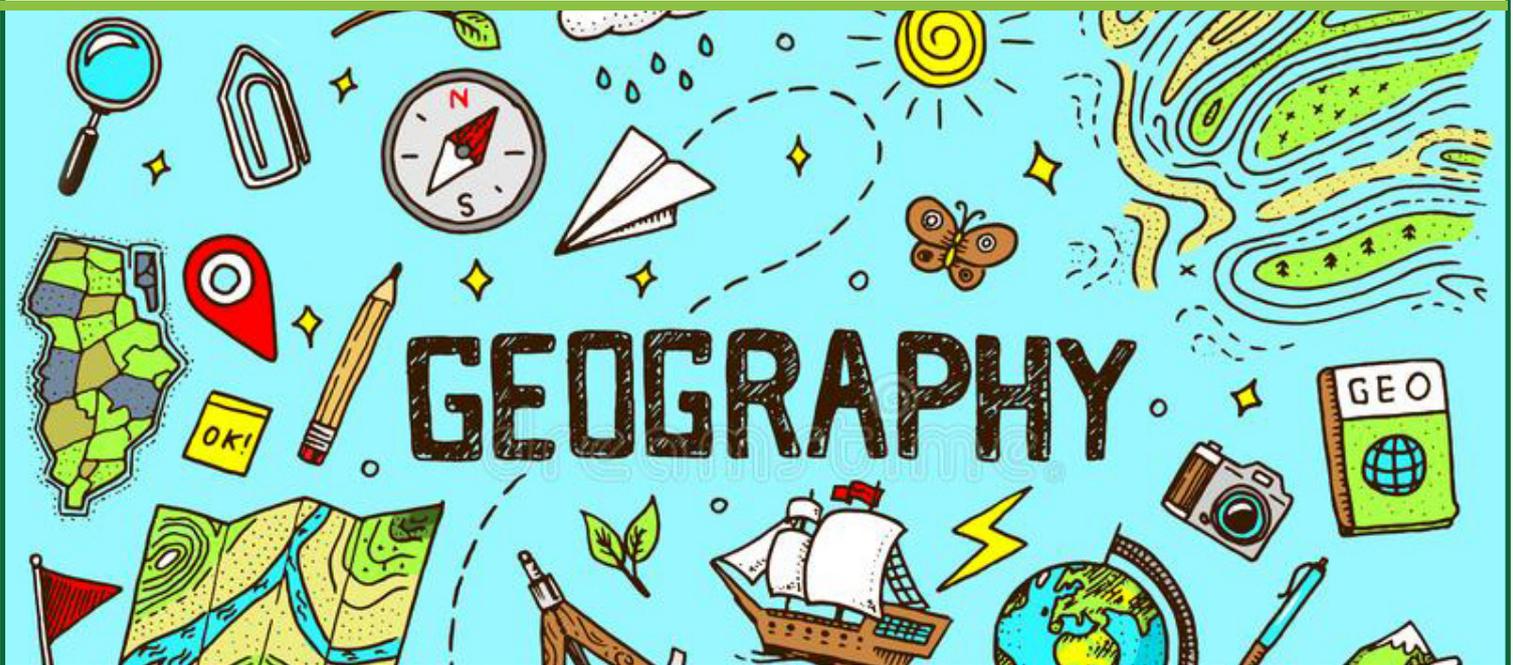




Geography Bridging Work

Year 10 into 11 for 2020/21



Name: _____

Tutor Group: _____

Teacher: _____

Bentley Wood High School
GCSE Geography
SECTION B: The Living World



STUDENT WORKBOOK

Name _____

Class _____

“Forests are the worlds air-conditioning, the lungs of the planet and we are on the verge of switching it off.”

HRH Prince Charles

Characteristics of a Tropical Rainforest

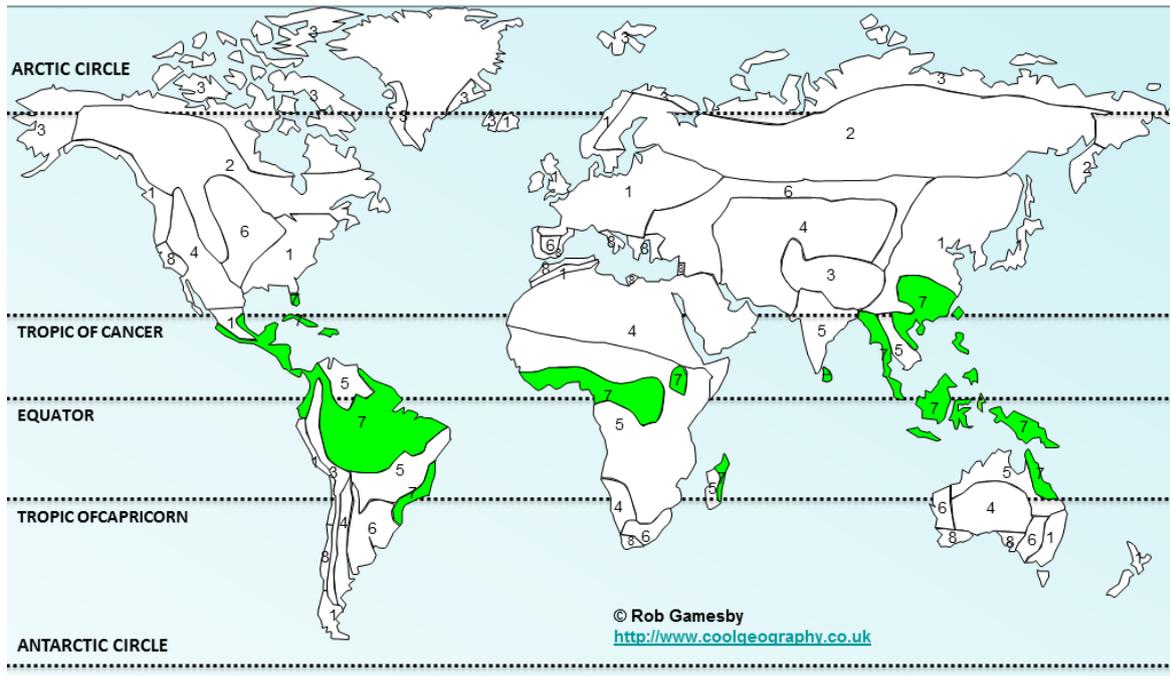
Describe the location of the below biome shown in figure 1.

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- | | | | |
|---|---------------------------|---|----------------------------|
| 7 | Tropical Rainforest | 6 | Grassland |
| 5 | Tropical Savannah | 1 | Temperate Deciduous Forest |
| 4 | Desert | 2 | Temperate Boreal Forest |
| 8 | Chaparral (Mediterranean) | 3 | Arctic and Alpine Tundra |

Map of the Tropical Rainforest Biome

As the tropical rainforests occur on or close to the equator, the **climate** is typically warm and wet all year round and there are no definite seasons. Near the equator, the sun is overhead all year round; this means that the temperature is very hot and averages about 27°C throughout the year. Rainfall is very

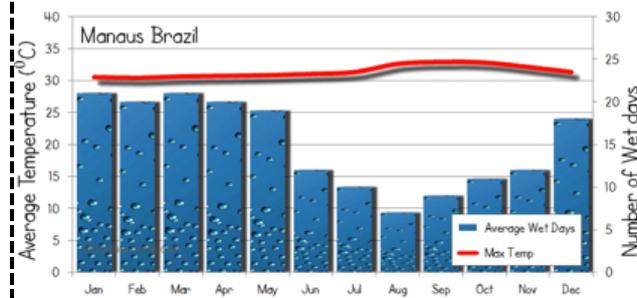
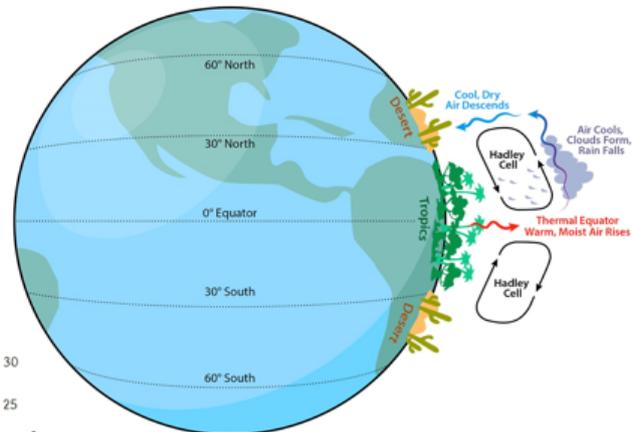
Month	Temperature (°C)		Rainfall (mm)
	Max.	Min.	
January	31	24	249
February	31	24	231
March	31	24	262
April	31	24	221
May	31	24	170
June	31	24	84
July	32	24	58
August	33	24	38
September	33	24	46
October	33	24	107
November	33	24	142

Figure 1 Climate Data for Manaus, Brazil!

high, generally over 2000mm per year. It rains every day, mainly in the afternoon. This is because the global atmospheric circulation causes an area of low pressure to form at the equator. The air rises as it is warm, this cause cooling and condensation forming clouds and triggering heavy rain. This supply of water feeds the rivers such as the Amazon in Brazil and the Congo in Central Africa.

The climate graph below is for Manaus, in the Amazon rainforest in Brazil.

- ✓ The temperature is high and constant throughout the year. This is because the powerful Sun is overhead for most of the time.
- ✓ The rainfall is high. This is because the global atmospheric circulation causes an area of low pressure to form at the Equator. The rising air creates clouds and triggers heavy rain.



- ✓ Rainfall varies throughout the year, with a distinct wet season lasting about six months. This is due to a period of intense rainfall when the equatorial low pressure area is directly overhead.

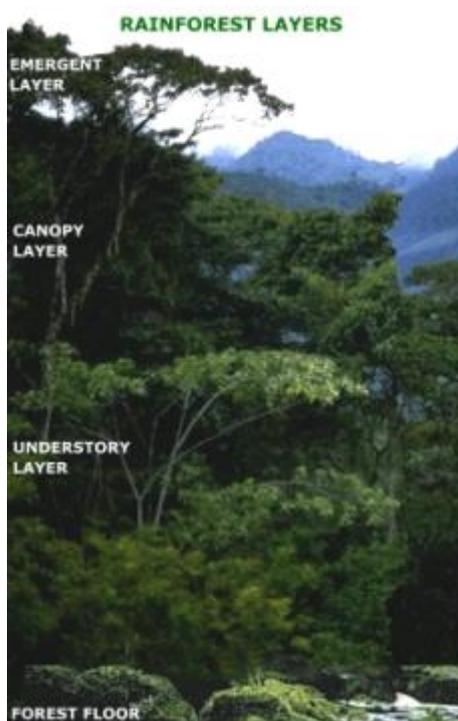


Figure 2 Layers of the Rainforest

Tropical Rainforests are well known for their rich **vegetation** cover, particularly the very tall trees (between 30 and 45 metres in height). Most trees are evergreen meaning they don't drop their leaves in any particular season. Fast growing trees such as Kapok out compete other trees to reach sunlight, such trees are called emergents. Many leaves have flexible bases so that they can turn to face the sun, they also have 'drip tips' to allow heavy rain to drip off the leaf. Trees have thin, smooth bark to allow water to flow down easily. Buttresses are massive ridges that help support the bases of tall trees and help transport

water. They may also help oxygen/carbon dioxide exchange by increasing the surface area. Lianas are woody creepers rooted to the ground but carried by trees into the canopy where they have their leaves and flowers. The vegetation is very dense (closely compacted), very little light reaches the forest floor. There are lots of epiphytes (plants that grow on other living plants and take nutrients and moisture (water vapour) and sunlight rather than soil) for example orchids and ferns.

The **soils** in a tropical rainforest are mainly thin and poor, they are not very fertile as heavy rain washes the nutrients away (this is called leaching). Leaching leaves behind an infertile red iron-rich soil called latosol. There are some nutrients found at the surface due to decomposing dead leaves, this layer is very thin as decay is fast in warm, moist conditions. Many trees and plants have short roots to absorb these nutrients. Fungi growing on the roots transfer nutrients straight from the air (this is a good example of nutrient cycling, see figure 5).



Figure 3 Latosol Soil

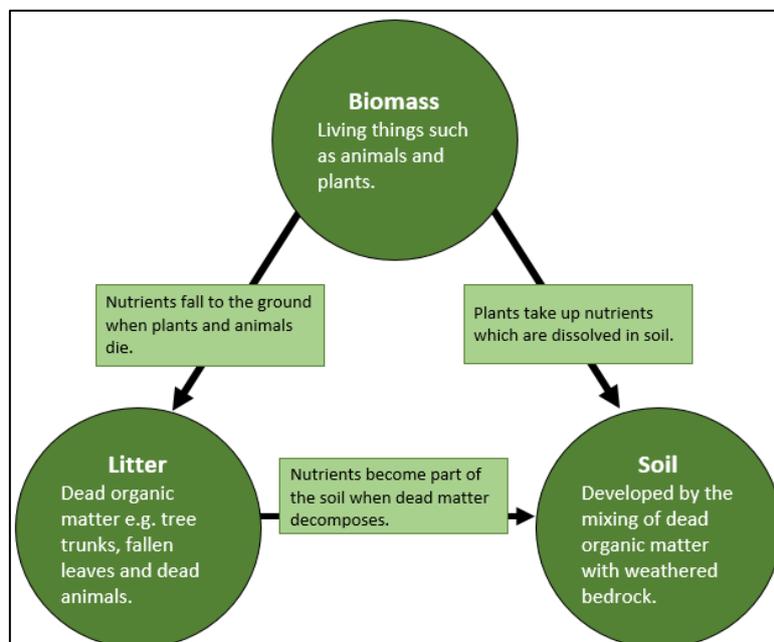


Figure 4 Nutrient Cycle



Figure 6 Animals in the Rainforest

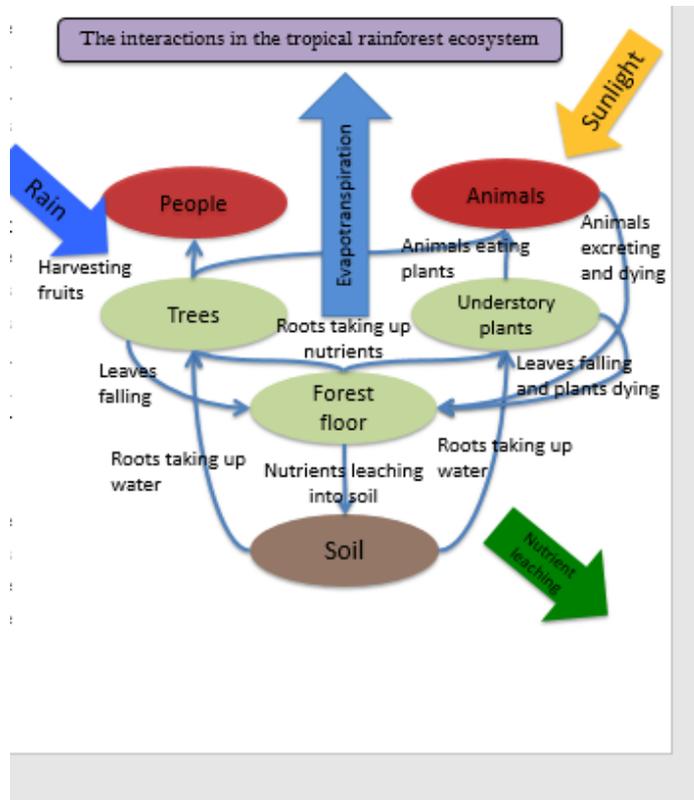
Rainforests are believed to contain more **animal** species than any other ecosystem. Some examples of animals found in the tropical rainforests are tree frogs, sloths, anacondas, jaguars and gorillas. There are also many species of insects and birds, many are brightly coloured and make a lot of noise.

