Knowledge Organiser World Studies

Forests Under Threat

Name:

Class Teacher:

Big Question	Task	Due Date
1-2	Nutrient cycle – plant animal adaptations	
Previous content	Recall quiz	

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Exam structure & Case Studies

Paper 1: Global Geographical Issues (37.5%)

- ❑ Topic 1: Hazardous Earth
- ❑ Topic 2: Development dynamics
- ❑ Topic 3: Challenges of an urbanising world

Written examination: 1 hour and 30 minutes, 94 marks.

Answer all questions

Paper 2: UK Geographical Issues (37.5%)

- ❑ Topic 4: The UK's evolving physical landscape
- ❑ Topic 5: The UK's evolving human landscape
- ❑ Topic 6: Geographical investigations

Written examination: 1 hour and 30 minutes, 94 marks.

Answer all questions in Topic 4 and 5

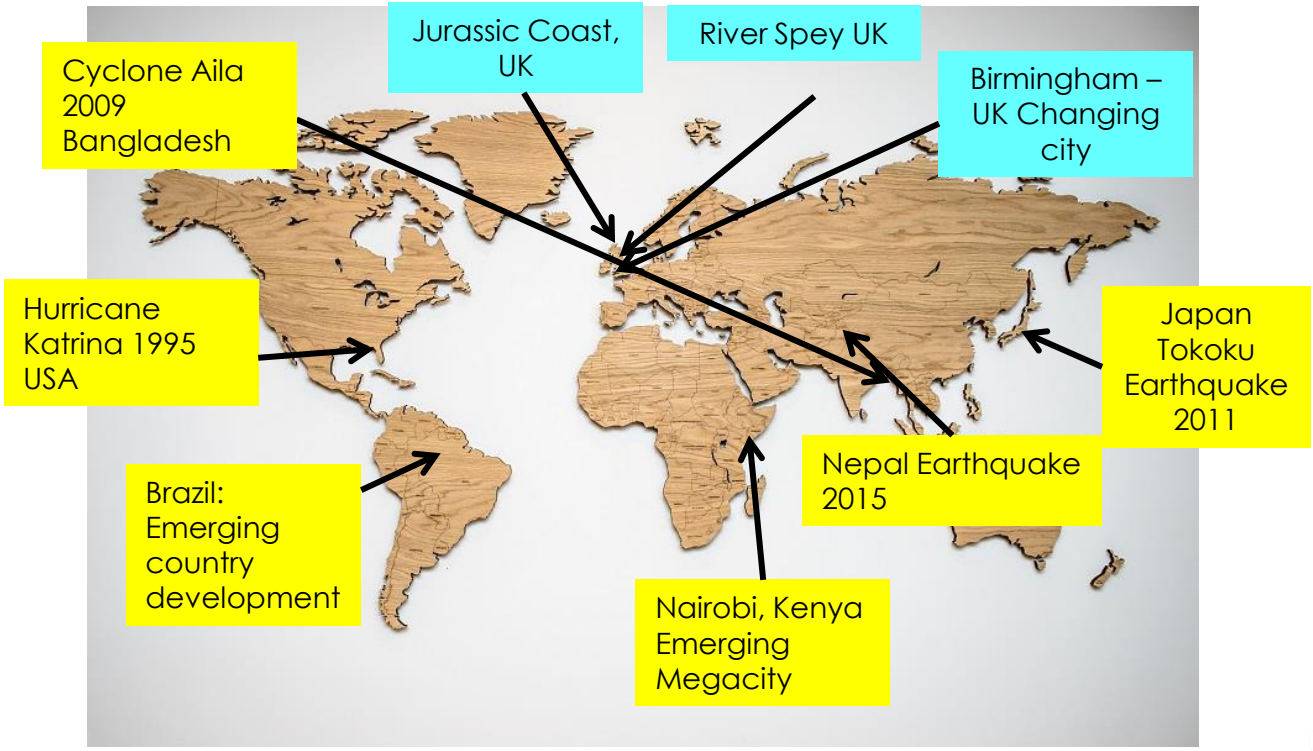
Topic 6: Answer Q 8 & Q10

Paper 3: People and Environment Issues – Making Geographical Decisions (25%)

- ❑ Topic 7: People and the biosphere
- ❑ Topic 8: Forests under threat
- ❑ Topic 9: Consuming energy resources

Written examination, 1 hour and 30 minutes, 64 marks.

