1964 Wilderness Act created government owned land untouched by human activity.
- Motorised transport is not allowed.
- Recreation such as camping is allowed but people must leave no trace of their activities.
- Logging, mining and road building are banned.

National Parks:

- Conservation takes priority over exploitation and resources.
- Have legal protection.
- Park rangers protect and monitor the area.
- Are open to the public for recreation and leisure.

Selective logging:

- By only removing the largest trees, the rest of the forest is left to flourish.
- It can also be used to remove diseased trees to stop diseases and pests from spreading.

Finland's 'Everyman's Right':

- Because people have the right to use the forest as they wish, Finland has found that people want to protect them and put pressure on governments and industries to protect and conserve them.

Skills:

- Using and interpreting nutrient cycle diagrams and food web diagrams.
- Using GIS to identify the pattern of forest loss.

Revision Websites

Oregon Forests

Soft Schools

Component 3: People and Environment Issues

Consuming Energy Resources

Key Word	Definition
Non-renewable energy	Resources that are being used up and can't be replaced (e.g. coal)
Renewable energy	Resources that will never run out and can be used over and over again (e.g. solar)
Recyclable energy	Resources that provide energy from sources that can be recycled or reused (e.g. nuclear)
Energy-poor	Lacking electricity or the means to pay for it
Black gold	A term used for oil as it is regarded as such a valuable commodity
Peak oil	The theoretical point at which half the world's known oil reserves have been used
OPEC	Organisation of Petroleum Exporting Countries. Regulate the global oil market and get a fair return for its members
Fracking	Using steam to shatter rocks and extract shale gas and oil
Tar Sands	Sediment that is mixed with oil, can be mined to extract oil to be used as fuel
Strip mining	Digging large holes in the ground to extract ores and minerals that are close to the surface
Carbon footprint	A calculation of the total greenhouse gas emissions caused by a person, country, organisation, event or product.

Revision Websites:

BBC Bitesize

Seneca

Classifying Energy Resources

	Examples	Advantages	Disadvantages
Non-Renewable	Coal, oil, gas	Abundant and affordable	Once they have been used up they can't be replaced. Release greenhouse gasses when burnt
Renewable	Solar, wind, Hydro-electric	Do not release greenhouse gases, cheap to buy	Expensive to install infrastructure needed
Recyclable	Biofuel, nuclear	Generally cheaper	Can have serious environmental impacts and impact human health if not carefully controlled

The UK's Energy Mix

Fossil Fuels: Big in the 1960s. New technology allowed easy access to natural gas and oil in the North Sea. This is now declining due to declining reserves.

Renewable Energy: provide 10% of UK energy. Most wind potential is out at sea but the cost is very high, limiting their use currently.

Recyclable Energy: nuclear energy provides 16% of UK energy. Developed in the 1950s, the UK now has several Nuclear Power Stations and Nuclear Reactors.

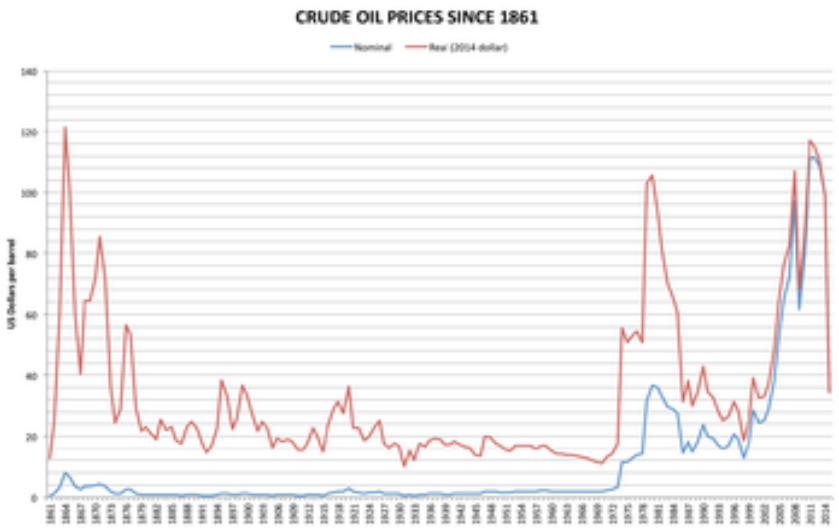
The use of coal is massively declining due to its high cost, declining demand and concern about the greenhouse gas emissions.