Birds live in the canopy (branches) feeding on nectar from the flowers. Mammals such as monkeys and sloths are well adapted to living in the trees. Animals like deer and rodents live on the forest floor.

The rainforests are home to many native **people** (indigenous tribes), who have adapted to life there over the generations and live as part of and in harmony with the environment. They earn money by hunting and fishing, gathering nuts and berries and growing vegetables in small garden plots.



Figure 7 Indigenous Tribes in the Amazon



What is the graph showing?

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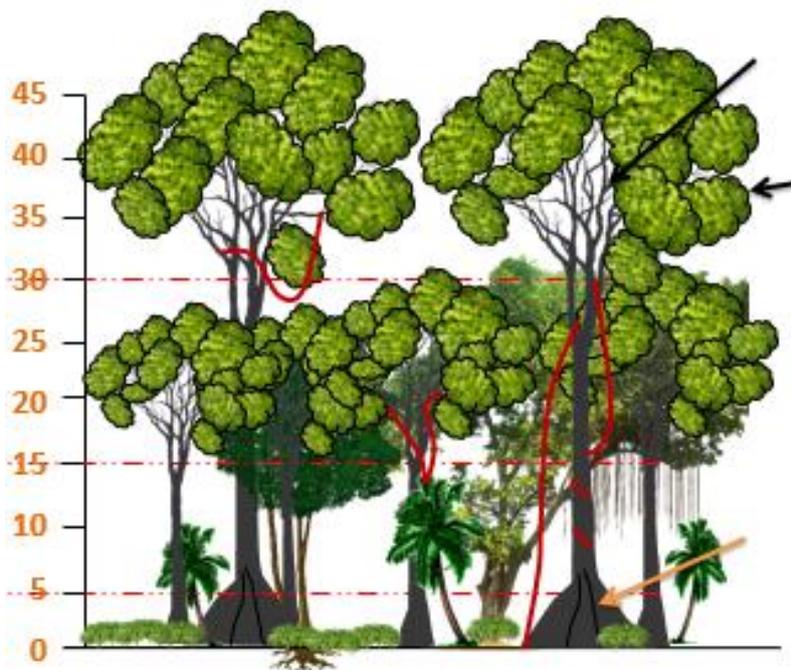
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Task: Identify the features of the rainforest

Epiphytes, Drip tip leaves, Liana, Buttress roots, emergent layer, canopy, understory and shrub layer.



Explain how the climate affects the characteristics of soils that form in tropical rainforests (2).

★ **TIP:** Think about the new knowledge you learnt on page 5 about soils and ensure that you **develop your points**. Think about what happens to the soil when the climate is very hot and what happens to the soil with heavy rainfall.

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Describe and **explain** the main plant adaptations in a tropical rainforest (6).

★ **TIP:** Once you have described the adaptation, make sure you explain as to why they have adapted. Aim for at least 3 adaptations with full explanations.

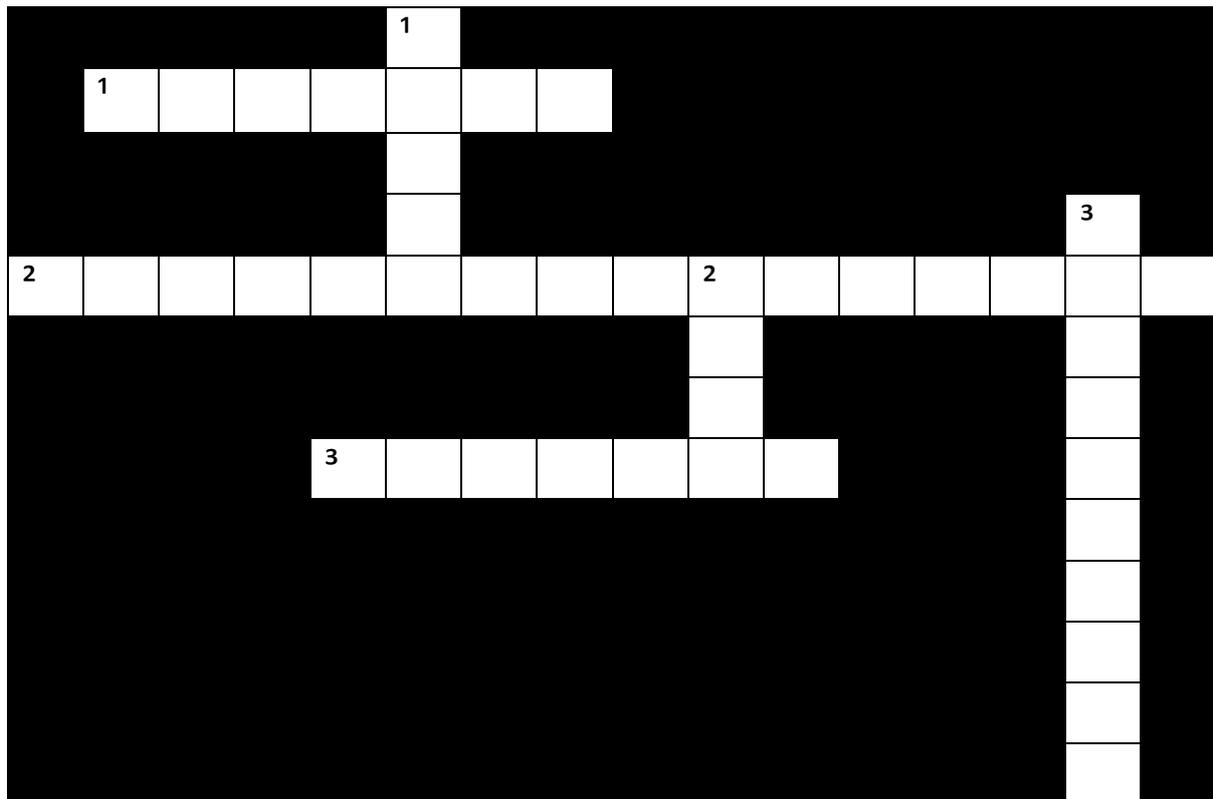
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Interdependence in a Tropical Rainforest

LO: To explore the interdependence of climate, water, soils, plants, animals and people within tropical rainforests.

DO IT NOW: Complete the crossword.

★ **TIP:** Think about the distinctive characteristics of tropical rainforests.



Across	Down
<ol style="list-style-type: none"> temperatures average about 27°C and rainfall is over 2000mm a year (7). people who have adapted to life there over the generations and live as part of and in harmony with the environment. (10, 6). any such living organism other than a human being or plant. (7). 	<ol style="list-style-type: none"> transparent and nearly colourless chemical substance that is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. (5). In a tropical rainforest only the surface layer is fertile (4). assemblages of plant species and the ground cover they provide (10).

Rainforests are **interdependent ecosystems**. All the characteristics of the rainforest (c_____, w_____, s_____, p_____, a_____ and p_____) are dependent on one another. If any one of these changes, then everything else is affected.

ACTIVATE: This section covers information on interdependence within a tropical rainforest and what relies on what.

Interdependence means where one factor is reliant on one or more other factors. There are many examples of interdependence in a tropical rainforest. Figure 8 shows the main characteristics of the tropical rainforest ecosystem: climate (rain and sun), soil, vegetation (trees and plants), animals and people. The arrows demonstrate how they interact to create an interdependence. For example, the warm and wet climate means that dead material is decomposed quickly by fungi and bacteria on the forest floor. This makes the surface soil high in nutrients, as a result plants can grow quickly and easy.

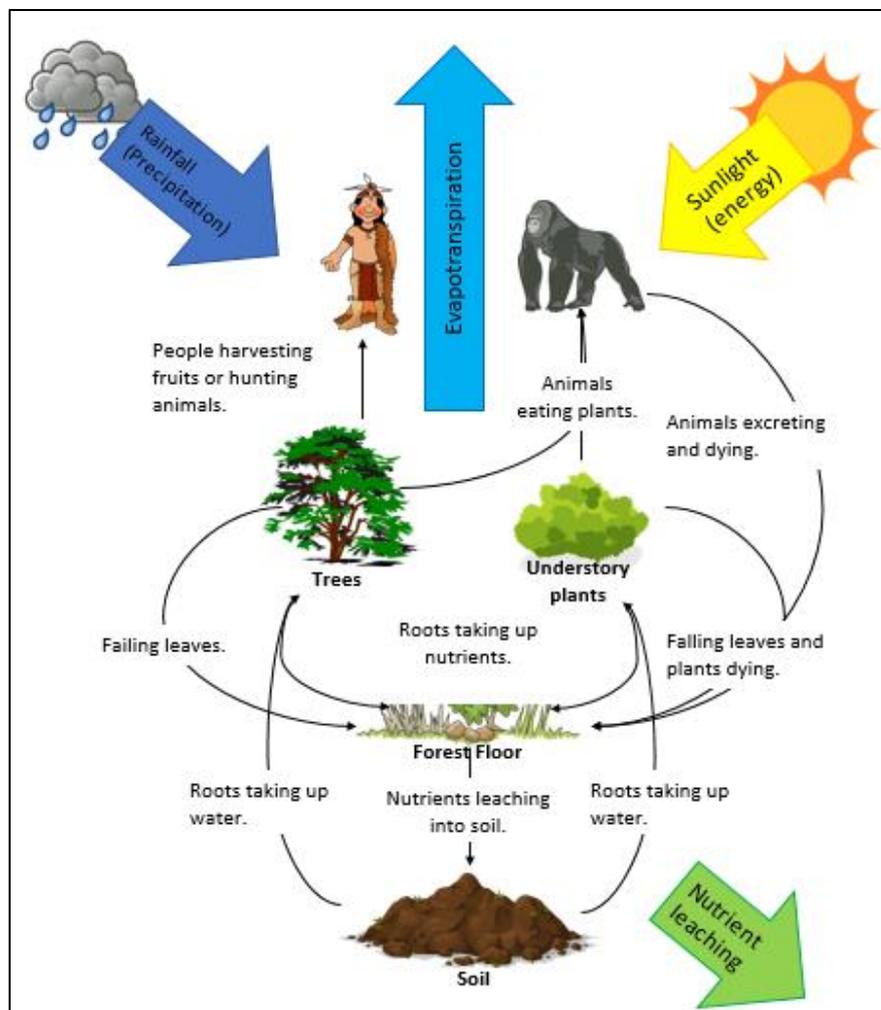


Figure 8 Tropical Rainforest Ecosystem

Another example is plants passing on their nutrients to animals when they're consuming the plants. The dense vegetation provides lots of food, so animal populations are high. Many plant and animal species have formed symbiotic relationships (where they each depend on the other for survival).

This is demonstrated by agouti (a rodent), they are one of the only animals that can crack open the hard seed pod of the Brazil nut to consume the nut inside (Figure 9). Sometimes, the agoutis bury the nuts which can then sprout into new seedlings. If the agouti becomes extinct, then Brazil nut trees would decline and so could all the other animals that live in or feed on the Brazil nut trees as their habitat or food source has gone. People who sell Brazil nuts to make a living may also be affected by a reduced income.



Figure 9 Agouti and a Brazil Nut

Changes to the tropical rainforest ecosystem from deforestation such as people reducing tree cover (deforestation), can have a direct effect on the whole ecosystem. For example, by reducing the tree cover, there will be a direct reduction in the amount of CO₂ absorbed from the atmosphere through photosynthesis, therefore there will be more CO₂ in the atmosphere, adding to the greenhouse effect and changing the climate.

A final example is interception, trees intercept rainfall and take up lots of water and releases it back into the atmosphere through evapotranspiration, this provides moisture for further rainfall. Deforestation means the climate may change and the risk of drought increases. This will affect the plants and animals living in the ecosystem.

DEMONSTRATE: Explain the interdependence shown in **Figure 8**.

★ **TIP:** Read the information on page 9 to refresh your knowledge of **Figure 8**.

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Outline what would happen if vegetation (trees and plants) coverage was reduced.

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Explain how the soil and plants in tropical rainforests are dependent on one another (2).

★ **TIP:** Think about how plants depend on soil and then vice versa.

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Adaptations in a Tropical Rainforest

LO: To explore how plants and animals adapt to the physical environment in a tropical rainforest.

Define biodiversity.

★ **TIP:** Look back at **Figure 5**, the nutrient cycle on page 4 or **Figure 10** below.

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Figure 10 Plants and Animals in the Rainforest

ACTIVATE: This section gives you information on how plants and animals (biodiversity) adapt to the physical environment in the tropical rainforest.

Biodiversity in a tropical rainforest is very high. Biodiversity means the variety of plant and animal life that lives in an area/habitat. Around 50% of the world's plant, animals and insect species are found in the rainforest. This is because rainforests are stable and productive environments where the climate is hot and wet all year round. Plants and animals do not have to cope with changing conditions and there is always plenty to eat.

Tropical rainforests are made up of layers (**Figure 4**, page 4). Most of the animal and plant species are found where there is most light, in the canopy layer. The forest floor is dark and damp. Biotic factors in the tropical rainforest ecosystem such as plants, animals, fungi and bacteria along the forest floor, have close but fragile relationships with the abiotic factors such as soil, temperature and moisture. Adaptations of plants and animals provide good examples of interdependence within the rainforest ecosystem.

The soil in the tropical rainforest are very poor with only the surface layer being rich in nutrients as nutrients in the lower layers is washed away (leaching) from high rainfall. As a result, plants in the tropical rainforest have adapted to coping with high rainfall, high temperatures and competition for light.

Tall trees that are competing for sunlight have developed big roots to support their trunks. Plants have thick and waxy leaves with pointed tips (drip tips), this is so the water can run off and no bacteria can grow on the leaf. The waxy leaves repel the rain. The rainforest has four distinctive layers, all with different adaptations. For example, plants in the highest layer (emergents) only have branches at their crown (where the most light reaches them) and plants in the undercanopy or understory have large leaves to absorb as much light as possible. Lianas are climbing plants, they use the tree trunks to climb up to sunlight. Plants do not drop their leaves in specific seasons, they drop their leaves gradually through the year allowing them to continue to grow all year round. **Figure 11** shows some of these adaptations.



Figure 11 Plant Adaptations in the Tropical Rainforest

Animals are adapted in different ways so that they can find food and escape predators. Many animals spend their entire lives up in the canopy. They have strong limbs so that they can spend all day climbing and leaping from tree to tree, for example, the howler monkey. Some animals such as flying squirrels have flaps of skin to allow them to glide between trees. Others have suction cups for climbing such as red-eye tree frogs. As the rainforest is full of dense tangled branches, some birds have short and pointed wings so that they can manoeuvre between obstacles, the harpy eagle for example. Camouflage is another method of adaptation for animals such as leaf-tailed geckos. This is so that they can hide from predators. Some animals have adapted to the temperature are nocturnal (active at night), sloths sleep during the day and are active at night because it is cooler and this helps to save energy. As there is a lack of sunlight on the forest floors, animals have adapted to low light levels. Anteaters have developed a strong sense of smell and hearing to detect predators without seeing them. Many of the rainforests animals can swim, like jaguars and sloths. This allows them to cross rivers.

DEMONSTRATE: Rainforests are said to be stable and progress, **suggest** one way in which human activity may make rainforests become unstable and **describe** the consequence of this on the biodiversity of the ecosystem.

