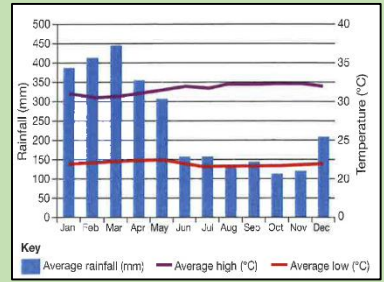


1 What is the climate of the rainforest biome like?

Tropical rainforests are located around the equator, usually between the tropic of Cancer and Capricorn. Tropical rainforests can be found across the world; in Brazil in South America, the Congo Basin in central Africa and in many Asian countries such as Indonesia and Malaysia. One thing they have in common in their climate: There is no dry season, with at least 60mm of rainfall each month. Temperatures are high. At least 26-32°C all year round, resulting in no seasons.



Forests Under Threat-Tropical Rainforests

Memory Organiser

2 Plant and Animal adaptations:

Plant adaptations:	Animal adaptations:
<p>Drip Tips Leaves have waxy surfaces and pointy ends. Excess rainwater can run-off easily. Prevents algae growing which could block sunlight and stop photosynthesis.</p>	<p>Three-Toe Sloth Huge claws allow sloths to hang on branches, and gather food from the canopy layer. Green algae also grows in their fur to help camouflage from their predators.</p>
<p>Buttress Roots Massive roots which don't join the main trunk at the tree's base. Provide extra stability, as the trees have shallow roots but can grow over 30m tall in the canopy layer!</p>	<p>Toucans Large, powerful beaks to break open nuts. Rainforest birds also have loud calls because it is easier to hear potential mates than see them in the dense canopy.</p>

3 Deforestation is a direct threat to the rainforest biome:

Causes	Impacts
<ul style="list-style-type: none"> Cattle ranches (60%) Small-scale, subsistence agriculture (33%) Fires, mining, urbanisation, road construction, dams (3%) Large-scale commercial agriculture (1%) (** percentages relate to the Amazon rainforest) Poverty-Many people in poverty who live in or near rainforests rely on the wood for fuel and heat 	<ul style="list-style-type: none"> Soil erosion-when trees are cut down this exposes the soil to the heat of the sun. This dries the soil out and the nutrients are then either blown away by the wind or washed away when there is rain. Water Cycle-when trees are cut down they are no longer there to intercept rainfall which can lead to increased flooding and poorer water quality. Loss of Biodiversity-It is estimated that about 50 to 100 species of animals are being lost each day as a result of destruction of their habitats, and that is a tragedy

4 Climate change is an indirect threat to the rainforest biome

Climate change is a much harder threat to manage than the direct threats in box 3. The scale is much larger and the areas being affected are often the places that cannot afford to adapt to the changing climate.

Current Impacts of Climate Change

- Plants are flowering earlier
- Bird migration patterns are changing
- Arctic tundra is warming rapidly
- Biomes shifting towards poles by 6km/10yrs
- Unprecedented species extinctions

Feedback cycle in rainforests as a result of climate change:

- Rainforests suffer from drought due to climate change
- Trees die as they cannot adapt to the change in temperature
- The ability of rainforests to absorb CO2 (a greenhouse gas) is reduced and instead the dead and decaying or burning trees due to forest fires emit (give off) CO2
- This will increase temperatures further and so the vicious cycle continues.

The future:

Deforestation in the Amazon has slowed since 2004 because:

- The Brazilian government have started to protect areas of the rainforest from logging and cattle ranching
- The 2008 recession (credit crunch) meant that there was less demand for products from the rainforest as people had less disposable income.

HOWEVER THE THREATS TO RAINFORESTS STILL OUTWIGH THESE MEASURES

6 How can rainforests be managed and used sustainably?

In order to manage rainforests so that they will still exist long into the future we need to give equal consideration to the importance of the natural environment, society (people) and economy (money) and try to strike a balance.



Case Study-COSTA RICA

In the 20th century Costa Rica lost approx. 80% of its rainforest to deforestation for activities such as cattle ranching.

So what has been done?

ECOTOURISM-The Rainforest Alliance is giving hotels and lodges the tools they need to run sustainably. They train hotel employees and tour operators, provide marketing support to certified businesses, and strengthen international ecotourism standards. This means the rainforest is not destroyed for large commercial tourist businesses and the locals benefit from the jobs and income.

SUSTAINABLE FARMING-Instead of clearing the area for crops, farmers are encouraged to allow the natural vegetation to grow onto the farm land. Farmers can then plant crops amongst the natural plants and benefit from the high value, organic crops. This provides locals with a constant food supply as well as trading opportunities to generate income without the clearance of the forest.

MANAGED LOGGING- Instead of cutting trees down, locals and large-scale companies are encouraged to seek out fallen or dead trees amongst the forest to prevent living trees being cut down.

Costa Rica does face a number of challenges in the future:

- Population growth is bound to increase pressure to deforest areas to accommodate growing settlements
- Urban areas, industry and road construction could result in the forest being destroyed
- Climate change could begin to degrade the forest
- Small-scale methods may not provide sufficient income and result in countries returning to large-scale deforestation in order to increase profits.

