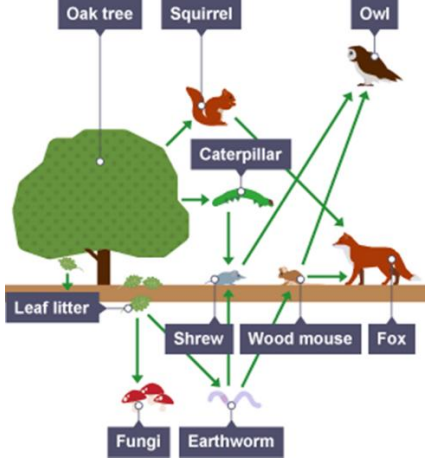


Subject	Geography	Year Group	10-11	Sequence No.	2	Topic	The Living World
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Retrieval	Core Knowledge	Student Thinking
What do teachers need retrieve from students before they start teaching new content ?	What specific ambitious knowledge do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to development of our students thinking, encouraging them to see the inequalities around them and 'do something about them!'

At the start of the topic link back to the Y8 Fragile Environments topic-ask students to retrieve knowledge about the meaning of the term and how this will be important when we learn about the tropical rainforests and hot deserts. L2-retrieve the meaning of the term ecosystem, abiotic and biotic Link back to Y7 Sherwood Forest topic when learning about food chains and food webs L3-link back to Y7 What is Africa really like-what is a climate graph. L5 refers back to L4 recapping some of the adaptations in the TRF L6 refers back to the structure of the TRF from earlier in the topic When looking at the impacts of the TRF students consider how we categorise impacts in geography-social, economic and environmental When learning about the climate of the hot desert-students will link back to Y7 and	<u>L1&2 What is an ecosystem</u> An ecosystem is a community of plants and animals and the environment they live in. It includes living (biotic) and non living (abiotic) parts Habitat-an ecosystem on a small scale Biome-ecosystem on a larger scale Characteristics of different ecosystems-what do they look like Producer-start of all food chains and food webs. They are plants and get their energy from the sun. Consumer-you can get primary (eat producers), secondary and tertiary consumers Scavenger-preys on dead animals Food chain-a series of organisms each dependent on the next as a source of food. Food web- a system of interlocking and interdependent food chains.  <u>What are the characteristics of a tropical rainforest?</u> Climate graph-bars shows rainfall/precipitation. Line shows the temperature. The TRF has high temperatures all year that are constant as well as high levels of precipitation	With the knowledge learnt in this topic students will get the opportunity to overcome misconceptions linked to the TRF and hot deserts. They will explore ways to problem solve issues that we face and make cross curricular links to biology. Link the topic to a career students could go into-conservation officer. Students to discuss how our actions can have knock on effects to ecosystems, food webs and food chains. They will focus on a local small scale ecosystem-Sherwood Forest Students discuss when and how climate graphs will be useful outside of a geography classroom. Students create their own ‘ultimate animal’ Students look into real life places (Indonesia and the Amazon rainforest) where humans are impacted on the TRF and they decide on what the best way to manage the TRF Students will look into the impact of deforestation in Students read about how the covid pandemic led to an increase in deforestation in the Amazon rainforest Students assess what the biggest opportunity and challenge is in the Thar desert they also discuss whether there are more opportunities or challenges in hot deserts Students read about the great green wall project in Africa and discuss whether this would be a positive way to deal with desertification
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earlier in the topic to what a climate graph is

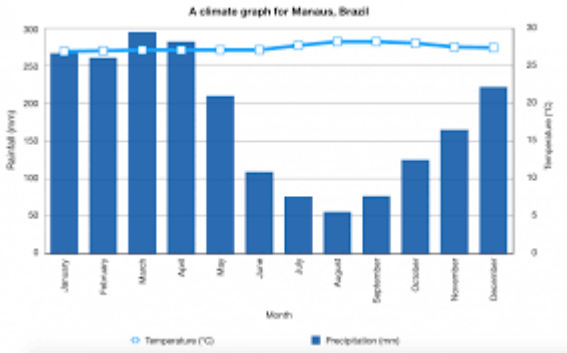
When looking at where hot deserts are found students will recap from other geography topics what the term distribution means

When discussing interdependence in the hot desert students will link back to the key terms biotic and abiotic from earlier in this topic. They will also link back to Y7 geography when they looked at the importance of soil quality

When students learn about the plant and animal adaptations in the hot desert they will recap the those from the TRF

When looking at the Thar desert case study students should link back to KS3 geography and UIC to discuss what the terms challenges and opportunities mean.