★ **TIP:** Look back at how a tropical rainforest ecosystem may change on page 10.

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Study Figure 12, images of animal life in the tropical rainforest ecosystem. **Describe** and **explain** how these animals have adapted.

★ **TIP:** There may be more than one adaptation per animal. Use page 14 for support.

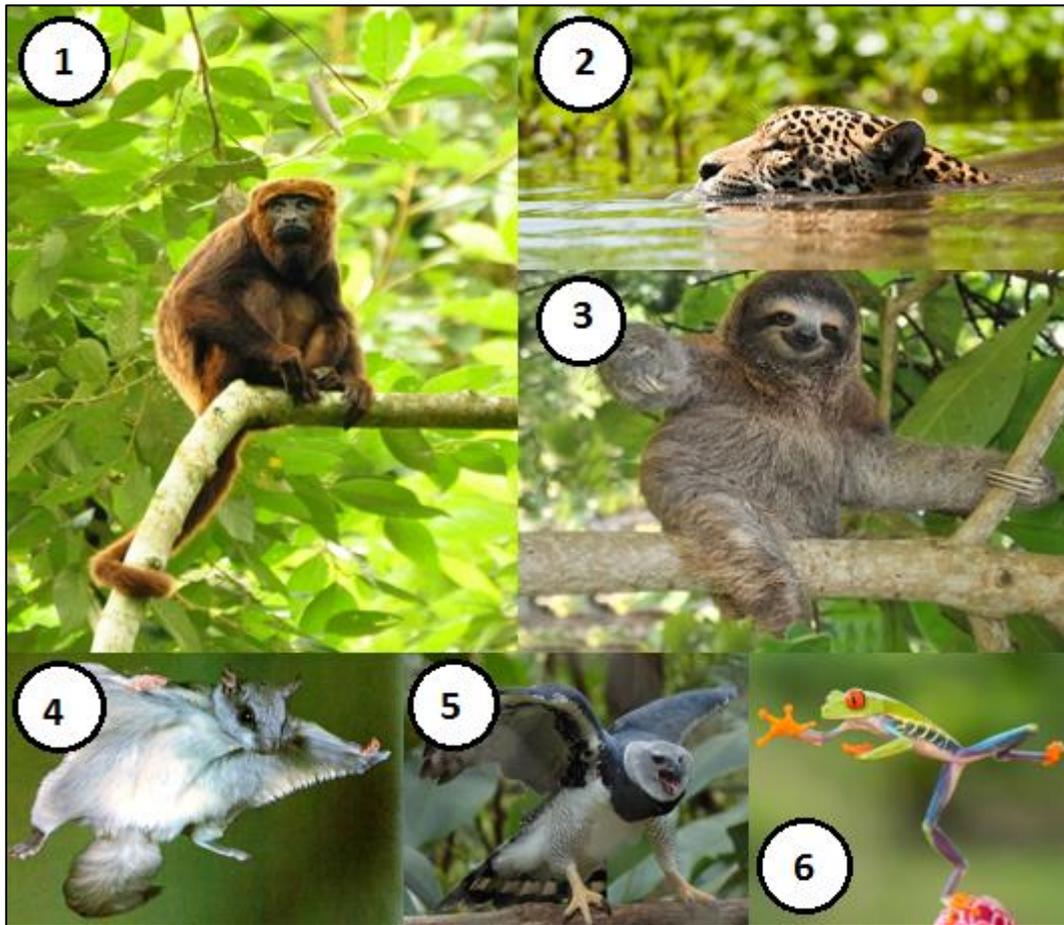


Figure 12 Animal Adaptations in the Tropical Rainforest

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Study Figure 13, a diagram to show the four layers of the tropical rainforest. **Outline** two ways that trees have adapted in the emergent layer (2).

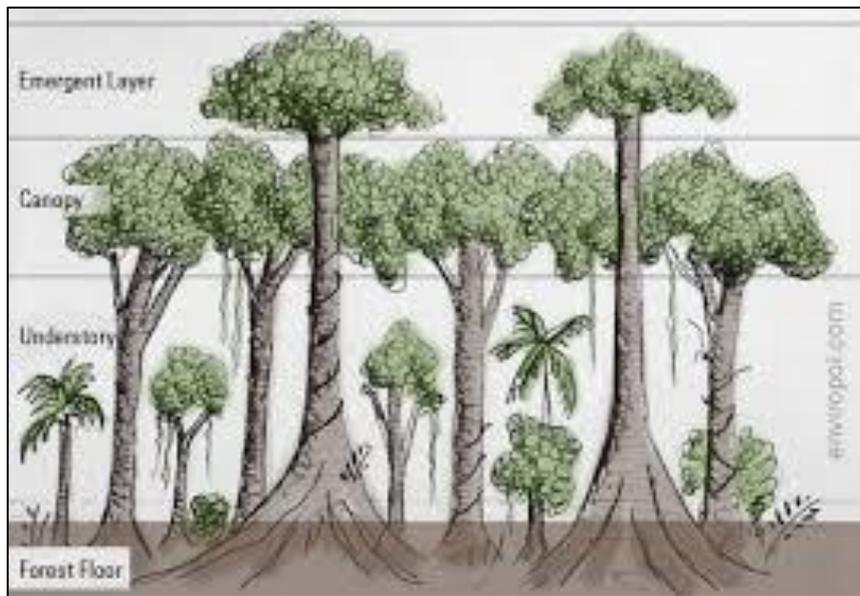


Figure 13 Four Layers of the Tropical Rainforest

Adaptation 1:

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Adaptation 2:

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Explain how human development of tropical rainforests might reduce biodiversity (3).

★ **TIP:** Go into detail about the knock-on effect of the human activity onto the atmosphere and then on to climate.

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Deforestation of Tropical Rainforests

LO: To explore the changing rate of deforestation.

DO IT NOW: Study Figure 14, a bar chart to show tropical deforestation rates between 2000 and 2005. Describe the countries that have the highest and lowest deforested area between 2000 and 2005.

★ TIP: Use data such as place names and average area deforested per year.

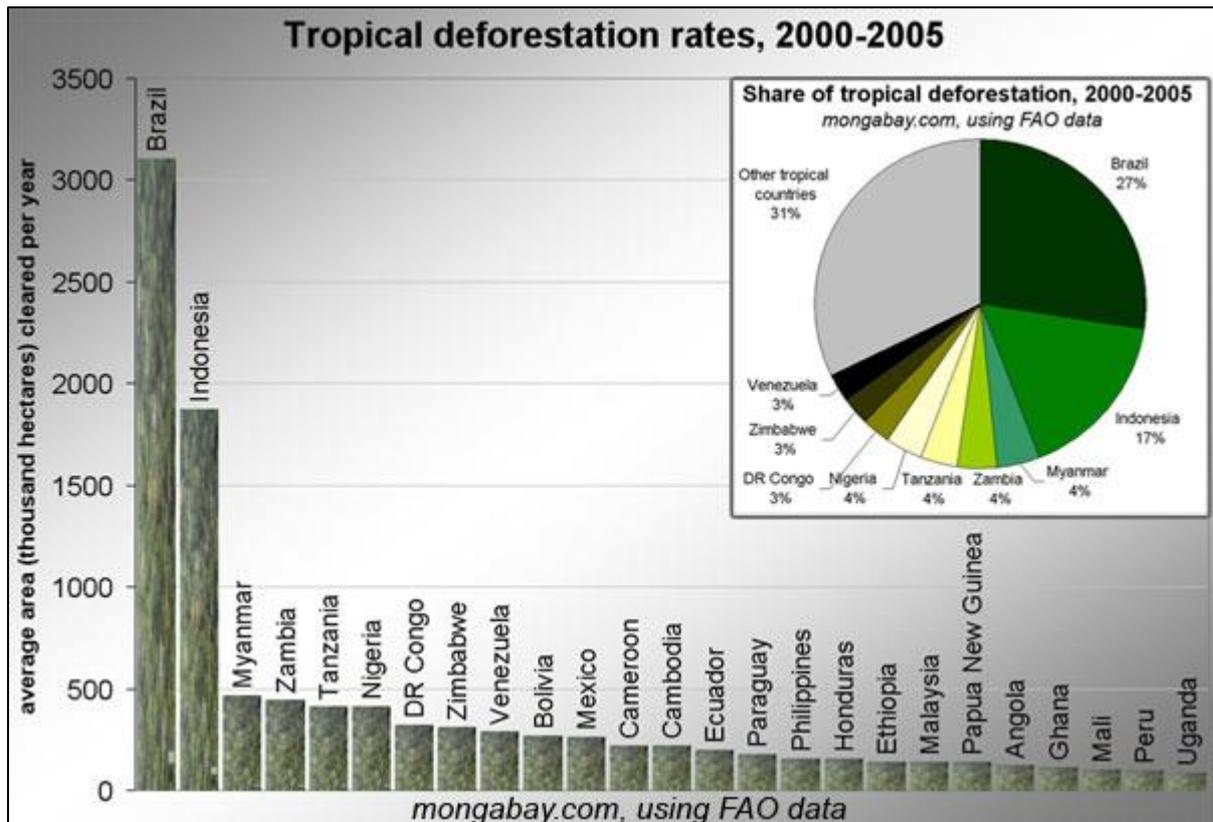


Figure 14 Deforestation Rates

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Define deforestation.

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ACTIVATE: This section has information about the changing rate of deforestation and the current situation of deforestation in **Brazil**.

In the last 100 years, the impact of deforestation on tropical rainforests has become serious. There are 62 countries with a tropical rainforest within their borders. The United Nations Food and Agriculture Organisation (UNFAO) estimate that around half of the world's tropical rainforests have now been deforested.

Figure 15 shows that the rate of deforestation during the first decade of the twenty-first century has increased in all three continents: Asia (Indonesia, Malaysia and Thailand), Africa (Madagascar and Mali) and South America (Peru, Guatemala and Bolivia).

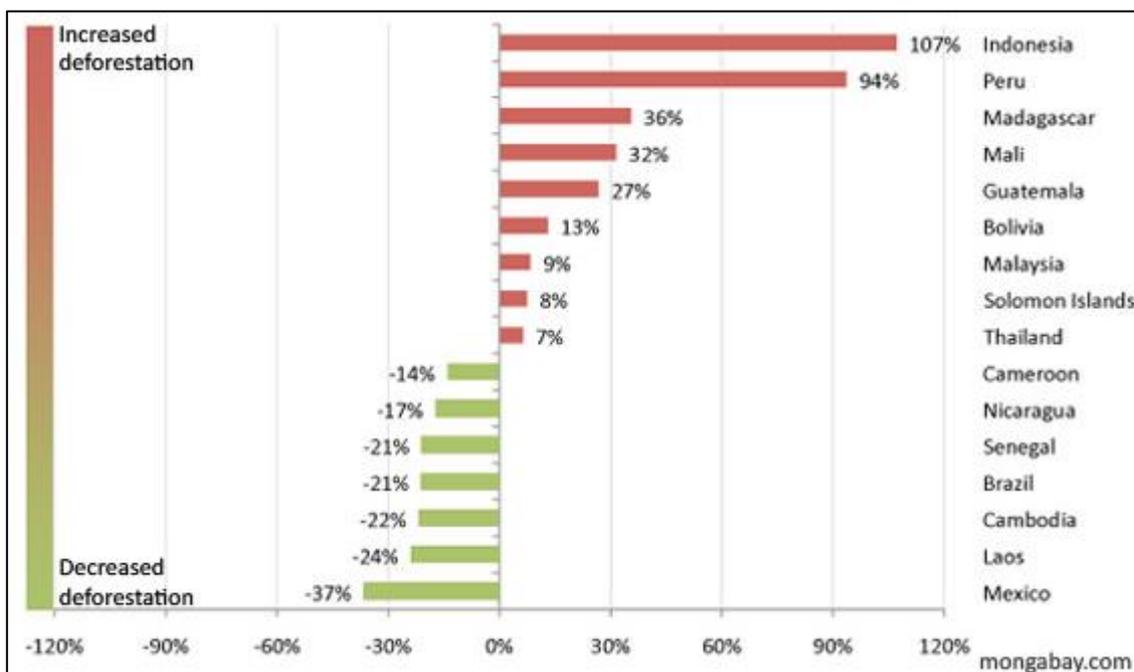


Figure 15 Change in Annual Deforestation Rate (2000 and 2010)

The rate of deforestation decreased in seven countries. The rate of deforestation has fallen in Brazil to a record low. It is estimated that around 50% of Brazil's remaining rainforest now has some form of protection status. However, 20% of the Amazon rainforest has now been cleared since 1970; that's an area of 761,000 km² (about three times the size of the UK).

The rate of reductions elsewhere may indicate that other countries have also put measures in place to protect and preserve their

rainforests. In Mexico, strenuous efforts are being made to protect the little rainforest that remains but it disappears entirely.

It is important to note that only the rate of deforestation has increased, deforestation continues in all countries shown in **Figure 15**. Borneo and Nigeria are just some of the hotspots where the rate of deforestation is increasing. Today, the global rate of tropical rainforest deforestation is estimated to be:

- 1 hectare per second.
- 60 hectares per minute.
- 86,000 hectares per day (an area larger than New York City).
- 31 million hectares per year (an area larger than Poland).

The Brazilian rainforest occupies the large area of lowland basin drained by the Amazon and its tributaries. **Figure 16** illustrates how much the tropical rainforest cover was cleared up to 2006.

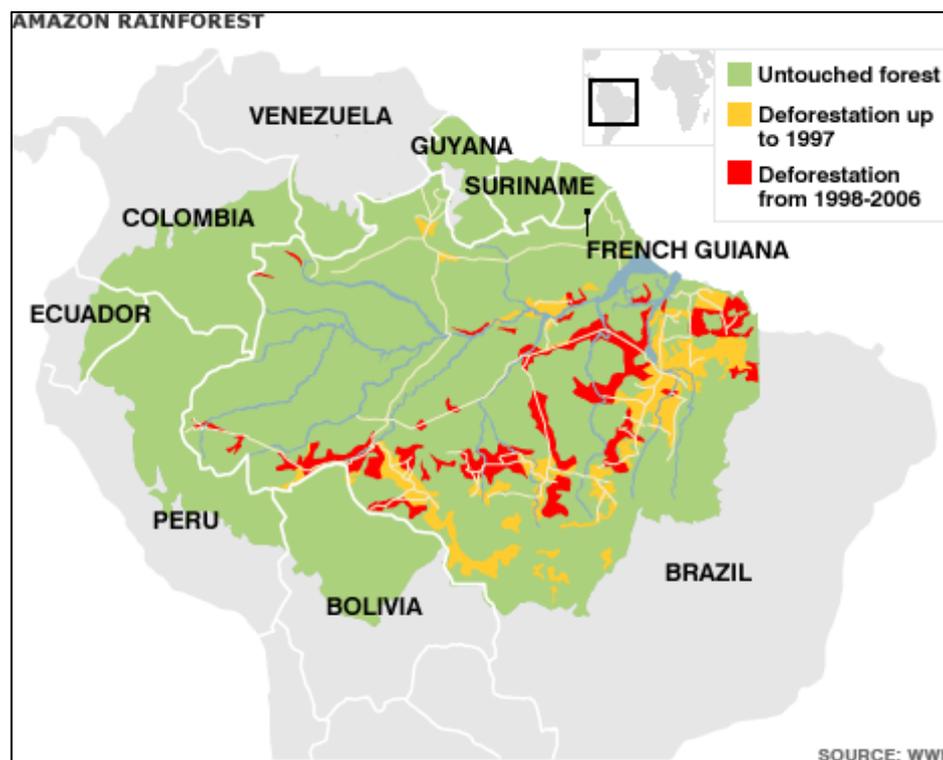


Figure 16 Deforestation in the Amazon Rainforest

There is noticeable clearance to the south of the Amazon. This part of the rainforest is most accessible from the main cities in Brazil such as Rio de Janeiro, São Paulo and Brasilia. For centuries, the rainforest has been lived in by indigenous tribes that have harvested fruits and

nuts, cut wood for fuel, used timber to build their own dwellings, discovered cures for numerous illnesses and cleared small areas of the rainforest through slash and burn (a type of subsistence agriculture). Forested land is clear cut and any remaining vegetation gets burned. The resulting layer of ash provides the newly-cleared land with a nutrient-rich layer to help fertilise crops. Slash and burn has done little lasting damage to the tropical rainforest ecosystem. When the soil in one small area becomes exhausted, the tribe move on and clears another. It is sometimes referred to as 'shifting cultivation'. Once left, the forest that was being used can regenerate.