Answer all questions



How to answer different types of questions

Command word	Tariff	Meaning	Structure
Assess	8	**Make an informed judgement** Use evidence to determine the relative significance of something. Give consideration to all factors and identify which are the most important	PEECE! **x3** **P**oint **E**xplanation **E**vidence **C**ounter-argue **E**valuation/Link
Compare	2 or 3	Find the similarities and or the difference of two elements	PEE
Describe	2-4	Give an account of the main characteristics of something or the steps in a process	
Define	1	Give the meaning of a term	P
Evaluate	8	Measuring the value or success of something and project a judgement e.g. strengths and weaknesses	PEECE! **x 3**
Explain	2-4	Provide a reasoned response of how or why something occurs **e.g.** *shield volcanoes are less steep* ***because*** *the lava is hot and runny* ***leading to*** *it spreading further,* ***therefore*** *forming shallow sided volcanoes.*	BLT **B**ecause **L**eading to **T**herefore
Identify / State / Name	1	Recall or select one or more pieces of information	P
Select …. And Justify	12	Select one option from those given and justify the choice using the resources provided and own knowledge/ understanding.	**DOTFARTS** (6 to 8) **D**ata (booklet) **O**wn knowledge **T**wo thirds option 1 **F**or (4) Eco/Env/So **A**gainst (1) **R**easons not 2/3 **T**ie (conclusion) **S**PAG
Suggest	2-4	Provide a reasoned response of how or why something occurs with a justification	BLT

Lesson 1 BIG Question: What are tropical rainforests like?

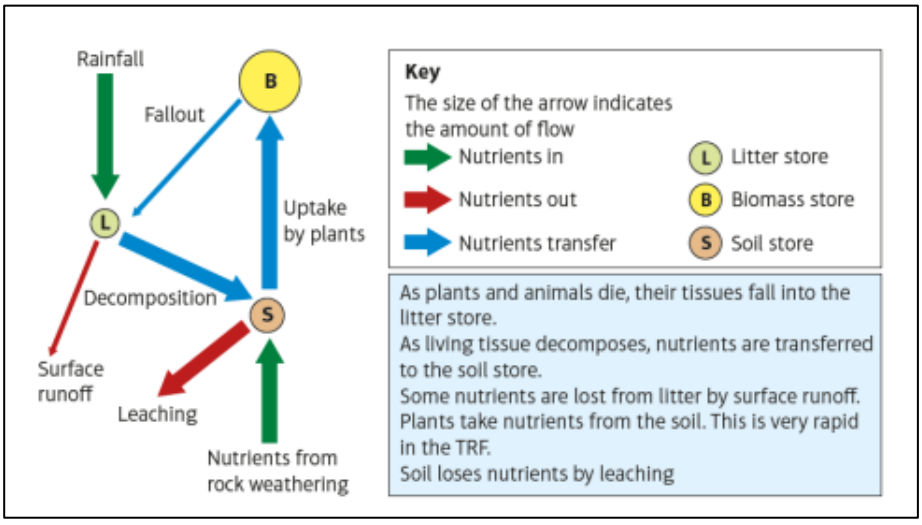
Tropical rainforests

Tropical rainforests of which the Amazon found in south America is the largest have very high biodiversity (the number of different plants and animals species). In just Amazonia there are over 40 000 plants species of which includes 16 000 different tree species.

The reasons for this are related to the climate as it enables growth and reproduction all year due to the lack of winter. Rainforests are also very ancient so animals and plants have had years to evolve into numerous different species. As well as this there is a distinct layering within the rainforest which allows particular species to have evolved and take advantage of these layers.

Nutrient Cycle

The nutrient cycle describes how the nutrients within an ecosystem are transferred around. There are three stores within the nutrient cycle, these are shown by the circles in the diagram below. The size of the circle also represents the size of the store. The arrows show how nutrients move around the cycle as well as how they leave and enter. Due to the high levels of rainfall some of the nutrients are washed away out of the soil this is called leaching. The nutrient cycle also allows us to begin to understand how components of the rainforest are reliant on one another this is called interdependence.