Skills:

- Categorise energy resources correctly
- Use and interpret world maps to show and describe the distribution of energy resources
- Using data to graph energy trends over time
- Calculating carbon and ecological footprints

Key Word	Definition
Energy Security	Having access to reliable and affordable energy sources
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs
Stakeholders	A person with an interest or concern in something
Energy diversification	Getting energy from a variety of different sources to increase energy security

What affects the price of oil?



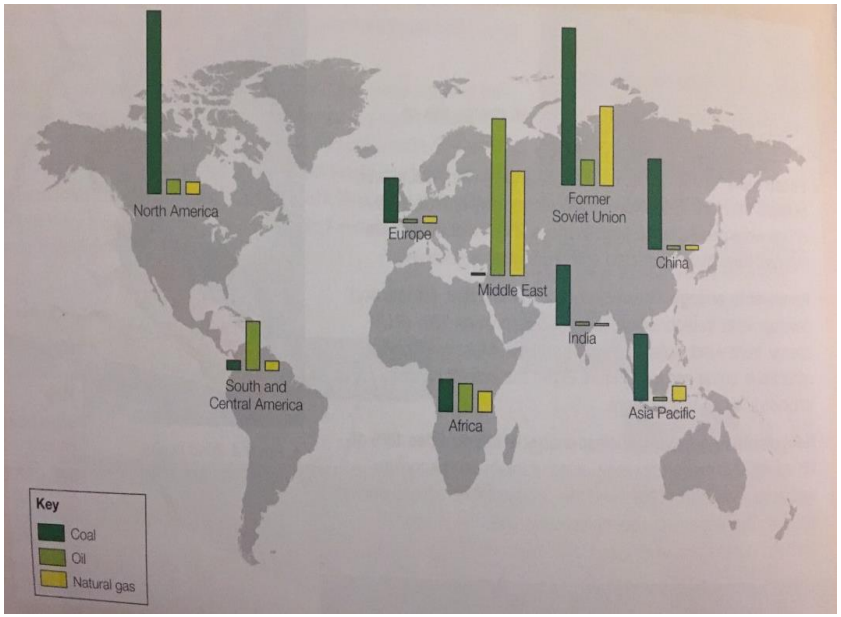
Demand: High demand causes prices to rise and vice-versa.

Supply: Too much oil the price falls, too little and it increases.

War: Can cause supplies to be limited or cut- off, increasing the price (e.g. Iraq War 2003-2011)

Access: Developing new technology (e.g. fracking) to access new reserves has helped to reduce prices.

Global coal, oil and natural gas deposits



- Countries with large deposits of particular energy resources will tend to rely on these as their main energy source.
- They can also help a country to advance economically, particularly if they have large oil deposits, which are very valuable (e.g. UAE/ Middle East.)

Variations in Energy Use

HICs have high energy consumption due to increased ownership of domestic appliances, cars and technology.

LICs are energy poor and rely on wood or biofuels for cooking and heating.

Economic development

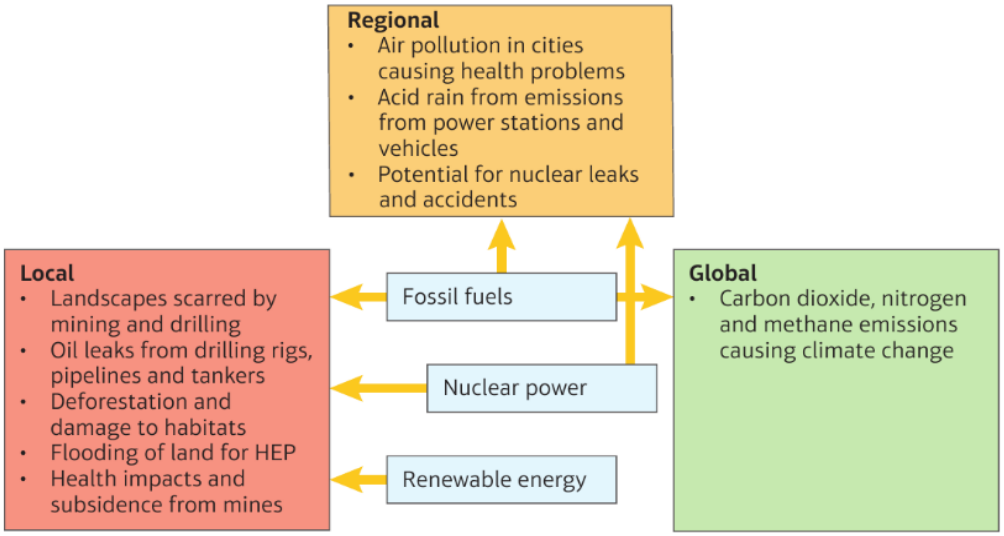
Traditional Society

Causes of variations

Demand

LICs have mainly primary economies, which use little energy. NICs focus on manufacturing which uses high amounts of energy. HICs consume more products so energy demands grow. However, growth of tertiary and quaternary economies reduces energy consumption. Manufacturing is sent abroad which increase other countries demand.