In the desertification lesson they will explore human and physical causes of the process a key geography concept from lower school



Plant and animal adaptations in the TRF

Characteristic-what a plant or animal looks like

Adaptation-how an animal or plant changes itself to live in specific conditions

Plant adaptations: Drip tips - plants have leaves with pointy tips. This allows water to run off the leaves quickly without damaging or breaking them.

Buttress roots - large roots have ridges which create a large surface area that help to support large trees.

Epiphytes - these are plants which live on the branches of trees high up in the canopy. They get their nutrients from the air and water, not from the soil.

Capoc tree

Characteristics: Smooth bark

Adaptation: the smooth bark allows the water to run down to it roots helping it grow.

Emergent trees

Characteristics: this tree can grow really fast.

Adaptation: Emergent trees have adapted to grow very quickly. When an old tree falls in the forest it creates a gap in the canopy. It is a race for the plants to grow quickly and take advantage of this gap in the canopy. By being able to grow quickly they can make the use of the most sun.

Lianas

Characteristics: these vines can grow on any part of a tree.

Adaptation: The seeds of these vines are deposited by rodents and mammals on the branches of other trees. They then grow roots down to the soil and leaves into the canopy and lots of light. The ground layer of the rainforest is very dark and it would be difficult for the seeds to grow.

Jaguar

Characteristics: Rosettes/spots Large feet

Adaptation: Rosettes/spots for camouflage when hunting prey

Large feet – to walk through small streams and sand banks and not sink

Capybara

Characteristics: Webbed feet Nose is high up on its head

Students look into desertification in the Bauchi state of Nigeria. They aim to solve the problem of desertification there through the choice of 3 options

Adaptation:

Webbed feet – to swim through the many streams/ivers

Nose is high up on its head – to help it swim in the wet environment

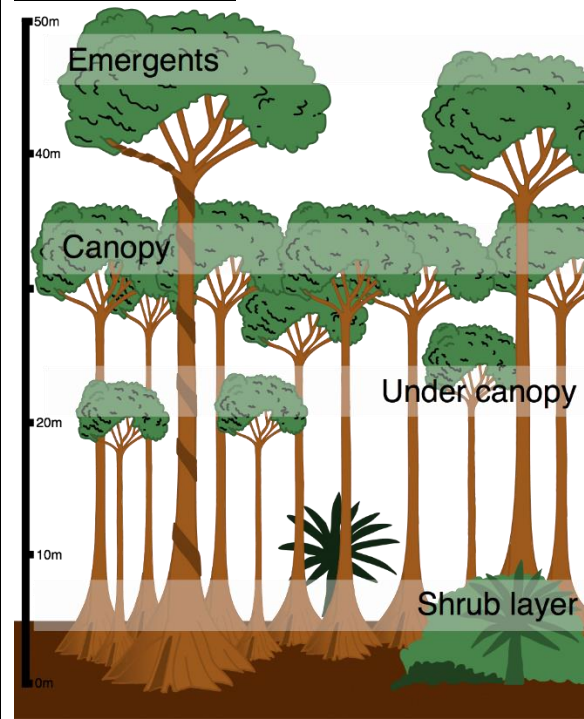
The sloth uses camouflage and moves very slowly to make it difficult for predators to spot.

The spider monkey has long, strong limbs to help it to climb through the rainforest trees.

The flying frog has fully webbed hands and feet, and a flap of loose skin that stretches between its limbs, which allows it to glide from plant to plant.

The toucan has a long, large bill to allow it to reach and cut fruit from branches that are too weak to support its weight.

Structure of the TRF



Nutrient cycling in the TRF

The majority of nutrients in the tropical rainforest are stored in the biomass. The biomass is all the living things in an ecosystem, including plants and animals.

Nutrients are rapidly recycled in the tropical rainforest biome. The warm, moist climate provides ideal conditions for decomposers to break down organic material in the litter layer very quickly. The litter layer is all the dead organic material such as fallen leaves, dead wood or dead animals on the surface of the soil. Vegetation takes up nutrients which are dissolved in the soil.