An important point to remember is that human activity does not always mean deforestation. Many cases of human activity lead to forest degradation, this is where the rainforest ecosystem is changed in a negative way and the supply of resources declines.

DEMONSTRATE: Identify the differences between deforestation and forest degradation.

★ **TIP:** Define the two terms and identify the differences.

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In the past, before urbanisation and globalisation, what would people have used the tropical rainforests for?

★ **TIP:** Think about the human activity of indigenous tribes.

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Study Figure 16, and explain why there is much untouched forest to the north of the Amazon basin **(3)**.

★ **TIP:** Think about human activity and accessibility.

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Describe the changing rate of deforestation around the world since 2000-2010.

★ **TIP:** Examine **Figure 15**, think about how many tropical rainforests there are in the world and where the rate has increased and where the rate has decreased.

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CONSOLIDATE: Write **5** key words from today's lesson in the fingers of the hand. **Summarise** one of the key points to remember from today's lesson in the palm of the hand.

Causes of Deforestation in Brazil

LO: To explore a case study of a tropical rainforest to illustrate the causes of deforestation.

ACTIVATE: This section will introduce you to how people exploit the rainforests resources and the activities that cause deforestation.

Brazil is located in South America. It is the fifth largest country in the world and contains the largest area of tropical rainforest. The Amazon covers an area of around 8 million km², including parts of Brazil, Peru, Columbia, Venezuela, Ecuador, Bolivia, Guyana and Suriname. Since 1978, around 761 000km² has been destroyed by deforestation. Like other countries the tropical rainforest in Brazil is being exploited in two ways: by using its resources such as timber, water and minerals and by deforesting the area to make way for other activities such as growing crops and rearing livestock. **Figure 17** shows the mains reasons for deforestation in Brazil.

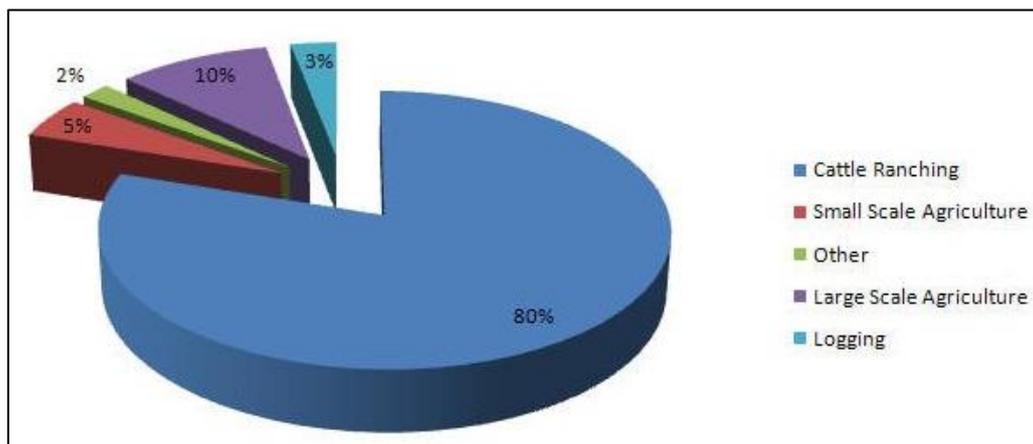


Figure 17 Causes of Deforestation in the Brazilian Rainforest

The main resource extraction activities include logging, mineral extraction and energy development.

Logging (**Figure 18**) is the first step in the conversion of forest land to other uses. This may seem surprising giving that logging only accounts for 3% of the causes of deforestation. This is because it is the eventual use of the cleared land is put to that is recorded in the pie chart. Timber companies are interested in specific trees such as mahogany and teak (selective logging), they sell the timber to other countries to make furniture. Smaller trees are used as wood for fuel or made into pulp or charcoal. Vast amounts of the rainforest are cleared in one go (clear felling). There is also lots of illegal logging.



Figure 18 Logging in the Brazil Rainforest



Figure 19 Gold Mining in Brazil

Mineral extraction such as gold mining fall into the other category that accounts for 2% of the causes for deforestation. In 1999, there were 10,000 hectares of land being used for gold mining. Today, there is over 50,000 hectares of land being used for gold mining. The rainforest also suffers from bauxite extraction which is used to make aluminium.



Figure 20 Itaipu Dam, Brazil

Also, included in the other category is energy development. An unlimited supply of water and ideal river conditions have encouraged dams to be built to generate hydroelectric power (HEP). This involves flooding vast amounts of

rainforest. Often, the dams have a short life. The submerged forest eventually rots, making the water very acidic which then corrodes the HEP turbines. The dams also become blocked with soil washed down deforested slopes by the heavy rain.

Figure 17 also mentions the activities that are causing the rainforests to be cleared such as subsistence and commercial farming, road building, settlement and population growth.

Agriculture is one of the main causes of deforestation in the Brazilian rainforest. Subsistence farming (which means farming to feed

oneself and family) is the traditional method of agriculture and temporarily clears small patches of the rainforest. This is mainly done by indigenous tribes and accounts for 5% of the causes of deforestation in the Brazilian rainforest.



Figure 21: Cattle on Deforested Land

Commercial farming is far more damaging the rainforest. Large areas of the Amazon have been cleared to make room for livestock rearing. The rearing of cattle is estimated to account for 80% of the causes of deforestation in Brazil. However, the land cannot be used for long. The quality of the pasture quickly declines which means that the farmers move on and clear more rainforest to create more room for cattle pastures.

In addition to cattle rearing, commercial farming also includes the growing of crops. The rainforest is cleared to make way for vast plantations of crops such as bananas, palm oil, pineapple, sugar cane, tea and coffee. The cultivation of soybean has also caused much forest clearance in Amazonia. The amount of rainforest cleared for this crop has doubled between 1990 and 2010. Like cattle ranching, the soil will not remain fertile for long and therefore does not have a long-life span for sustaining crops. After a few years, farmers must fell more rainforest for new plantations. Growing sugar can for biofuel is beginning to become a major crop.



*Figure 22 The Trans-Amazonian Highway,
Brazil*

Road building is accounted for in the 2% other category. Roads are needed to bring in equipment and transport products to markets, it means cutting great amounts of the rainforest down. Additionally, a road built for one commercial activity makes the forest more accessible to other exploiters of the rainforests

resources. The Trans-Amazonian Highway began construction in 1972 and is 4,000km long. Although only a small part of it paved, it has played an important role in opening up areas of the rainforest.

Population growth and migration to the area is also putting pressure on the Amazon rainforest, especially as the Brazilian government offers land in the rainforest to poor people from overcrowded cities. Many people migrate to the rainforest for work in the industries mentioned above. In turn, this means that land needs to be cleared to make way for settlements where workers and their families can live.

DEMONSTRATE: Study Figure 17, describe the importance of different causes of deforestation.

★ **TIP:** Use data in your answer.

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Explain why logging has such low value as a cause of deforestation in Brazil.

★ **TIP:** Read page 23 again if you are struggling and look at the value of logging on **Figure 17**.

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List which activities are accounted for in the 2% other category of **Figure 17**.

★ **TIP:** Read pages 23, 24 and 25.

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Draw your own pie chart to show the causes of deforestation in the Brazilian Rainforest. You will need to show 5 categories and use **Figure 17** to get the data for each category.

★ **TIP:** Use a percentage protractor or convert your percentages into angles, for example...

80% of the causes are due to cattle ranching. To show this we work out 80% of 360 (because there are 360° in a circle).

$0.8 \times 360 = 288$. This means that 288° of our circle should be sectioned off and coloured blue.

Don't forget to include a key.

Impacts of Deforestation in Brazil

LO: To explore a case study of a tropical rainforest to illustrate the impacts of deforestation.

DO IT NOW: Study **Figure 22**, a photograph of Itaipu Dam in Brazil, recall two environmental impacts of building dams in rainforests.

★ **TIP:** Visit page 23 and 24 to read the relevant information.



Figure 22 An enlarged photograph of Itaipu Dam, Brazil (Figure 20).

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Impact 2:
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ACTIVATE: This section will cover the local and global impacts of deforestation in Brazil.

There are many consequences or impacts of deforestation, whilst two are of global significance, the others are essentially local. Climate change is amongst the significant global impacts of deforestation in the rainforest. During photosynthesis, the tree canopy absorbs carbon dioxide (a greenhouse gas) in the atmosphere which reduces the rate of climate change. The Amazon stores around 100 billion

tonnes of carbon. When the trees are felled, this stops and more carbon dioxide remains in the atmosphere. Fire is often used to clear the rainforests, this means that the carbon stored in the wood is released back into



Figure 23 Burning Rainforest

the atmosphere where it will absorb heat and increase Earth's climate. Deforestation is responsible for at least 15% of global CO₂ emissions each year – more than all the world's transport emissions combined. In addition, trees give off moisture from the process of transpiration; deforestation reduces the moisture in the air resulting in a drier local climate. With less moisture comes less condensation and in turn rainfall. The natural recycling of water is like a cooling system, once the recycling is reduced (through less moisture) the local climate becomes warmer. Increasing dryness and rising temperatures are not good for people or activities such as agriculture.



Figure 24 Vincristine: an anti-cancer drug made from Periwinkle; a rainforest plant

Biodiversity is a measure of the variety of plants and animals in an ecosystem. Rainforest are the most biodiverse ecosystem in the world. Clearing tropical rainforests means that the biodiversity will be reduced and individual species will

become endangered and trees possible extinct. It has been estimated that 137 plant, animal and insect species are being lost each day due to deforestation. This amounts to 50, 000 species each year. As the rainforest species disappear, so do many cures for life-threatening diseases. Currently, over 120 prescription drugs sold worldwide come from plant sources. 25% of the active ingredients in today's cancer-fighting drugs come from the organisms found only in the rainforest. Recent research has shown that the Amazon rainforest could lose between 30 and 45% of their main species by 2030.

Soil takes thousands of years to form, but it can be stripped away in a matter of hours. Removal of soil by wind and rain is called soil erosion. The roots of trees and plants bind the soil together. As soon as any part of the rainforest is cleared, the thin layer of topsoil is quickly removed by heavy rainfall. Bare slopes are prone to soil erosion. Once the topsoil has been removed, there is little hope of anything growing in that area again. Soil erosion also leads to the silting up of river courses. Even when the soil is protected, it quickly loses the little fertility it has when covered by trees. Grazing and plantations do little if anything to keep the soil fertile. The decline in soil fertility leads to pastures and plantations being abandoned, so more areas of the rainforest are cleared.

Deforestation in many parts of the world is driven by profit. Deforestation may lead to short-term economic gains but it may also lead to long-term economic losses. The natural rainforest has brought wealth to countries that were poor. Agriculture makes a lot of money in the rainforest. In 2008, Brazil made \$6.9 billion from trading cattle, Brazil is also the world's second biggest exporter of soy bean. The mining industry creates jobs for local people, for example the Buenaventure mining company in Peru employs over 3100 people. Logging contributes a huge amount to Brazil's economy. Companies will pay taxes to the government which can be used to improve public service such as education, healthcare and water supply. However, in the long-term, deforestation can destroy the resources that countries depend on such as timber and non-

timber products, tourist numbers may also decline as the area reduces in attractiveness. The livelihoods of some local people are destroyed as deforestation can cause a loss of animals or plants that they rely on to make a living. For example, local Brazilian rubber tappers who extract natural rubber from rubber trees have lost their livelihoods as trees have been cut down.

DEMONSTRATE: Make a **list** of the short-term economic gains and the long-term economic losses of deforestation in Brazil.

★ **TIP:** Read pages 30 and 31.

Short-term economic gains	Long-term economic losses

Explain the local impacts of climate change in Brazil.

★ **TIP:** Think about the water and carbon cycle. Visit page 36 if you are struggling.

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Value of the Tropical Rainforest

LO: To explore the value of tropical rainforests to people and the environment.

DO IT NOW: Outline one positive economic impact of deforestation.

★ **TIP:** Think about how deforestation is used to make money.

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Outline one negative social impact of deforestation.

★ **TIP:** Think about how people have been badly affected because of deforestation. Think about how people depended on the tropical rainforest.

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ACTIVATE: You will now read about the different goods and services that the tropical rainforest provides.

Previous lessons on tropical rainforests have proved that the rainforest is a valuable provider of resources and opportunities. These fall into two different groups: those provided by the rainforest in its natural state and those provided by the land once it is cleared of its forest cover. The latter group has extensive commercial value, especially the crops and livestock and so this group is the driving force behind current rates of deforestation.

The resources and opportunities offered by the tropical rainforest itself are widely known as goods and services. Goods are things that can be directly obtained from the rainforest whereas services are

benefits that the rainforest can offer to both people and the environment. **Figure 25** demonstrates these.

Goods	Services
Native food crops (fruit & nuts)	Air purification (absorbing CO ₂)
Wild meat and fish	Water and nutrient cycling
Building materials (timber)	Protection against soil erosion
Energy from HEP	Wildlife habitats
Water	Biodiversity
Medicines	Employment opportunities

Figure 25 Goods and Services in the Tropical Rainforest

The plants of the tropical rainforest include many of the things that we eat, such as cocoa, sugar and bananas. Cinnamon, vanilla and many other spices also come from the rainforest. Useful products like rubber, ropes and baskets are made from rainforest plants. Some of the chemicals from rainforest leaves, flowers and seeds are used to make perfumes, soaps, polishes and chewing gum. Traditional subsistence farming is still very much about the harvesting of rainforest goods. The use of these forest products has been going on for a very long time.

However, we are beginning to realise that the rainforest has more to offer. It is the stock of plants that pharmaceutical companies are finding to contain ingredients to help treat and cure diseases. Indigenous tribes have a very long tradition of using parts (barks, resins, roots and leaves) of various plants for this purpose. Currently, over 120 prescription drugs sold worldwide come from plant sources. About a quarter of drugs used in the developed world are derived from rainforest ingredients. Less than 1% of rainforest tropical trees and plants have been tested by scientists to find out if they have any medical value. 25% of the active ingredients in today's cancer-fighting drugs come from the organisms found only in the rainforest (**Figure 24**). In 1980, there were no pharmaceutical companies researching possible new drugs and cures from plants. Today, there are well over 100. It is in the interest of global healthcare to protect the tropical rainforest and its medicinal plants. It is vital that these plants are not over exploited.

Some of the services listed in **Figure 25** such as water and nutrient recycling and protection against soil erosion are services that benefit the environment and assist in maintaining the general health of the rainforest. On the other hand, the rainforest biodiversity and wildlife habitats are benefits that people can enjoy, either as native settlers or as tourists. However, it perhaps the rainforests air purification that service that is of most value to both people and the environment, locally and globally.