Impacts of energy production and developing unconventional oil and gas resources



Tar Sands extraction – Athabasca, Canada.

- Huge amount of water needed (5 barrels of water to produce 1 barrel of oil).
- Leaks from tailing ponds resulting in death of wildlife and reports of cancers in local people.
- Disruption of breeding grounds of rare animals such as the Caribou and Wood Buffalo
- Loss of habitats endangering animals (it is estimated by 2050 six million birds will be lost.)

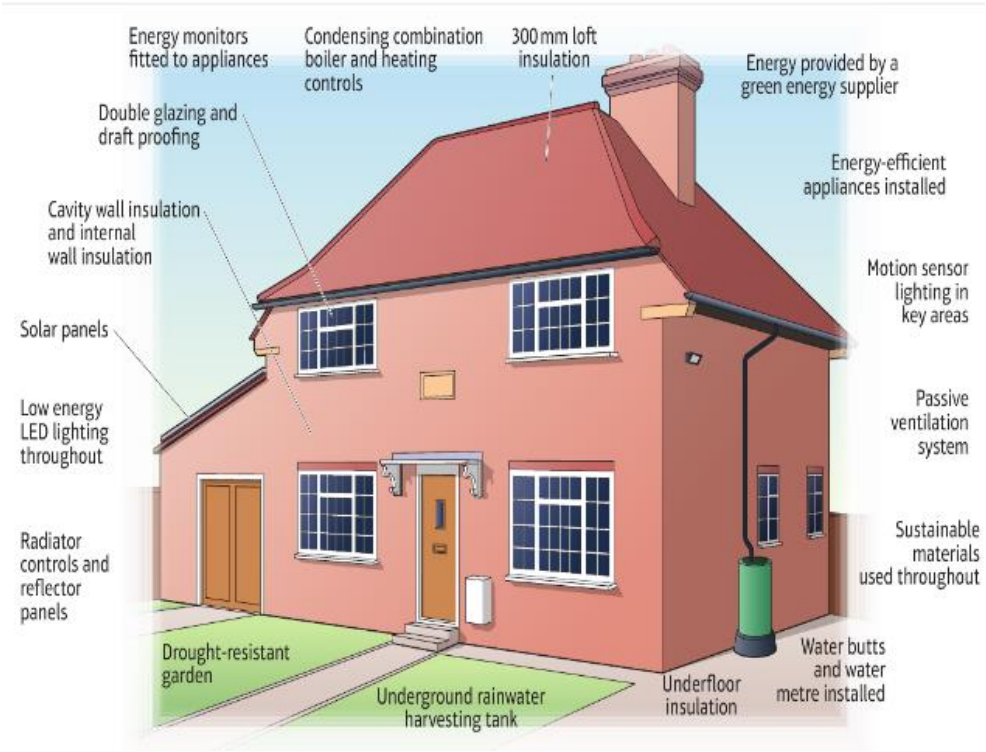
The future?

The UK was one of 195 countries to attend the UN climate change summit in Paris. In 2015, they pledged to limit the global temperature rise to 2°C. Individual countries set their own targets to reduce carbon emissions, and developed countries set up a £100 billion fund to help developing countries be more sustainable. The UKs targets are:

1. Set carbon budgets to limit the greenhouse gas emissions.
2. Invest in low carbon technology so that by 2050 the UK produces 80% less carbon than it did in 1990.
3. Reduce the demand for energy by implementing smart meters in homes and businesses.
4. Create a public report of carbon emissions to allow people to assess their impact on climate change.

Reducing Reliance on Fossil Fuels

Energy Efficiency and Conservation at home:



Improving Transport efficiency and reducing emissions:

Hybrid cars – lower CO_2 emissions and increase fuel efficiency.

Electric cars – no CO_2 emissions but limited on mileage.

Hybrid buses – 40% more fuel-efficient and produce 40% less CO_2.

Cycle Hire schemes – encourage people to uses bikes as opposed to cars or public transport so reduce emissions and congestion in cities. Cycle superhighways in places like London aim to encourage people to cycle by making it safer.

Congestion Charge – by making people pay to bring their own vehicles into cities, it is hoped that more will be encouraged to use public transport, therefore reducing CO_2 emissions and congestion. The money is reinvested in improving public transport to make it even more attractive.