The soil is formed by the mixing of dead organic material with weathered bedrock. Soils in the rainforest are mainly thin and poor. Nutrient levels in the soil are low due to the leaching (washing away of nutrients) by the heavy equatorial rain. This leaching means that the lower layers of the soils lack the nutrients and minerals needed by the lush vegetation. Also, rainforest vegetation rapidly absorbs nutrients from the soil. Soils are often red in colour as they are rich in iron.

The nutrient cycle in the rainforest is an excellent example of interdependence. the diagram above shows the links between different stores of nutrients in the rainforest. Decomposers rely on fallen leaves, branches and dead animals to thrive. In turn, nutrients from decomposed matter enter the soil providing nutrients to support the growth of vegetation that is consumed by primary consumers.

The nutrient cycle in the rainforest is very fragile. If a nutrient flow changes this can have a negative impact on the ecosystem. For example, when deforestation occurs the litter layer no longer receives organic matter and the soil quickly becomes infertile. Because there is no vegetation cover to protect the soil nutrients are rapidly leached by heavy equatorial rainfall.

How do humans use the TRF?

Deforestation-removal of trees

Use of medicines-medicine cabinet of the world

What are the causes of deforestation?

Logging

- Most widely reported cause of destructions to biodiversity.
- Timber is harvested to create **commercial items** such as furniture and paper.
- **Violent confrontation** between indigenous tribes and logging companies.

Agriculture

- Large scale '**slash and burn**' of land for ranches and palm oil.
- Increases **carbon emission**.
- **River saltation** and **soil erosion** increasing due to the large areas of **exposed land**.
- Increase in **palm oil** is making the **soil infertile**.

Mineral Extraction

- **Precious metals** are found in the rainforest.
- Areas **mined** can experience **soil and water contamination**.
- **Indigenous people** are becoming **displaced** from their land due to roads being built to transport products.

Tourism

- **Mass tourism** is resulting in the building of hotels in extremely **vulnerable areas**.
- Lead to **negative relationship** between the government and indigenous tribes
- Tourism has **exposed animals** to human **diseases**.

Energy Development

- The **high rainfall** creates ideal conditions for **hydro-electric power (HEP)**.

Road Building

- **Roads** are needed to bring supplies and **provide access** to new mining areas, settlements and energy projects.
- Logging companies use an **extensive network of roads** for heavy machinery and to transport wood.

Impacts of deforestation

Impacts of deforestation

Economic development

- + Mining, farming and logging creates employment and tax income for government.
- + Products such as palm oil provide valuable income for countries.
- The loss of biodiversity will reduce tourism.

Soil erosion

- Once the land is **exposed by deforestation**, the soil is more **vulnerable to rain**.
- With **no roots to bind soil together**, soil can easily **wash away**.

Climate Change

- When rainforests are cut down, the climate becomes **drier**.
- Trees are **carbon 'sinks'**. With greater deforestation comes more greenhouse emissions in the atmosphere.
- When trees are burnt, they **release more carbon in the atmosphere**. This will enhance the **greenhouse effect**.

Management of the TRF

Sustainability for the Rainforest

Uncontrolled and unchecked exploitation can cause irreversible damage such as loss of biodiversity, soil erosion and climate change.

Possible strategies include:

- **Agro-forestry** - Growing trees and crops at the same time. It prevents soil erosion and the crops benefit from the nutrients.
- **Selective logging** - Trees are only felled when they reach a particular height.
- **Education** - Ensuring those people understand the consequences of deforestation
- **Afforestation** - If trees are cut down, they are replaced.
- **Forest reserves** - Areas protected from exploitation.
- **Ecotourism** - tourism that promotes the environments & conservation

What are the characteristics of the hot desert?

Hot and dry

Cold at night

Sparse vegetation

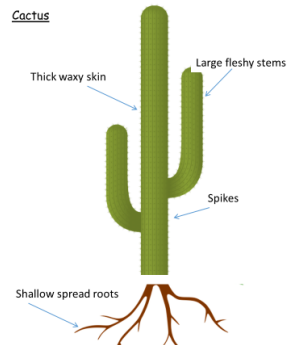
Lower levels of biodiversity

Interdependence-The living things in an ecosystem are interdependent. This means that living things depend on their interactions with each other and also non living things for survival. For example, a tree depends on sunlight for energy and food.