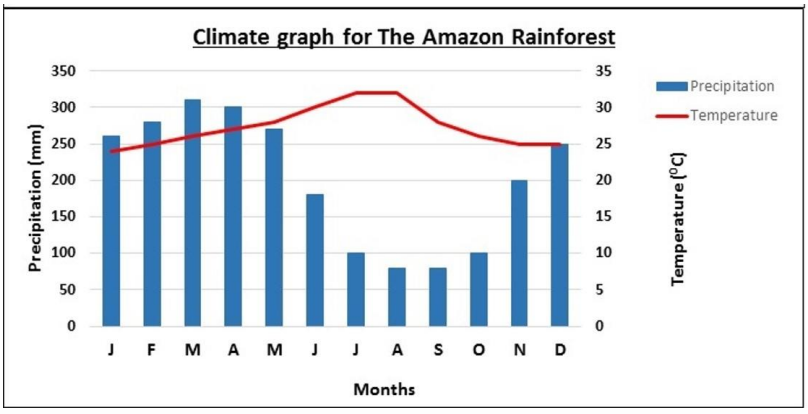
Lesson 1 BIG Question: What are tropical rainforests like?

Rainforest Climate

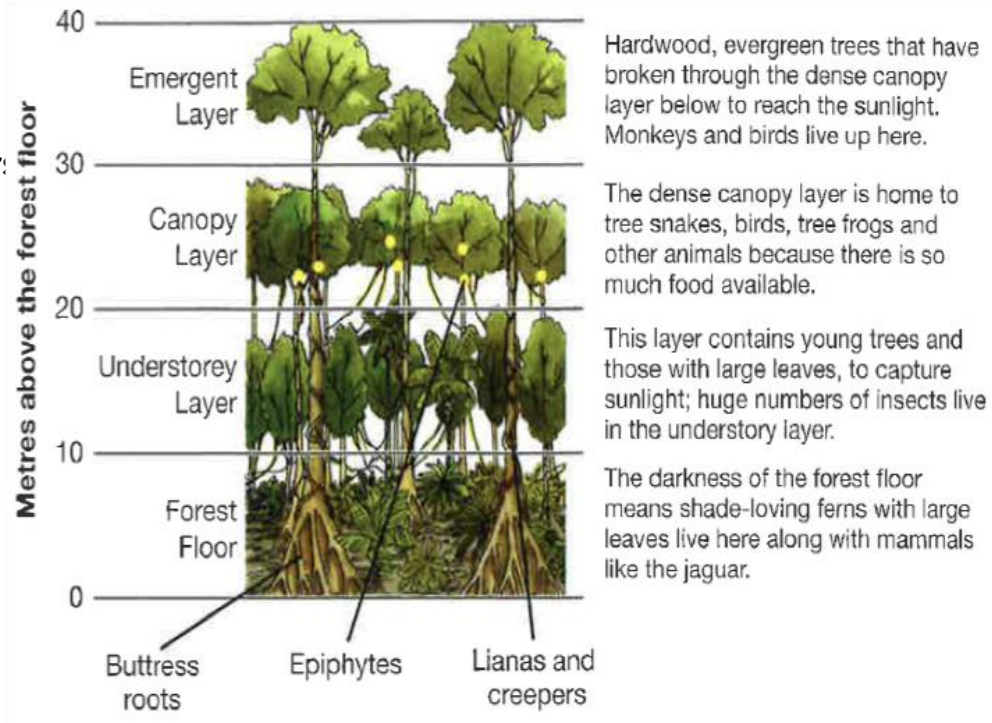
Amazon alone contains 10% of the worlds species of plants and animals. This is in part due to the unique climate found within all tropical rainforests, which is an equatorial climate.

Two key points are:

1. There is no dry season, some areas get metres of rain every month.
2. Temperatures are high all year round, between 26-32 degrees Celsius, there are no seasons such as summer or winter.



Layers



Lesson 1 BIG Question: What are tropical rainforests like?

Animal and plant Adaptations

Animal	**Adaptation**
Sloth	Sloth: Huge claws, green algae on their fur to camouflage with the trees and their fur grows away from feet to help shed rain.
Primates	Primates: Have evolved to live in the canopy where most food is, long tails for balance and strong claws.
Jaguar	Big cats: such as the Jaguar have light and dark spots to mimic the sunlight hitting the forest floor.
Toucan	Birds: Such as the Toucan have loud calls to attract a mate. Powerful beaks to break open fruit.