5 Evaluating global actions towards protecting tropical rainforests: CITES- Aims to prevent the trade of endangered species of plants and animals

Successes	Failures
<ul style="list-style-type: none"> Works well for species which are considered high profile and draw attention. E.g. Snow Leopard. Success in reducing the ivory trade and halting the decline of the African Elephant 	<ul style="list-style-type: none"> Relies on countries setting up, monitoring and funding the project, which many LIC's cannot afford CITES disrupts people's incomes through stopping the trade of plants and animals, however dishonest the income is. This easily causes social tensions between the poachers and the authorities.

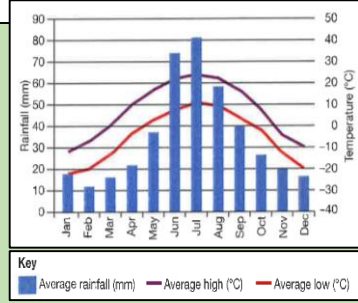
Forests Under Threat- Taiga

Memory Organiser

Plant and Animal adaptations-biodiversity is low in the Taiga due to the climate:

Plant adaptations:	Animal adaptations:
<p>Needle-like leaves are protected by a waxy coating which prevents damage by frost and limits water-loss. When these eventually fall, they create a thick layer of pine-needles on the floor, which are acidic and prevent other plants from growing.</p>	<p>Mammals: (Bears, wolves, moose) Have thick, oily fur to help retain body heat and provide waterproofing. Some animals also hibernate as food is hard to find during the winter months.</p>
<p>Tree roots are shallow, but wide in order to help stabilise the trees and avoid the frozen ground below (permafrost).</p>	<p>Birds: Most birds migrate during the winter months because of the cold and lack of food.</p>

1 What is the climate of the Taiga biome like?



Taiga, or boreal forest, is the world's largest land biome. It covers 390 million square km, and makes up 29% of the world's forests. They are mostly found in the Northern Hemisphere, between 50° and 70° latitude covering large areas of Russia and Canada. The climate consists of:

- Short, wet summers of 3 months where temperatures rise to 20°C

- Long cold, wet winters with months of below freezing, with lows of -20°C resulting in snow on the ground for many months.
- Precipitation is low, below 20mm for 5

3 Deforestation is a direct threat to the taiga biome:

Causes	Impacts
<ul style="list-style-type: none"> • Illegal logging in Russia to supply timber to other countries-mainly China • Tar sands in Canada-extracting oil reserves beneath the boreal forest • HEP (Hydro-electric power) in Canada- 	<ul style="list-style-type: none"> • Amur tiger close to extinction • Roads, pipelines and open pit mines can disrupt and displace many wildlife species that depend on large intact landscapes. They are also fragment forests, meaning that animals cannot move around safely which can impact breeding. • Alter the hydrology of the river systems and often influence wetlands • People have rerouted streams and rivers giving a change in fish migration, this can also result in forests becoming fragmented (broken up).

4 Climate change is an indirect threat to the Taiga biome

Since the 1850s, the mean annual temperature in the boreal region of Canada has risen by 0.5 C to 3.0 C, this increase of temperature caused by global warming has caused a range of impacts that can affect the biodiversity of this biome.

Droughts and wildfires: The number of wildfires is increasing significantly and having a negative effect on the biodiversity. Forests are unable to regenerate properly, as trees are unable to mature between fires. This also influences the animals, birds and insects that feed upon them.

Pest outbreak: Increased temperatures during winter months, insect infestations and disease has increased amongst boreal forests, having a negative influence on the biodiversity. These insects kill some tree species, not only lowering their commercial value but altering the food web as only forest trees resistant to pests can continue to grow.

Acid rain: Increased amount of fossil fuels burnt, releases higher levels of sulphuric dioxide and nitrogen dioxide which react with water in the clouds to create acids, precipitation then carries these acids down onto the ground. This can influence aquatic life as lakes and wetlands are made so acidic that fish and plants die. Acid rain can also weaken trees by damaging the needles and their ability to photosynthesis.

5 How can the Taiga biome be managed and used sustainably?

In order to manage the Taiga so that it will still exist long into the future we need to give equal consideration to the importance of the natural environment, society (people) and economy (money) and try to strike a balance.



1. 1964 Wilderness Act and owned by the government. In this 4.6% of USA land area, motorised transport is not allowed, logging, mining and road building are all banned also. This aims to keep the wilderness exactly as found in order to prevent further development entering into the area.
2. National parks, these are large-scale areas, where building, development and exploitation are all illegal. Governments provide a budget, employ rangers in order to keep the area under protection.

3. Selective logging, removes large, valuable trees and leaves some of the forest intact in order to promote regrowth and regeneration. Trees that have been cut down can also get replanted in order to speed up the recovery rate. This is more sustainable as it allows loggers to build businesses while not destroying the forest.

6 Differing view points on how the Taiga should be managed that could result in conflict:

Conserve the taiga	Exploit the taiga
<p>In favour: Environmentalists, indigenous groups and scientists</p>	<p>In favour: Businesses, local government and some residents</p>
<p>Reasons:</p> <ul style="list-style-type: none"> • They are important to many indigenous people • The chance of landslide increased significantly in place of deforestation • The forests are vital global carbon sinks to help combat global warming 	<p>Reasons</p> <ul style="list-style-type: none"> • The taiga biome is a big business opportunity • In Russia they employ over 2 million people • Resources can be exported to boost national GDP • In Canada they employ over 500 000 people