Perhaps the single most important global issue today is climate change. Climate change will only be checked by:

- Greatly reducing the burning of fossil fuels and so lowering CO₂ emissions.
- Greatly reducing the rate of deforestation to ensure that as much of the Earth as possible is covered by trees to absorb CO₂ from the atmosphere.

As one of the largest carbon sinks in the world, the tropical rainforest has a critical role to play. Protecting the remaining rainforest requires doing two things:

- Ensuring that much of it is left untouched, so that it remains in a pristine state, for example, making large areas of rainforest into nature reserves and national parks.
- Allowing the goods and services of the tropical rainforest to be used to benefit people and the environment, but only in a sustainable way.

DEMONSTRATE: Outline the difference between the goods and services of an ecosystem.

★ **TIP:** Define ecosystem goods and ecosystem services and describe the differences.

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Discuss the ways that tropical rainforests are good for global health.

★ **TIP:** Think about the facts around tropical rainforest and medicines, what has been discovered, what is yet to be discovered and who it benefits.

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Label Figure 26 with the different goods and services that you can see in this photograph.

★ **TIP:** Think deep and visit **Figure 25** on page 34 for some help if needed.



Figure 26 A photograph of the rainforest in Rio de Janeiro, Brazil

Explain why the tropical rainforest is needed to fight climate change.

★ **TIP:** Discuss how the rainforest plays a part in reducing the rate of climate change and the consequences of deforestation onto this natural benefit of rainforests.

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Sustainable Management of the Tropical Rainforest

LO: To explore strategies used to manage the rainforest sustainably.

ACTIVATE: In this final section of reading, you will learn why sustainable management is needed, international agreements and government intervention to protect the rainforest.

If the goods and services of the tropical rainforest are not protected, then they will soon become lost forever. Sustainable management means using goods and services in such a way that they are still available for the future. If that does not happen, then the rainforests stock of renewable resources will gradually become exhausted. Many products including rubber, coffee, chocolate and medicines sourced from the rainforest may become extinct, the chance to discover and develop new medicines will reduce. It is important to protect the rainforest, to protect its biodiversity; maintaining the high diversity of plants and animals is valuable to both people and the environment. Further large-scale deforestation has no place in any sustainable management of the rainforest.

Most action to protect the tropical rainforest are taken at three levels: local, national and international. Some topics such as conservation and education, crop up in all three action levels. Other actions tend to occur at only one of these levels.

Selective logging involves felling trees only when they are fully grown. This is less damaging to the forest than felling all trees in an area. If only a few trees are taken from each area then the overall forest structure is kept, the canopy is still there and the soil is still protected. This means that the rainforest will be able to regenerate so it can be used in the future. It involves a cycle lasting 30 to 40 years. The least damaging forms are horse logging and helicopter logging which involves removing felled trees out of the rainforest using horses or removing them with helicopters instead of huge trucks. This prevents further areas being felled to build roads for transporting logs out of the rainforest. Helicopter logging is used in the Malaysian state of Sarawak (**Figure 27**).



Figure 27 Helicopter Logging in Malaysia.

Replanting is perhaps one of the most obvious methods of managing rainforests sustainably. Seeds are collected from existing patches of primary rainforest, grown into saplings in nurseries and then planted back in the deforested areas. This means that there will be trees for people to use in the future. It is important that the same types of tree are planted that were cut down, so that the variety of trees is kept for the future. In some countries, there are laws to make logging companies replant trees when they clear an area. In June 2015, Brazil promised to replant 12 million hectares of rainforest.

For the areas untouched by logging, ecotourism presents a type of sustainable action. Ecotourism is tourism that minimises damage to the environment and benefits the local people. Only a small number of tourists are allowed in an area at a time. Environmental impacts are minimised such as making sure waste and litter are disposed of correctly to prevent land and water pollution. Ecotourism provides an income for local people as they act as guides, provide accommodation and transport. It can also raise awareness of conservation issues and bring in more revenue for rainforest

conservation. If local people are involved in tourism, they don't have to log or farm to make money, meaning fewer trees are felled. If a country's economy relies on ecotourism, there's an incentive to protect the environment. Ecotourism has been very successful in Costa Rica (Central America). It is the largest source of revenue for the country and has led to 21% of the country being protected from development.

Many countries have set up national parks and nature reserves to conserve areas within the rainforest. In these areas, damaging activities such as logging are restricted. However, a lack of funds can make it difficult to police the restrictions. As a result, some countries have set up funds which overseas governments and businesses can invest in. The countries get the money in exchange for conserving the rainforest. This money can then be used to enforce restrictions on damaging activities and to promote sustainable use of rainforests. Norway has paid \$1 billion into Brazil's Amazon fund to be used for conservation.

Another method of sustainable management of rainforests is to educate the international community about the impacts of deforestation. This can encourage people to buy products that are certified from sustainably managed sources. Some local people don't understand the environmental impacts of deforestation, local people focus on making money in the short-term (illegal logging) to overcome their own poverty. Educating local people about the impacts of deforestation and ways to reduce the impacts decrease damage to the rainforest. Also, educating local people about alternative methods to make money that don't damage the environment as much such as ecotourism, means that they aren't dependant on unsustainable options to make a living.

Hardwood is a general term for wood from certain type of trees such as mahogany and teak which are dense and hard, these woods are often used to manufacture furniture. High demand for hardwood from consumers in richer countries are becoming rarer as people are chopping them down and selling them. There are international hardwood agreements in place to try to reduce illegal logging and

promote hardwood from sustainably managed rainforests. The Forest Stewardship Council is an organisation made up of NGO (non-governmental organisations) such as Greenpeace and individuals worldwide. They mark sustainably sourced timber products with their logo so that consumers can choose their products that are not contributing to unsustainable deforestation.

A lot of tropical rainforests are in LICs (low income countries) that often borrow money from wealthier countries or organisations such as the World Bank, to fund development schemes or cope with emergencies like floods. The money must be paid back with interest and so a lot of countries with rainforests are in debt. Countries often allow logging, farming and mining in rainforests to make money to pay back the debt. Reducing debt means countries don't have to conduct this activity and so can conserve the rainforest for the future. Debt can be cancelled by countries or organisations but there is no guarantee that the money that would have been spent on repayments will be spent on conservation instead. A better solution is a conservation swap, where part of a country's debt is paid off in exchange for a guarantee that the money is spent on conservation. In 2008, the USA reduced Peru's debt by \$25 million in exchange for rainforest conservation.

DEMONSTRATE: Identify the seven methods of sustainable management of tropical rainforests and provide an example for each method.

★ **TIP:** Read pages 38 - 41, each method is explained in detail and examples are found at the end of each paragraph.

Explain how international hardwood agreements can encourage the sustainable management of tropical rainforests **(3)**.

★ **TIP:** Give examples of hardwoods and NGOs that promote the use of sustainable wood products.

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Evaluate to what extent selective logging is a more effective method of sustainable development than reducing debt **(6)**.

★ **TIP:** Use comparative language such as ‘however’ and ‘on the other hand’. Tell the examiner what each method involves, give an example of where it is carried out and criticise the method. Provide an overall conclusion on which method is better and why.

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CONSOLIDATE: RAG your knowledge of tropical rainforests.

Key Concept/Idea	☹️	:	😊
Physical characteristics of a tropical rainforest.			
The interdependence of climate, water, soils, plants, animals and people within a tropical rainforest.			
How plants and animals adapt to the physical environment.			
Issues related to biodiversity.			
Changing rates of deforestation.			
A case study of a tropical rainforest to illustrate causes of deforestation			
<ul style="list-style-type: none"> • subsistence and commercial farming 			
<ul style="list-style-type: none"> • logging 			
<ul style="list-style-type: none"> • road building 			
<ul style="list-style-type: none"> • mineral extraction 			
<ul style="list-style-type: none"> • energy development 			
<ul style="list-style-type: none"> • settlement and population growth 			
A case study of a tropical rainforest to illustrate impacts of deforestation			
<ul style="list-style-type: none"> • economic development 			
<ul style="list-style-type: none"> • soil erosion 			
<ul style="list-style-type: none"> • loss of biodiversity 			
<ul style="list-style-type: none"> • contribution to climate change. 			
Value of tropical rainforests to people and the environment.			
Strategies used to manage the rainforest sustainably:			
<ul style="list-style-type: none"> • selective logging and replanting 			
<ul style="list-style-type: none"> • conservation and education 			
<ul style="list-style-type: none"> • ecotourism 			
<ul style="list-style-type: none"> • international agreements about the use of tropical hardwoods 			
<ul style="list-style-type: none"> • debt reduction. 			

Part 3 UNIT IN A BOOKLET

The Living World.

Use the PPT and information sheets/resources to complete this booklet. The information and learning that you will complete will appear in the exam.

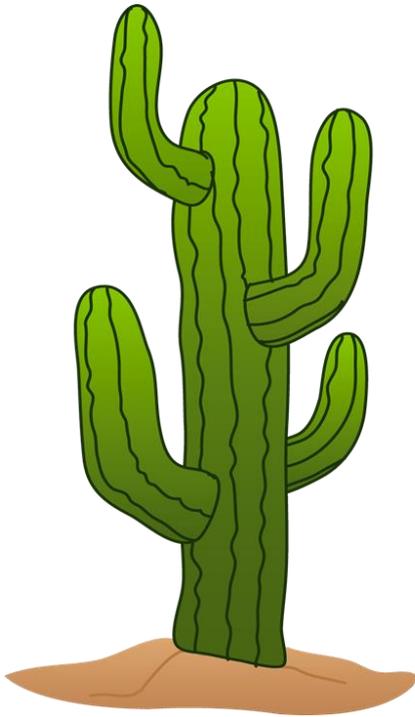
In order to check your understanding you will be given an end of topic test.

POWERPOINT 9: Hot deserts ecosystems

Task 1: Using slide 1 and 2: Define what a desert is:

Task 2: Use the images on slides 1 and 2 to describe what a desert looks like:

Task 3: Use slide 9 to help annotate the adaptations of the cactus and camel (use the pictures below to help label the main information)



Task 4: Read slides 4 to 9 and make key notes on the characteristics of the desert- use the wiki sheet on the next page to collate this information.



WIKIPEDIA
The Free Encyclopedia

- Main page
- Contents
- Featured content
- Current events
- Random article
- Donate to Wikipedia
- Wikipedia store

Learning tools

- Grades 1-3- describes features of hot desert
- Grades 4-6- use of key terminology to describe.

Grades 7-9- explains the links in the biome.

Definition tools

Hadley cell- warm air rises at the equator and falls at about 30 degrees Celsius.

Nutrient cycle- on going recycling of nutrients between living **organisms** and their environment.

Biodiversity- the variety of plant and animal life in an ecosystem.

Desertification- when the fertile soil is blown away

Article

Talk

Read

Edit

View history

Search

Q

Hot Desert Biome

From Wikipedia, the free encyclopedia

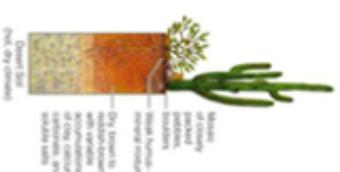
A deserts is a barren area of land where little precipitation occurs.

Climate

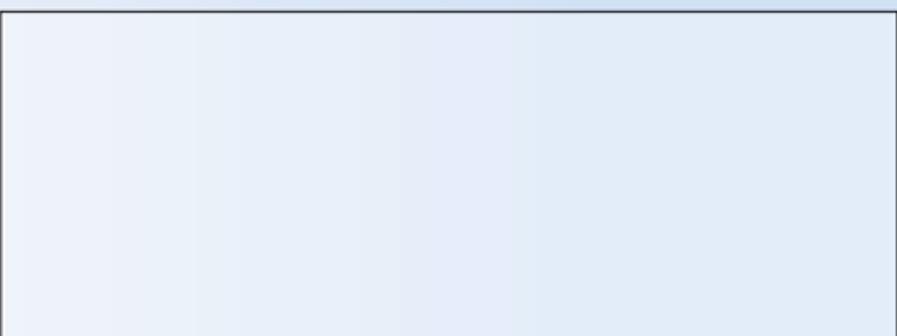
What is the hot desert climate like and why?

Soil structure

Interdependence and animal and plant adaptations



Location of Hot Desert



Task 5: choose one of the following 3 exam questions to answer

Explain the location of the world's hot deserts. (4 marks)

Describe the main characteristics of a hot desert soil. (4 marks)

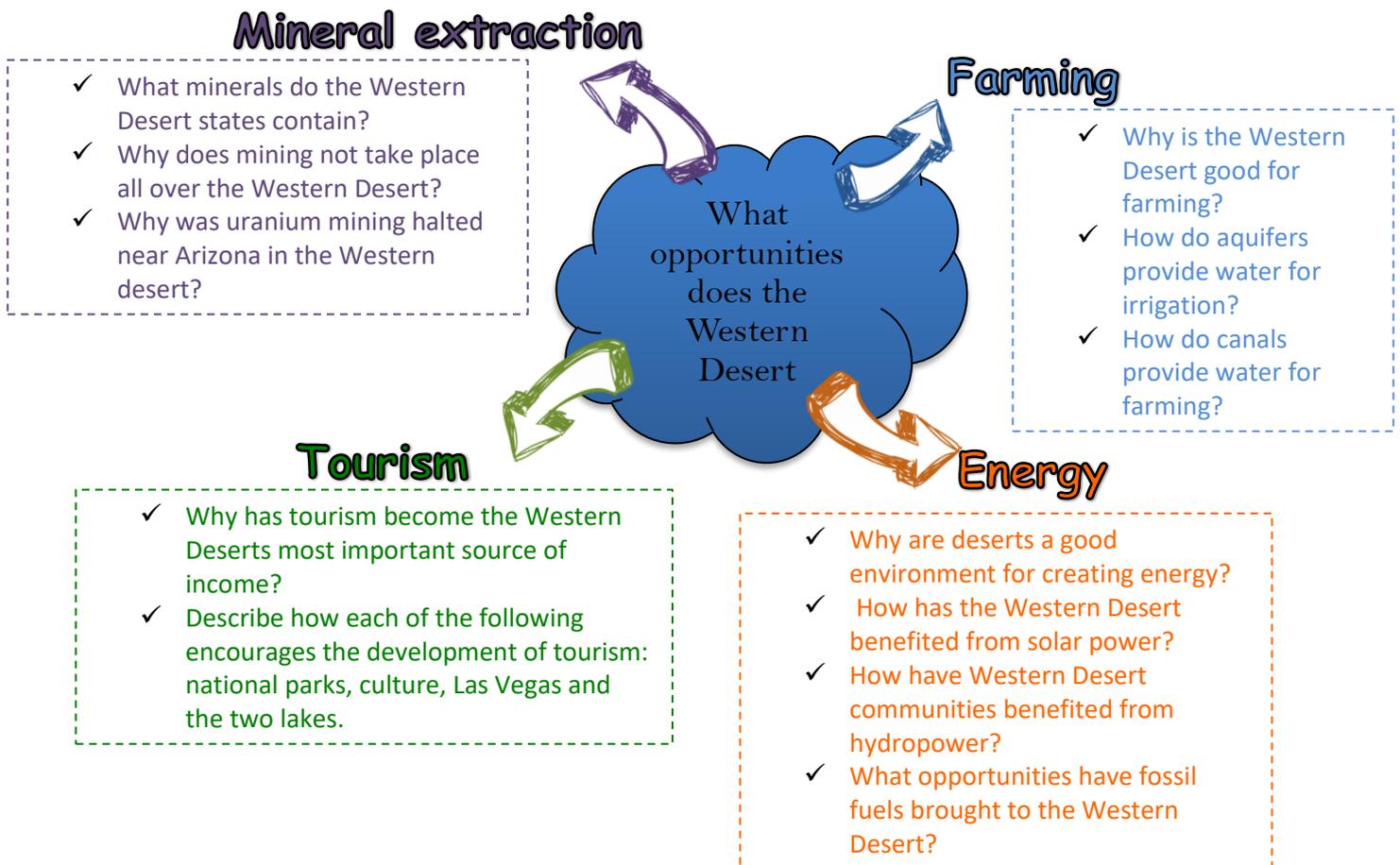
Describe the main characteristics of a hot desert ecosystem. (6 marks)

POWERPOINT 10: What are the development opportunities of the western desert?