Plant Adaptations	
Lianas: Climbing plants which use trees for support, they only open their leaves up in the canopy where the sunlight is.	Evergreen hardwood trees: Mahogany, teak and ebony trees have long slender trunks with few branches at the bottom due to lack of sunlight. These tall trees also have buttress roots which provide support for these tall trees.
Drip tips: most plants have waxy leaves and a pointed tip to shed water quickly and prevent them rotting.	Epiphytes: These live up in the canopy and get all their nutrients from the water and air rather than soil. Their roots dangle.

Lesson 2 BIG Question: What is the Taiga like?

The Taiga

Taiga is the largest biome on the earth it stretches from around 50 degrees north to 70 degrees north. The climate in this biome is called subarctic climate.

This means a climate which is dominated by a long cold winter with temperatures averaging as low as -40 degrees Celsius. Summers do exist but they are short and mild with temperatures rarely higher than 16 degrees Celsius. Snow remains on the ground for months at a time and precipitation is low with annual precipitation less than 500mm.

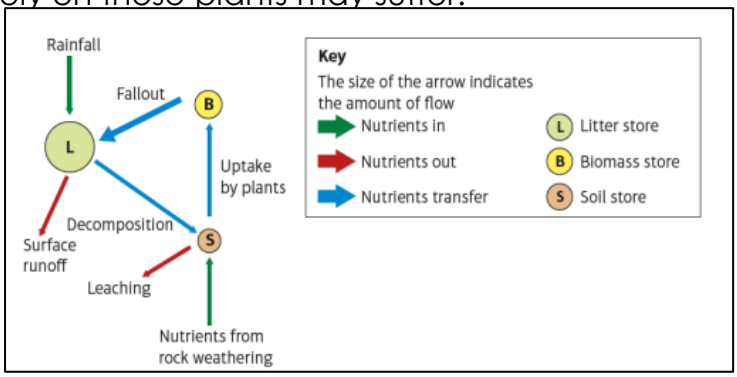
Nutrient Cycle

In the taiga forest the biggest store is the litter, this is mostly made up of pine needled which decompose very slowly, this litter layer builds up over time as it is so slow to decompose. The transfers between the stores re also small.

As the nutrients take so long to reach the soil it is not able to support a large biomass as it is lacking in nutrients. Pine needles also turn the soil acidic so only plants which are able to tolerate this can grow.

This shows us again how the climate, soil, plants, water, animals and humans are all interdependent on each other as one thing can have an effect on another.

For instance if humans deforest the area this will impact the amount of biomass, which will in turn reduce the amount of litter and further lower the nutrients within the soil. This may make it difficult for plants to grow and the animals which rely on these plants may suffer.



Lesson 2 BIG Question: What is the Taiga like?

Climate

As previously mention the climate in taiga forests is cool and dry. This can be seen in the climate graph below.

Plants and animals have had to adapt to this extreme environment.

Plant adaptations

Most of the taiga forest is made up of conifer trees, these grow tall and close together and have a simpler structure that tropical rainforests which have 4 distinctive layers. There are few plants on the floor due to the lack of nutrients and poor light.

Conifer trees have numerous adaptations

- ❑ They are evergreen (leaves all year) so they can photosynthesis all year as the available energy is so low, there is no time to waste.
- ❑ They have needles instead of leaves, this reduces the surface area of the leaf so water retention is better.
- ❑ The needles are dark green to help absorb as much light as possible.
- ❑ The needles contain very little sap to avoid freezing in the winter.
- ❑ The trees are cone shaped, this is to allow heavy snowfall to slide off and prevent tree damage.

Lesson 2 BIG Question: What is the Taiga like?

Animal adaptations

Birds

The drastic climate change between winter and summer means that there are many more species in the taiga during the summer such as birds. However, when the weather cools these migrate south to warmer climates. There are over 300 species of bird in the summer, but, only 30 stay for winter. They come back to the taiga in the summer to take advantage of the millions of insects which grow due to the lakes and swamps.

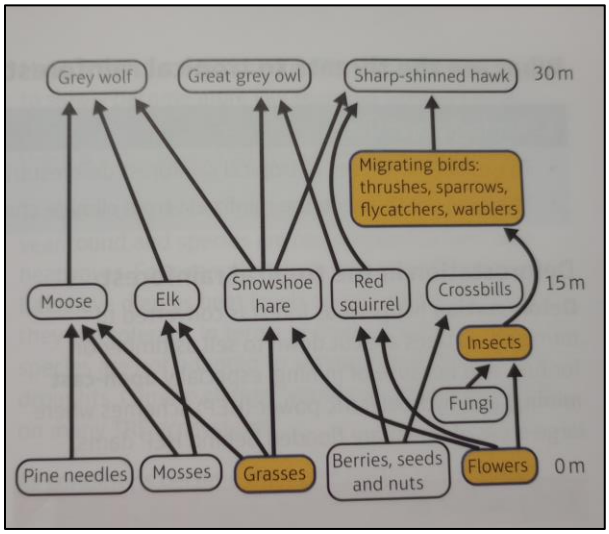
Mammals

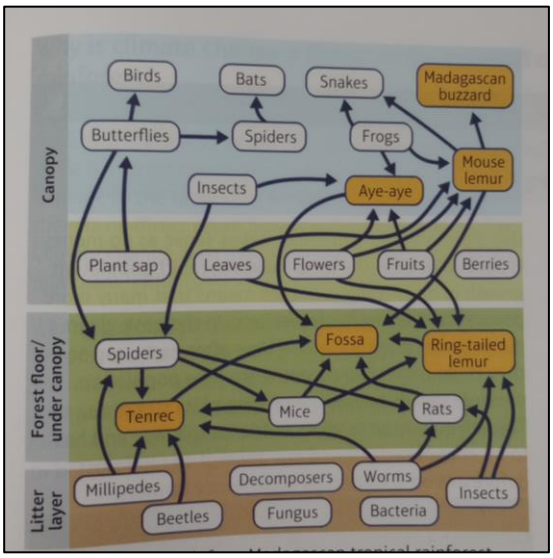
The mammals that live in the taiga often share similar adaptations. This includes thick insulating fur, as well as small ears and tails to avoid frostbite in the winter months. Such as wolves.

Some animals hibernate such as bears. This is to conserve energy during the winter and live of their fat supplies they built up in the summer.

Food webs

Food webs are a type of diagram we can use to show who eats what in ecosystems, they can also be used to compare them.





Lesson 3 BIG Question: What are the threats to the tropical rainforest?

Deforestation

The main threat to tropical rainforests is deforestation (removal of trees), there are many reasons why trees are cut down or burnt. These include the conversion of land for farming, selling timber, for fuel, to make way for mining especially open-cast mining (surface mining rather than digging a shaft into the ground) and for the building of hydroelectric dams (HEP), where forest is flooded as the reservoir fills up.

Deforestation for farming

The main cause for deforestation is **commercial agriculture**. In Brazil alone cattle farming accounts for 75% of deforestation in the Amazon as beef is a key export for Brazil. This has recently switched to growing sugarcane.

In south east Asia deforestation for farming is mainly to grow palm oil plantations. A product which appears in many consumer goods around the world.

Many of these crops are also used for biofuels, this allows countries to reduce their reliance on fossil fuels, however, biofuels have now been dubbed "deforestation diesel" due to the high amount of deforestation due to the growing of these crops.

Subsistence farming is when people farm to feed their families this is done on a much smaller scale. The method used is called "slash and burn". A small area is cleared and the undergrowth burnt so the nutrients can enter the soil, however, these are soon leached out of the soil. So now the family must clear another small plot and repeat the process.

Due to population growth this method has been increasing and sometimes plots are reused straight away, stripping the land of further nutrients. Eventually this land will be abandoned as crops simply wont grow anymore.

Lesson 3 BIG Question: What are the threats to the tropical rainforest?

Many people have little option but to log illegally due to poverty, as it pays well. Finally there are issues of corruption as many police and government officials will allow illegal logging to take place for bribes.

Mining

Some forests are on top of valuable resources beneath the ground, to access deforestation takes place so an open cast mine can be opened up, many roads will also have to be built to increase access. It is estimated that both mining and road building combines contributes o 15% of deforestation.