Task 1: Describe how migration has affected the multicultural mix of the Western Desert

Arizona **European descent** **Phoenix** **Navajo people** **Havasupai**
Indigenous people **River people** **Cocopah Tribe**

Task 2: Use slides 6 to 9 to complete the spider diagram on the next page (use the questions below to help you focus your notes).



Mineral extraction

Farming

What opportunities does the Western Desert provide?

Tourism

Energy

✓

✓

Task 3: Answer the exam question

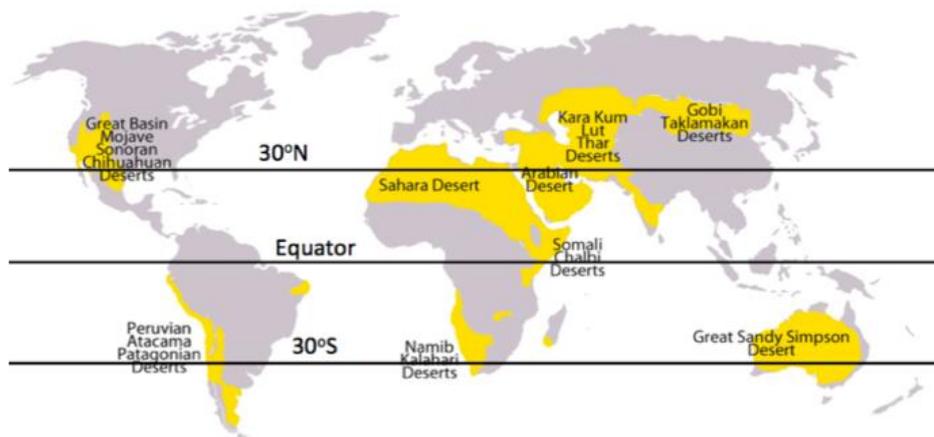
Explain the development opportunities created in a hot desert or cold environment you have studied. (6 marks)

Task 4: choose one of the following 3 exam questions to answer

Easy (Grades 1-3)

Describe the distribution of hot deserts shown in figure 1. (3 marks)

Figure 1- Distribution of hot deserts



Medium (Grades 4-6)

Describe one characteristic of the hot desert environment. (3 marks)

Hard (Grades 7-9)

Explain one plant adaptation shown in figure 2. (3 marks)

Figure 2- Hot desert vegetation



POWERPOINT 11: What are the development challenges in the Western Desert?

Task 1: Use the PDF on development challenges in the Western Desert to answer the following questions:

1. Using an example explain why there are some parts of the Western Desert with no settled population. What does this show about the desert?

2. Explain where the first Native Americans settled.

3. Explain how the Native Americans created an economy in the Western Desert.

4. Describe why and where accessibility in the Western Desert is a problem.

5. On page 13: Create a timeline to show how the accessibility of the Western Desert has improved over time.

6. Annotate the image of the traditional Native American house to describe how it is adapted for the desert.



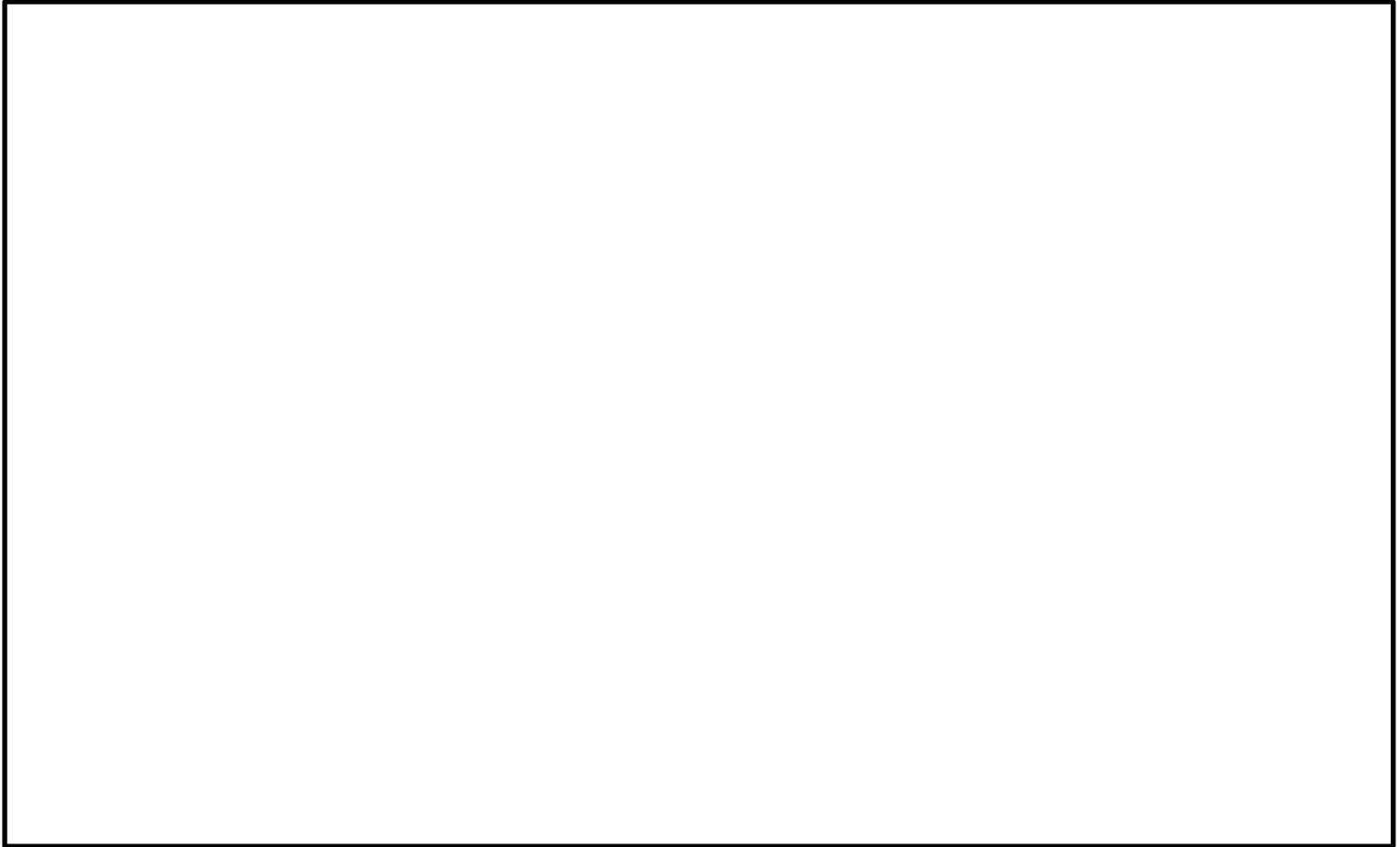
7. Annotate the image to show how nineteenth and early twentieth century migrants adapted to the climate.



8. Describe how people currently living in the Western Desert have adapted to water shortages.

5. Create a timeline to show how the accessibility of the Western Desert has improved over time:

Task 2: Explain one or more development challenges faced by a hot desert or cold environment you have studied. (4 marks)



POWERPOINT 12: Western Desert water crisis

Task 1: Use slide 1, and create a memory map explaining what the Western Deserts water crisis is?

**What is the
Western Deserts
water crisis?**

Task 2: Study the image below (make annotations to it) and answer the IDEAL analysis questions that follow on the next page.



IDEAL analysis

I

Identify what can you see?

D

Describe why is this required in a desert?

E

Explain - what are the advantages and disadvantages?

A

Apply - how did this create economic opportunities for the USA?

L

Link - how is this development affecting the water crisis in the Western Desert?



Complete the IDEAL analysis on your sheet.



Literacy

Can you use these key terms:

- Sandbanks
- Irrigation
- Tourism
- Agriculture
- Water transfer
- Meltwater
- Hydroelectric power
- Flow rate



Challenge

Can you now answer the following question using the IDEAL analysis to help you:

To what extent was the Colorado dam successful in bringing about economic opportunities in the Western Desert?

Task 3: answer the following exam question (use slides 6 to 8 and the help sheets to structure this answer.):

For a hot desert environment or cold environment you have studied, to what extent does that environment provide both opportunities and challenges for development. (9 marks)

POWERPOINT 13: Causes of desertification

Task 1: Read slide 2 to 6 and make key notes as to how each factor causes desertification

Population growth

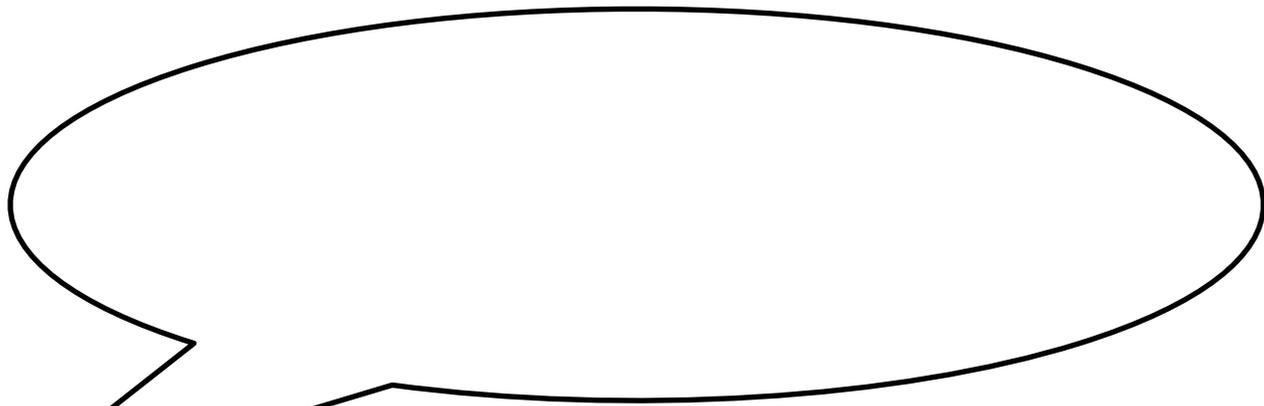
Over grazing

Over cultivation

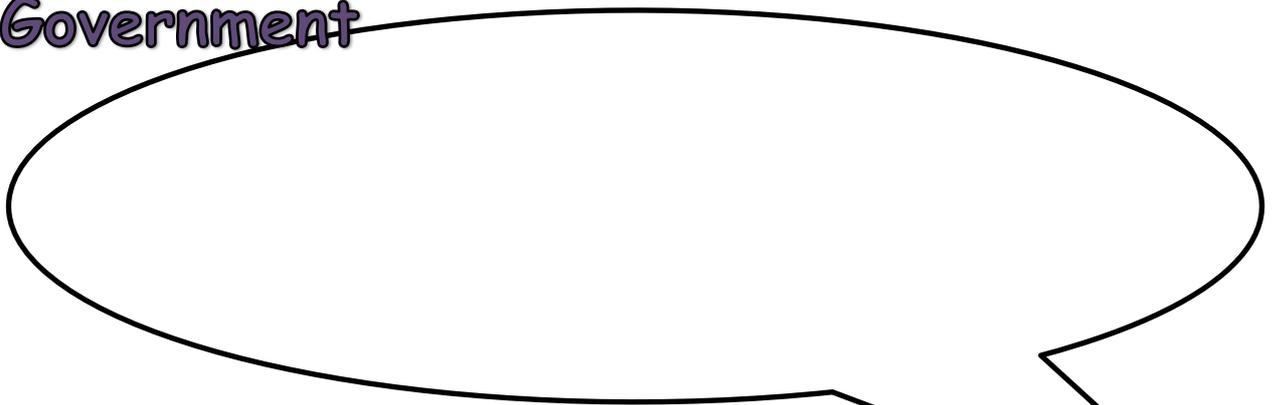
Soil erosion

Problems in Darfur

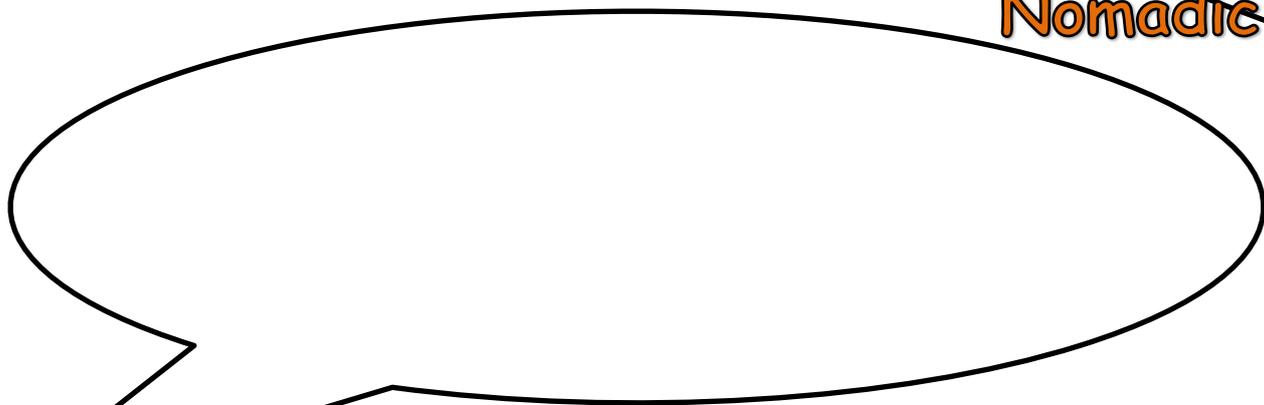
Task 2: From the perspective of those listed- explain why/how they are causing deforestation.