Fuelwood

People who live close by will often use the wood for burning as fuel, this can also be made into charcoal which is a very important source of fuel for people in numerous African cities.

Direst versus Indirect threats

So far we have only looked at directs threats to tropical rainforests, this means that when a tree is cut down we can see a direct connection between the action and the impacts. However, there are also indirect threats to the tropical rainforest, such as climate change. This is when we see no direct cause between one thing and something else.

Lesson 4 BIG Question: What are the threats to the taiga rainforest?

Taiga forest is under threat from commercial development, this is when an area is used to make money, there are differing reasons for this.

Direct reasons include logging. As the trees are removed there are fewer pine needles so there will be less nutrients going into the soil.

Indirect threats such as mining for oil and minerals and the building of HEP dams can damage the taiga through side effects of the development such as oil spills going into the soil.

Cause	Direct or Indirect?
Logging for softwood, taiga is the main source for global softwood. They are cut down then transported to sawmills then turned either into timber or pulp to make paper. In eastern Siberia as much as half of logging is illegal, so no effort is made to replace trees. Compared to Canada where there is tighter regulations.	Direct
Russia alone contains 20% of the worlds **oil and natural gas**, most of this is in the taiga. According to Greenpeace Russia spills 5 million barrels of oil each year through leaks and accidents. Decomposition is slow in the taiga and drainage is often poor, often worsening the effects of any oil spills.	Indirect
Mining for minerals such as gold, copper and iron ore requires trees to be chopped down so a mine can be dug along with access roads.	Indirect
HEP dams constructed on rivers create man made reservoirs that flood large areas of the taiga forest.	Indirect

Lesson 4 BIG Question: What are the threats to the taiga rainforest?

Other threats to the biodiversity of the taiga forest

Acid Precipitation

When fossil fuels are burnt they release gases such as sulphur dioxide and nitrogen dioxide. When these react with water and oxygen in the atmosphere they form acids which fall as acid precipitation. The plants in the taiga are damaged by the acid however, it is the acid going into the soil, rivers and lakes that does the real damage. The acid kills insects and their eggs, microbes in the soils which prevents nutrients from entering. This can make plant species weak and leaving them more vulnerable to cold winters, forest fires, pests and diseases.

Forest fires

Taiga forests are adapted to naturally occurring forest fires such as those from thunder strikes. The ash left behind is nutrient rich benefitting the new plants. However, this adaptation is meant for forest fires which occur every 80-100 years. Due to higher global temperatures and fires caused by humans these have become more common and the new plants are not able to regrow before the next fire takes place.

Pests and diseases

Pests and diseases are a natural part of any ecosystem as fungus and mould species can damage plants as well as pests such as spruce bark beetles. However, there appears to be an increase in the number of pests and diseases.

Warming temperature is thought to have made it easier for the pests and diseases to spread as well as new species being introduced. Also, due to the increase in other issues such as forest fires and droughts the ecosystem as a whole is weakened making it more susceptible to pests and diseases.

Spruce Bark Beetle

Lesson 5 BIG Question: how can tropical rainforests be protected?

The rates of deforestation vary around the globe

The rate on average is very high at roughly 130 000 km^2 a year. However, in some places it is decreasing while it is increasing in others.

Rising rates - e.g. Borneo and Nigeria

This is mainly due to poverty, foreign debt and economic development. As the population grows poverty levels may also increase so more small scale subsistence farming may take place plus the greater use of fuel wood. There demand for products from tropical rainforests is high, so it is an easy way for developing countries to make money, this can then help pay back debt to the richer countries. Thirdly as a country develops economically, so does transport infrastructure such as rail and road. This opens up the country to the potential increase in farming, logging and mining. Borneo has a large palm oil plantations.

Decreasing rates – e.g. Brazil and Costa Rica

Many countries that see decreasing rates of deforestation is down to government policies. This is the case in Costa Rica where the government has invested in ecotourism (we will cover this in the coming pages), and also pay landowners to plant trees. Global pressure also helps reduce rates as the people may name and shame companies who are involved forcing them to improve their practices. We are also able to monitor the amount through satellite imaging such as Global Forest Watch (GFW), so authorities can track illegal logging and put a stop to it.

Lesson 5 BIG Question: how can tropical rainforests be protected?