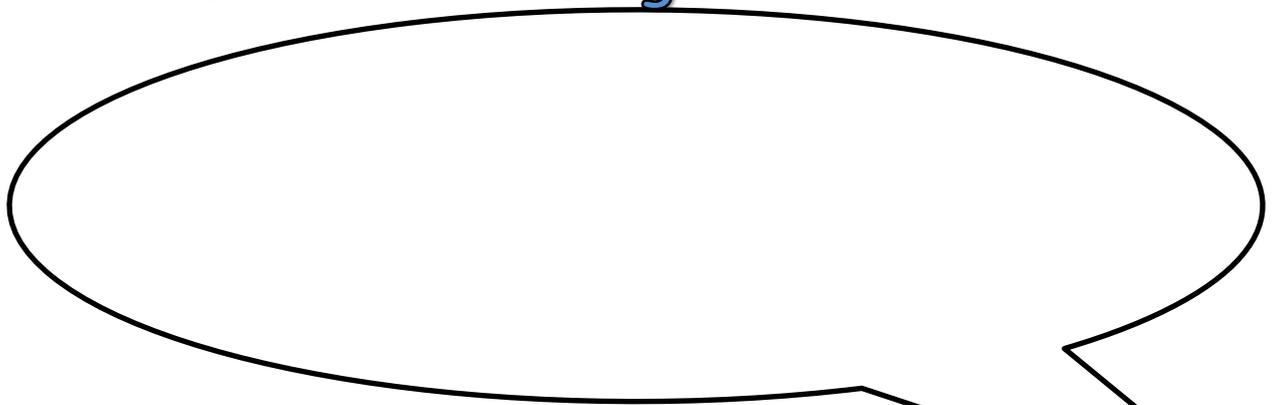
Sudan Government



Nomadic Herder



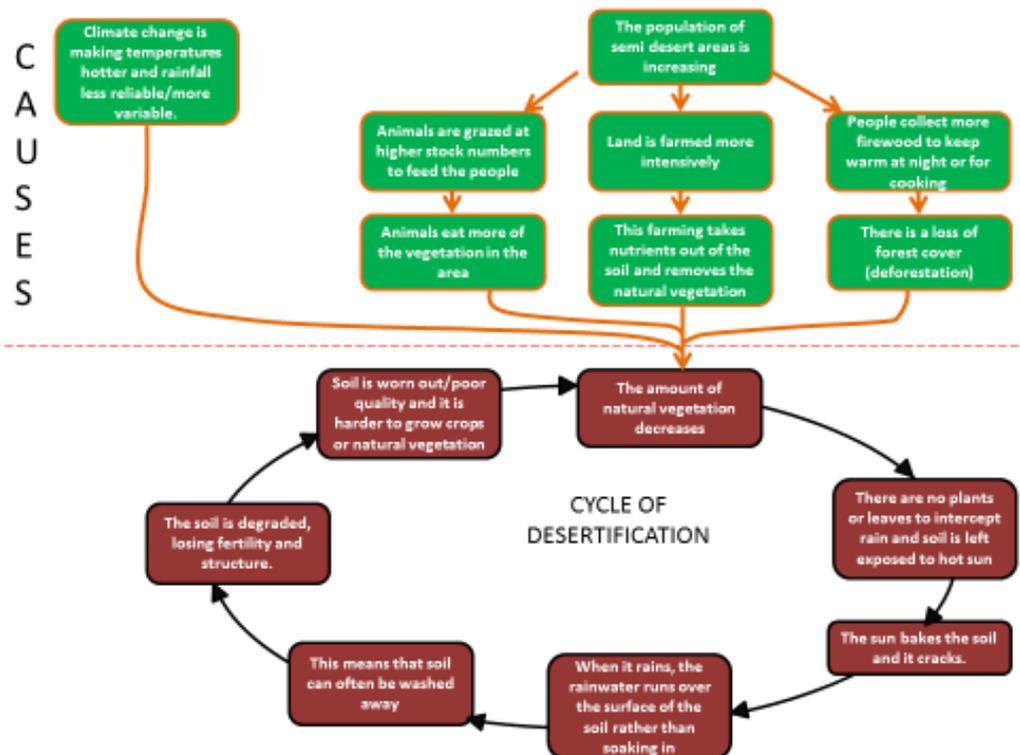
European Commercial Farming



Tiyyeni (farmers fighting soil erosion)

Task 3: Using an example you have studied explain the causes of desertification. (6 marks)

Task 4: study the causes and cycle of desertification



POWERPOINT 14: Solutions to desertification

Task 1: read slide 1 on suggestion about how to combat desertification in the Sahel. Make bullet point notes on the article.

Figure 1 The Sahel desert is experiencing desertification at an alarming rate.



Project 1

A project focusing on promoting sustainable farming methods. As part of sustainable farming, farmers plant trees to help bind the soil together and reduce the loss of fertile soil. Farms also create terraces on hills which prevent rainfall run off on sloping land, therefore keep the soils fertility high.

Project 2

Unusually trees are removed for cooking, however this is unsustainable. Practice Action are tackling the issue with the use of more fuel efficient wood stoves, which are both affordable and easy to use. Therefore cutting the amount of risky trips for firewood and allowing more trees to grow. Also burning smaller amounts of wood means that less smoke will enter their lungs and their homes.

Project 3

Laying low stone bunds in fields is a well known technique as a result various government and non government programmes are promoting the large scale introduction of the technique. The stone bunds form a barrier that slows down water runoff, allowing rainwater to seep into the soil and spread more evenly over the land. This slowing down of water runoff helps with building-up a layer of fine soil and manure particles, rich in nutrients.

Task 2: Watch the clip on slide 3. Answer the questions below:

<https://www.youtube.com/watch?v=AfbM-DNMnNg>

1. Why is there desertification happening in Senegal and the Sahel?
2. Describe the environment
3. Describe how the Acacia Trees project works
4. How is the project using Acacia trees helping against deforestation?
5. What impact does the project have on the people who live there?

Task 3: Watch the clip on slide 4 and complete the table below:

<https://www.youtube.com/watch?v=dO16g4LgBjl>

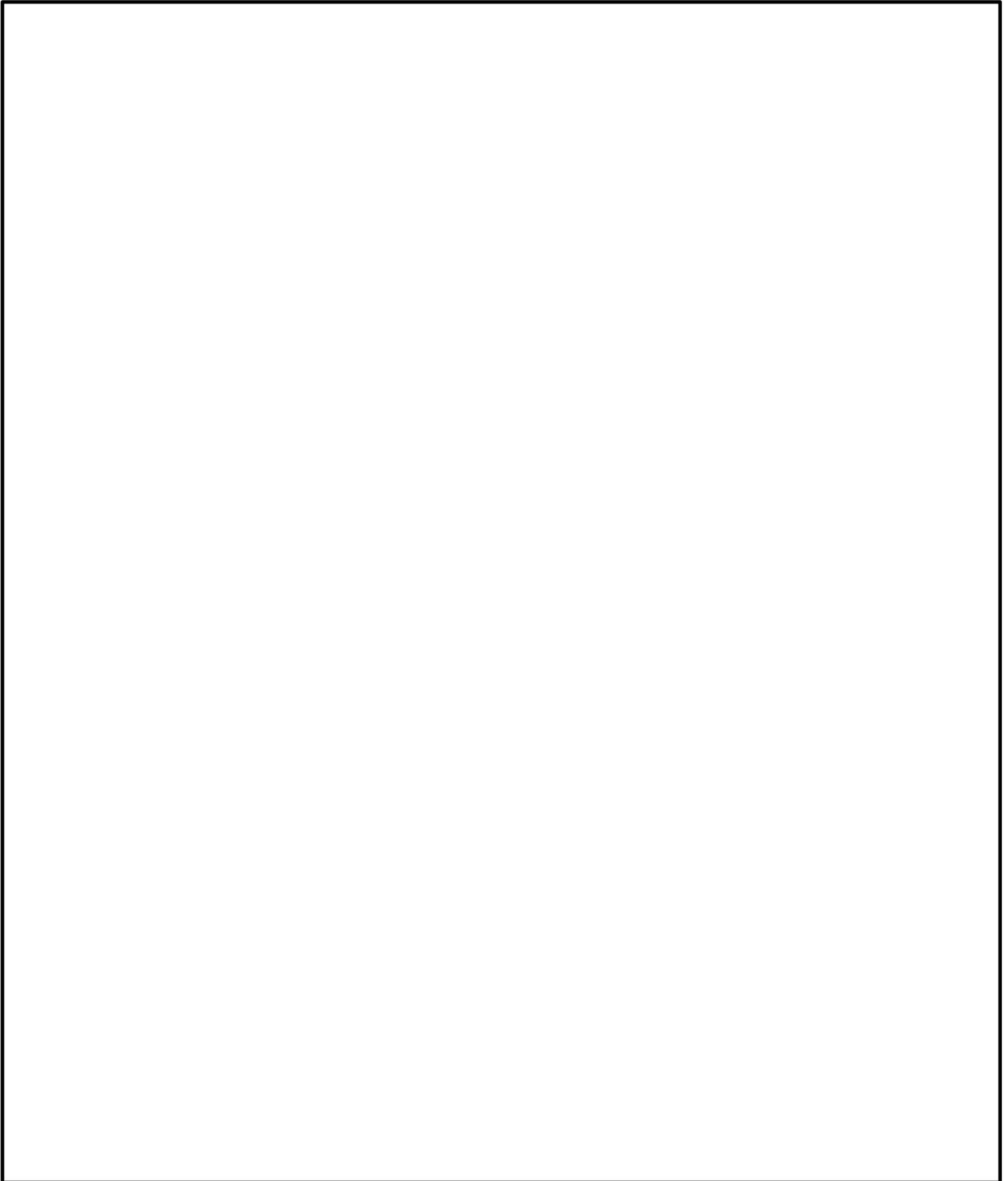
	How it manages water	How it manages the soil	How it is appropriate technology
Planting Acacia Trees			
Using Stone Lines			
Planting Pits			

Task 4: Read slide 7, 8, 9, and 10. Use the information to

Desertification management strategy	Description of the problem	Description of the strategy	Advantages/disadvantages of the strategy
Appropriate cooking technology			
Low stone walls (BUNDS) project			
Planting trees			
Better Land and management			

Task 5: Revisit the reading on the Sahel (it describes three projects that have been suggested to try and reduce the rate of desertification in the Sahel.) and look at slide 11 and use the information the answer the following questions:

Which of the three projects do you feel is the most sustainable for the LIC country of Sudan? (6 marks)



UNIT IN A BOOKLET

The Living World.

Use the PPT and information sheets/resources to complete this booklet. The information and learning that you will complete will appear in the exam.

In order to check your understanding you will be given an end of topic test.

POWERPOINT 1: What is an Ecosystem?

Task 1: What is an ecosystem: _____

Ecosystem key terms

- Ecosystem – A _____ of plants (_____) and animals (_____) that interact with each other (living components) and their physical environment (non-living components, e.g. _____, _____, soil, water, and light).
- Producer – An organism or plant that is able to absorb energy from the _____ through _____ (making sugars). It also needs _____, carbon dioxide and nutrients from soil/rock to produce what it needs for itself.
- Consumer – Creature that _____ herbivores and/or plant matter. They obtain the _____ from what they eat, e.g. if they eat a producer they will get the _____ they made.
- Decomposer – An organism such as a _____ or fungus, that _____ down dead tissue, which effectively _____ their nutrients back to the environment.
- Food chain – The connections between different organisms (plants and animals) that _____ upon one another as their source of food.
- Food web – A _____ hierarchy of plants and animals relying on each other for food.
- Nutrient cycling – A set of processes whereby organisms extract _____ (e.g. nitrogen, potash, and potassium) necessary for _____ from soil or water, before _____ them on through the food chain – and ultimately back to the soil and water when they _____.

Task 2: use the PDF of the Ecosystems information sheet to answer the following questions:

1. Describe two biotic aspects, two abiotic and one mixed of an ecosystem.
2. Describe the two types of interrelationships that take place within the ecosystem.
3. What are the inputs and outputs in an ecosystem?
4. Define the ecosystem sizes shown in the images. Give examples to support your answer.
5. Complete the missing parts of the food web.
6. Define the following biotic parts of an ecosystem: producer, herbivore, carnivore and top carnivore.
7. Describe the interrelationships between the parts of the food chain.
8. Complete the nutrient cycle diagram to show how nutrients travel between the biomass, litter and soil.

Practice Exam Questions.

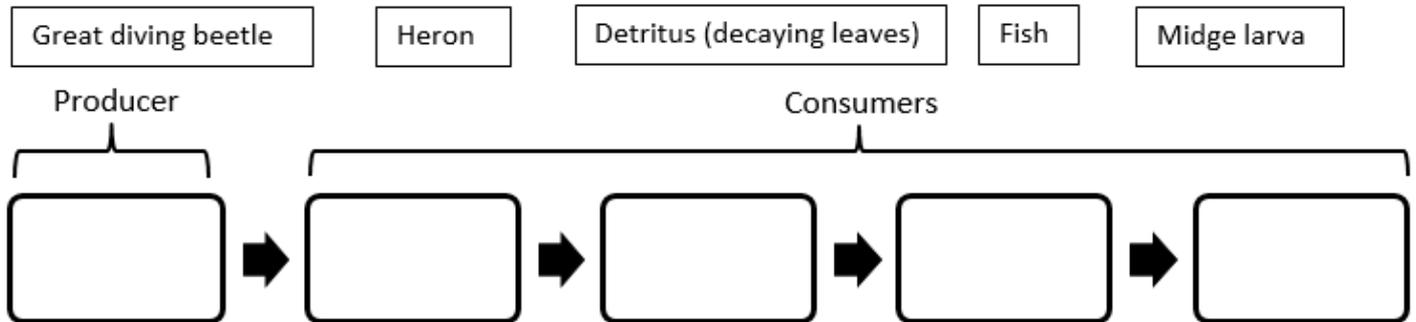
Describe the difference between abiotic and biotic parts of an ecosystem. (4 marks)

Task 3: Small UK ecosystem (fresh water)

Small-scale UK ecosystem: Freshwater food chain and web

Food chain

Add the names below to the correct part of the food chain



Food web

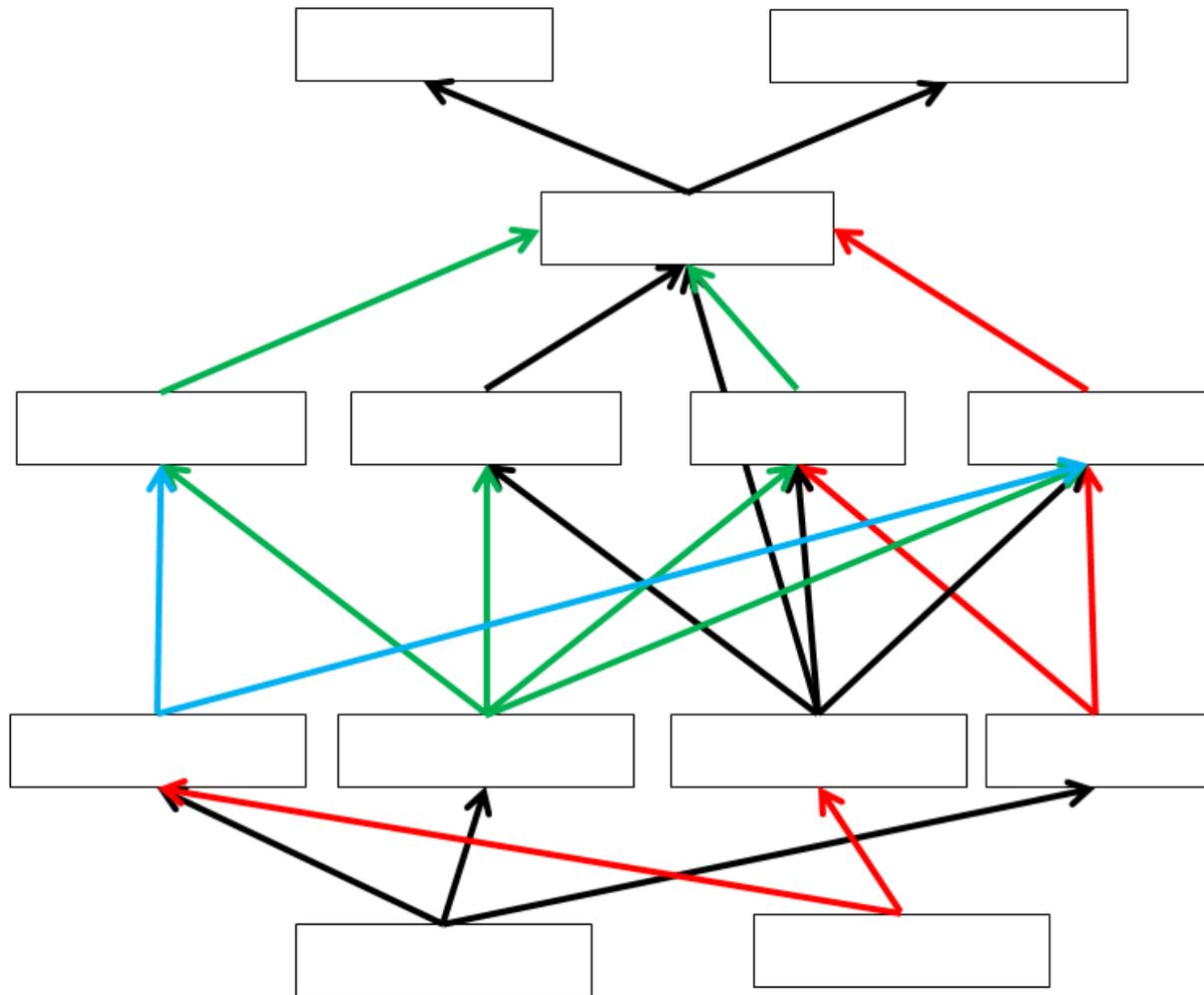
Using the table below complete a food web. Look for the producers and top consumers to help you start and then use the energy sources to figure out where the rest go. Remember arrows point to what is being eaten.