REDD+ stands for Reducing Emissions from Deforestation and forest Degradation. This is a United Nations scheme that gives advise to governments on how they can reduce their rate of deforestation. Large sums of money are provided to fund schemes such as money from the Word Bank.

Advantages	**Disadvantages**
REDD+	
It can be very difficult to reduce deforestation, however, REDD+ have the expertise to develop the best methods to reduce rates.	Deforestation remains high in places such as South Asia, despite countries signing up to the scheme.
The large level of funding REDD+ can provide makes it an attractive programme for governments.	REDD+ is not specific in what counts as forest replanting. In some places money has been given to projects which have replaced forest with palm oil tress lowering the biodiversity.

The challenge of sustainable rainforest management

Despite deforestation rates in Brazil reducing since 2014 they have started to increase again. Mostly due to the increase in land being used for beef cattle. It is very difficult to protect the rainforest as the land is simply worth more to farmers when used for ranching and businesses for mining and dam building.

One alternative is sustainable rainforest management. This is a way of trying to prevent damage to the rainforest but still help to benefit the local people. This can be done through sustainable farming and ecotourism.

Ecotourism is tourism that tries to minimise any damage to the environment and still benefit the local people. This includes only allowing a small number of visitors to arrive, this helps to reduce the waste produced and help minimise contamination of the land and water.

It provides jobs for local people who might be employed to be guides or work in the accommodation, this means they will not have to log or farm to make money therefor reducing deforestation rates.

Lesson 5 BIG Question: how can tropical rainforests be protected?

By providing tours to the tourists it can educate them and raise awareness about issues the local environment and people face potentially bringing in more money that can go towards the conservation of the rainforest.

Sustainable farming aims to reduce the repeated cutting down of trees when the soil looses nutrients due to improper farming methods. This includes educating farmers in better techniques and what crops may be better for the area. This may increase the yield of crops (number of plants) and improve soil quality so there is no need to clear a new area for farming every few years.

Techniques may include planting crops and trees at the same time so the tree roots help bind the soil together and reduce soil erosion. Green manure, which is planting certain plants that add nutrients to the soil as they grow rather than take nutrients away, therefore improving soil quality. Crop rotation can also be key to success, by rotating different crops between fields and leaving one empty each year so it has time to recharge before planting again.

One issue with both of these is that they require financial support from the government or international agencies. They also work best in areas which are already protected from deforestation such as national parks and reserves.

Lesson 6 BIG Question: how can taiga forests be protected?

Why does the taiga need protecting?

Despite being easily damaged by humans many areas are rich in resources so are used to help develop countries economically. So it can be very difficult to protect and use at the same time.

Due to the cold harsh climate and lack of nutrients the taiga ecosystem is very fragile and takes a long time to recover as plants grow very slowly. Taking as long as 50 years in some places to regrow. As decomposition takes such a long time any pollution that enters the environment can remain around for a very long time. As there are fewer species in the taiga when compared to a tropical rainforest if just one species is attacked by a pest or disease it can mean a large part of the forest will be affected.

Despite the remoteness and harsh environment human activity is still expanding especially in Canada and Russia.

Three ways in which taiga rainforests can be protected and managed is through national parks, protected wilderness and sustainable forestry.

National parks and protected wilderness

Whilst reading through **highlight** the **strengths** in one colour and **challenges** in another (or underline in different colours)

Both of these methods aim to protect an area making sure that it is not disturbed by human activity. Often they are not simply left to go truly wild and are instead managed very carefully. For example species of deer might be culled to control numbers as not enough large predators exist anymore to keep numbers down. The elk if left unchecked may over eat vegetation which other animals may rely on.

A reason for the lack of large predators is due to the sheer size of territory they need and national parks and protected wilderness areas are not large enough to fully protect them. However, they are large enough to make it difficult to fully monitor the entire area and ensure everything is protected as it should be.

Unlike wilderness area which create a totally protected area national parks allow humans to mix with nature. Logging and mining are not allowed but recreational activities are.

Lesson 6 BIG Question: how can taiga forests be protected?

Tourism and big predators also create an issue as tourists bring in revenue when visiting these areas and wish to see big predators, the animals themselves are not so keen so they seek more remote areas.

As many as 3-4 million tourists visit Canada's busiest national park Banff a year. Wishing to ski, ice-skate, sledge and enjoy other wintery activities. Being as careful as possible it is impossible for tourists not to harm the environment in some way such as the demand for road access and any associated pollution. The livelihoods of any indigenous communities must also be accounted for who may use the land for hunting.

Many animals migrate over large areas such as caribou so may exit the protected area and be vulnerable to harm. There is always pressure to utilise the resources within taiga forests such as oil and gas, the use of this would be of economical benefit but at the expense of the environment.

Fundamentally it is difficult to separate people from taiga forests completely as the money from tourism is used to pay for the conservation so often the parks and reserves which are closest to cities and towns are the most vulnerable to harm from pollution.

Sustainable forestry

Essentially sustainable forestry is the process of allowing logging to happen and replanting trees which are native to the taiga ecosystem. This allows economic activity to still occur but reduces harm to the environment in the long term. There may also be rules on the number of trees which can be cut down or the size of tree or total area felled. Some trees may also be left behind whilst others are cut down, this is known as selective logging.

There may be issues around enforcement of the rules as illegal logging takes place in many areas. Being especially prevalent in Russia. There may also be conflicting advice or plans of action making them sometimes difficult to be effective.

Lesson 6 BIG Question: how can taiga forests be protected?

Conflicting views on protecting or exploiting

There are many conflicting view on what to do with forests mostly the argument is whether to exploit or protect the taiga forest.

Protect	Exploit
The forest stores lots of carbon dioxide providing a vast carbon sink. Reducing the effects of global warming. There are species which may only be found in the taiga forest, so any destruction of habitat may lead to extinction. Indigenous communities such as the Sami people of Scandinavia are reliant on the taiga forest for their traditional way of life. The taiga forest is often used by tourists as a place to relax (this one could also be under exploit)	Increasing demand for resources such as wood for paper, oil and minerals. Logging and mining industries provide jobs for many. In Canada alone forestry and logging employs around 25 000 people whilst 380 000 are employed in the mining industry. Without mining for mineral and oil countries would be poorer such as Russia. The forestry business provides $15 Billion a year for Sweden.

Homework 1

Homework 1: Draw the nutrient cycle for both tropical rainforests and taiga forests

To the biomass store add additional information on the plant and animal adaptations that are in each type of forest.

Homework 2

Total: /16

Homework 2: Answer the following questions and revise the answers. Answers are provided at the back of the KO to support you with this task. You will be tested on these in lesson.

What is a producer? (1)

……

What is a direct threat to the tropical rainforests? (1)

……

What does CITES stand for? (1)

……

What is sustainable forestry? (1)

……

Describe the climate of the taiga (2)

……

What is meant by biotic (1)

……

Explain why the tropical rainforest is more productive (2)

……

……

……

……

Name 2 areas with decreasing rates of deforestation (2)

……

Explain how wilderness areas and national parks protect taiga forest (3)

……

……

……

One advantage of REDD+ (1)

……

Name the pest that impacts trees in the taiga forest (1)

……

Homework 2 Answers

Total: /16

Homework 2: Answer the following questions and revise the answers. Answers are provided at the back of the KO to support you with this task. You will be tested on these in lesson.

What is a producer? (1)

Plant – gets energy from photosynthesis (sun)

What is a direct threat to the tropical rainforests? (1)

When we can see the link such as logging

What does CITES stand for? (1)

Convention on international trade in endangered species

What is sustainable forestry? (1)

process of allowing logging to happen and replanting trees which are native to the taiga ecosystem

Describe the climate of the taiga (2)

Cool and dry

What is meant by biotic (1)

A living component of the biome

Explain why the tropical rainforest is more productive (2)

Due to warm weather and lots of rain (1), plants are able to grow all year round (1), very ancient so lots of different species have evolved (1)

Name 2 areas with decreasing rates of deforestation (2)

Brazil, Costa Rica

Explain how wilderness areas and national parks protect taiga forest (3)

Area is protected from human harm (1). Monitored to protect animals (1) Carefully managed to reduce harm (1)

One advantage of REDD+ (1)

Have expertise to reduce rates of deforestation, lots of funding available

Name the pest that impacts trees in the taiga forest (1)

Spruce bark beetle.