Species	Energy source (food or sunlight)
Algae and microscopic plants	Sunlight
Blackfly	Detritus
Caddis (small moth-like insect)	Mayfly, Blackfly
Detritus (decaying matter and waste)	Sunlight
Dragonfly	Worms, Mayfly, Blackfly, Midge larva
Fish	Mayfly, Caddis, Stonefly, Great diving beetle, Dragonfly
Great diving beetle	Midge larva, Blackfly
Heron	Fish
Kingfisher	Fish
Mayfly	Algae and microscopic plants
Midge larva	Detritus, Algae and microscopic plants
Stonefly	Blackfly, Mayfly
Worms	Detritus

Practice Exam Questions.

Explain the role of the decomposers in the ecosystem nutrient cycle. (6 marks)

Freshwater food web



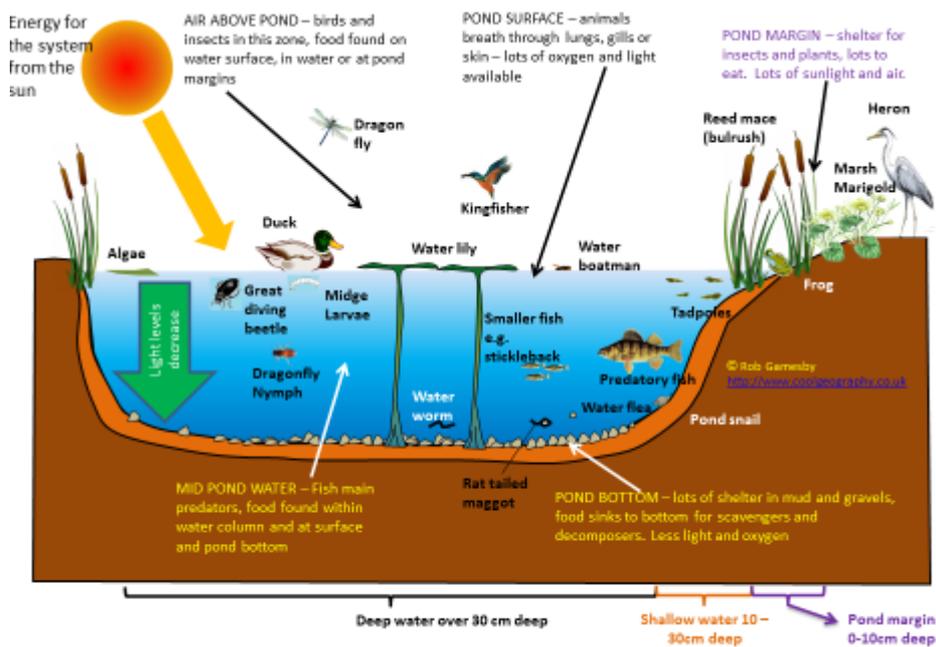
Task 4: What is the impact of changing one component on the ecosystem?

Study the food chain above and complete the following questions. What would happen if:

1. A disease wiped out all of the Mayfly?
2. The number of Dragonfly increased?
3. The number of Dragonfly decreased?
4. The detritus was cleared from the pond?

Task 5: A freshwater pond: A small-scale UK ecosystem

Study the diagram on the PPT (slide 10) or the diagram below. Answer the questions related to it:



1. What are the living (biotic) and non-living (abiotic) components in this ecosystem?
2. What producers are there?
3. What consumers are there?

Practice Exam Questions.

Explain the relationship between the producers, consumers and secondary consumers of an ecosystem. (6 marks)

POWERPOINT 2: What is the small-scale ecosystem of Epping forest like?

Task 1: Describe the forest ecosystem shown in the image below using the words shown in the wordphoto.

Task 2: Read slides 5 to 8 and complete the wiki outline on the next page.

Task 3: Answer the questions below in bullet points:

Describe two reasons characteristics of a small scale you have studied. (4 marks)

Explain the characteristics of the food web of a small-scale ecosystem you have studied. (6 marks)

Explain the interdependence that exists within a small-scale ecosystem you studied. (6 marks)



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- [Contents](#)
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Learning tools

[Grades 1-3](#), [describes the features of Epping Forest](#)

[Grades 4-6](#), [use of key terminology to describe](#)

[Grades 7-9](#), [explains the links in the ecosystem](#)

Definition tools

[Interdependence](#), [the reliance of the parts of an ecosystem on each other](#)

[Nutrient cycle](#), [on going recycling of nutrients between living organisms and their environment](#)

[Producer](#), [an organism or plant that is able to absorb energy from the sun through](#)

[photosynthesis](#)

[Food web](#), [a complex hierarchy of plants and animals relying on each other for food](#)

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Epping Forest ecosystem, UK

From Wikipedia, the free encyclopedia

Epping Forest is located east of London. It is all that remains of a larger forest which colonised England at the end of the last ice Age.

Characteristics of Epping Forest How is the forest ecosystem structured?

Nutrient cycle in the forest

Interdependence How are the producers, consumers and decomposers all interdependent?



Epping Forest

Task Bank

Write a description of the ecosystem characteristics of Epping Forest.

Explain how the producers, consumers and decomposers are all reliant on each other in Epping Forest. Give a specific example.

Draw a diagram and explain the nutrient cycle which takes place within the ecosystem of Epping Forest.

Epping Forest's food web



POWERPOINT 3: Factors affecting ecosystem

Task 1: Using the information about the factors that affect the ecosystems balance (slides 3 to 5) complete the activities in the boxes.

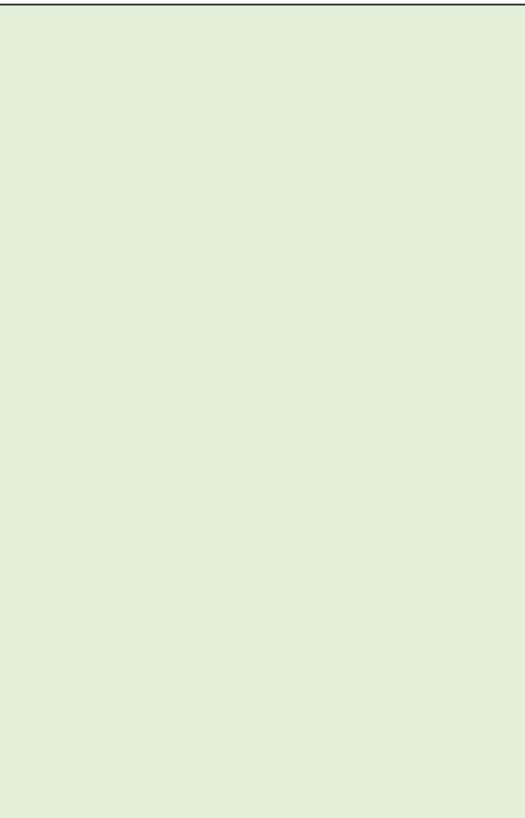
How do changes affect the balance of an ecosystem?

Identify two forces of change in an ecosystem. Draw a diagram to show a food web that is supported by an oak tree. Explain how removing a component of a food web will cause change. Give an example of an ecosystem that you have studied and explain how it is being restored.

What causes change in an ecosystem? (Think about how nature and human activity would cause an imbalance).



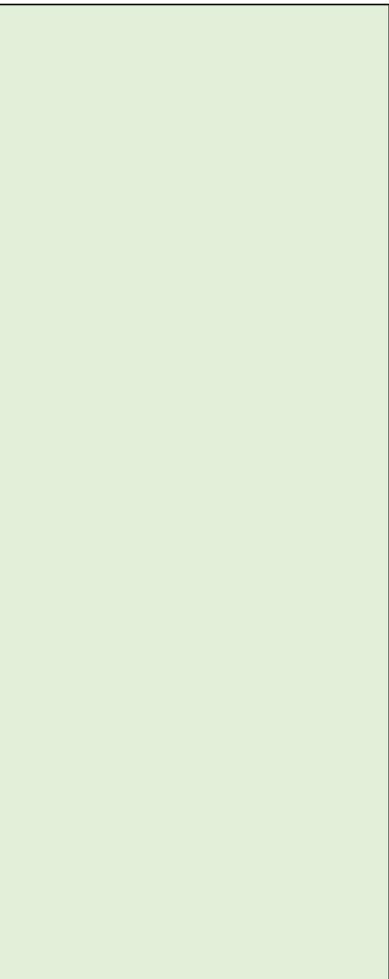
Circle a component of the food web. Explain how removing that component would impact on the ecosystem. (Think about what would flourish, what would decline, alternative food provisions and the



Draw a diagram to show a food web supported by an oak tree.



Give an example of an ecosystem that you have studied and explain how it being restored. (Think about why it needs restoring, the reasons for this particular management method and the benefits of the management method.)



Task 2: Answer the following exam question (you can use slide 6 to help):

Using a named example, explain how change can have short-term and long-term effects on an ecosystem. (6 marks)

POWERPOINT 4: World Biomes

Task 1: Watch this short introduction to large-scale ecosystems (biomes) -

http://www.bbc.co.uk/schools/gcsebitesize/geography/ecosystems/biomes_video.shtml

Biomes are large-scale ecosystems defined by abiotic factors:

- Climate (temperature and precipitation)
- Relief (steepness of the land)
- Geology (type of rocks)
- Soils (fertility)
- Vegetation (type and coverage)

Give an example of 2 global biomes and reasons for it:

Task 2: Use slide 2 to help explain the location of the world's biomes using an example (s). (4 marks)

Task 3: Use the information on slides 4 to 8 to **locate, describe/explain the climate** and **describe the characteristics** of each biome.

What are the characteristics of the world's biomes?



Polar



Deciduous Forest



Tundra



Desert





Tropical rainforest



Coniferous forest



Savanna



Temperate grassland



Mediterranean



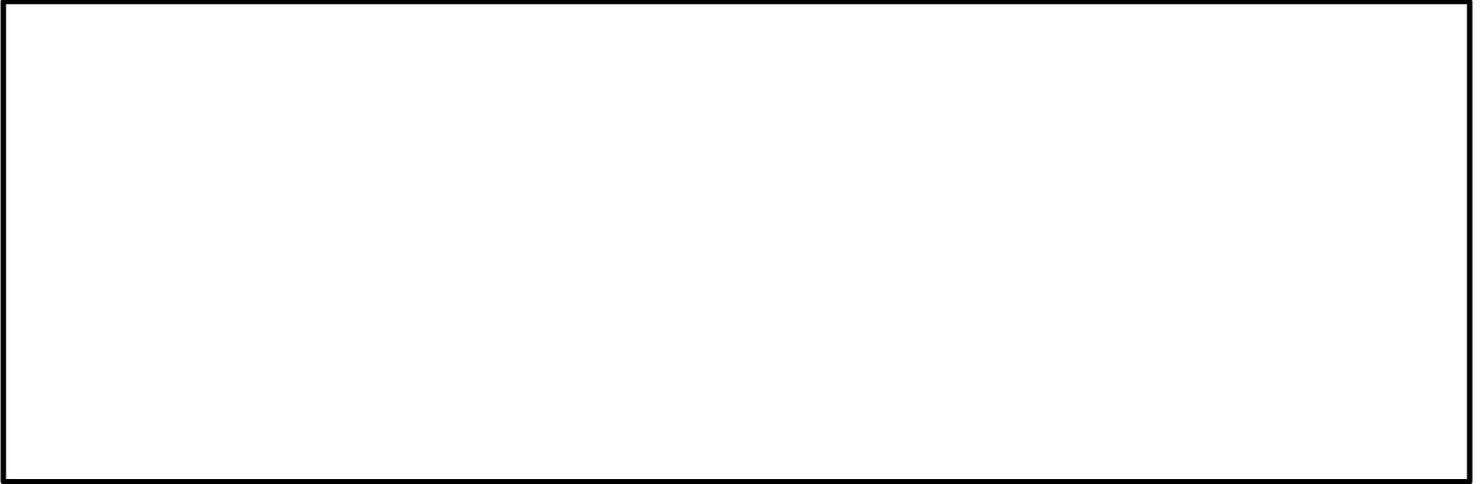
Summary of the location of the world's biomes

Task 4: Complete this table using the biomes from your map – you will need to look for the clues! Your map may help you.

Climate zone name?	Description of the climate and of the resulting vegetation
	Also known as the taiga, this biome is a northern coniferous (evergreen) forest. It is a cold woodland found north of temperate deciduous forests. It is the largest biome - covering about 17% of the Earth's land area and can be found in Canada, Europe, Asia, and the United States
	This biome has few extremes of climate and can be found in the eastern half of North America, and the west of Europe. It can also be found in Asia. The forest has four distinct seasons, spring, summer, autumn, and winter. In the autumn the leaves change colour. During the winter months the trees lose their leaves.
	This biome covers one-fifth of the land on earth – there is little precipitation, a short growing season; and poor nutrients. It is below freezing at night year round and the meaning of its name comes from Lappish language (Lapland) which means "land with no trees".
	A large biome with rolling terrains of grasses, flowers and herbs. It is a region where the average annual precipitation is great enough to support grasses, and in some areas a few trees. The precipitation is so unpredictable that drought and fire prevent large forests from growing.
	This is a very hot and wet biome located on or around the equator. It has the greatest biodiversity (number of plants and animals) found anywhere on earth.
	This biome is very hot and also very, very dry. As a result of this very little grows – only very hardy plants such as cactus which can survive drought.
	This is a biome that is found in small areas on of most of the continents - the west coast of the United States, the west coast of South America, the Cape Town area of South Africa, the western tip of Australia and the coastal areas of the Mediterranean. This biome has flat plains, rocky hills and mountain slopes. It is very hot and dry - the winter is very mild (usually about 10 °C), the summer is so hot and dry at 40 °C that fires and droughts are very common.
	A dry and hot area composed of mainly grassland and scattered shrubs and isolated trees, which can be found between a tropical rainforest and desert biome in Africa, Arabia and even Australia

Task 5: use slide 10 to help answer the exam question:

Describe the global distribution of the tundra biome. (4 marks)

A large, empty rectangular box with a black border, intended for the student to write their answer to the question about the global distribution of the tundra biome.