In the hot desert the harsh climate means that there is a lack of water, this means that soil quality is poor and this means that less plants are able to grow. The knock on effect of this is that not as many animals are able to survive and this makes it difficult for humans too as well.

Plant and animal adaptations in the hot desert

Cactus



- thick, waxy skin to reduce loss of water and to reflect heat
- large, fleshy stems to store water
- thorns and thin, spiky or glossy leaves to reduce water loss
- spikes protect cacti from animals wishing to use stored water
- deep roots to tap groundwater
- long shallow roots which spread over a wide area
- plants lie dormant for years until rain falls

Desert Tortoise

The desert tortoise may be **active during the day** or the morning and evening depending on the temperature.

The desert tortoise **burrows** under the sand to protect itself from extreme desert temperatures.

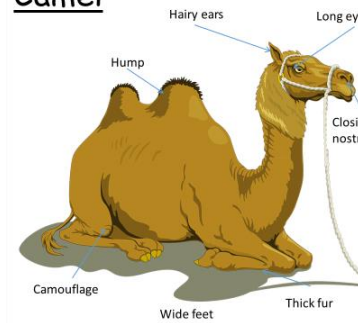
Adults can survive for about a year without water. They are able to **obtain water from their diet**.



Tortoises can withdraw their head, legs, and tail into the shell providing themselves **protection** against predators.

To utilize the infrequent rainfalls, tortoises dig shallow pits to catch the water. The tortoises may be found waiting by these areas when rain is in the forecast.

Camel



- long eye lashes, hairy ears and closing nostrils help to keep out sand
- thick eyebrows which stand out and shade eyes from the sun
- wide feet so they don't sink in the sand
- they can go without water for over a week because they can drink gallons in one go
- they can go months without food - they store fat in their humps
- body temperature can change to avoid losing water through sweating
- they are well camouflaged
- thick fur helps to keep them warm at night

Fennec Fox

Their **large ears**, which are usually 6 inches long (15 centimeters), help dissipate excess body heat on hot days in the desert.

The fennec fox seems to be the only carnivore living in the Sahara Desert able to survive without free water. Their **kidneys** are adapted to restrict water loss, their extensive burrowing may cause the formation of dew, which can then be consumed, and they will receive moisture from the food that they eat.

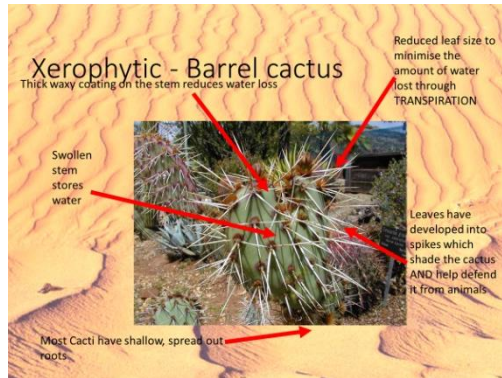


Their **burrowing and nocturnal** lifestyle helps restrict water loss.

Their **thick fur** helps insulate them from the cold desert nights.

Their sandy fur helps to reflect heat, and also provides excellent camouflage.

Fennec foxes also have **thick fur on the soles of their feet**, which insulate against the hot sand of the desert. This extra fur on the soles of their feet also affords them excellent traction in the loose sand.



Ephemeral plants (Wild heliotrope)

- Ephemeral plants do not live very long. When it rains they will grow very rapidly and distribute their seeds before it dries out when the water runs out. The new seeds will then lay dormant awaiting the next rainfall.



Challenge and opportunities in the Thar desert

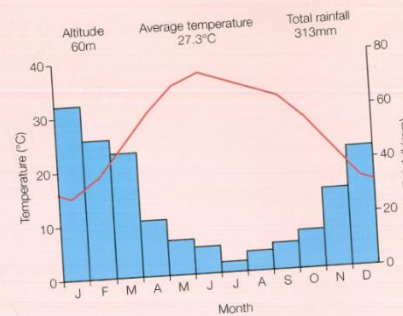
The Thar desert is in the North West of India and borders with Pakistan.

Challenges for development in the Thar Desert

Extreme temperatures

The Thar Desert suffers from extremely high temperatures (graph A), sometimes exceeding 50°C in the summer. This presents challenges for people, animals and plants living in this environment.

- Working outside in the heat of the day can be very hard, especially for farmers.
- High rates of evaporation lead to water shortages which affect people as well as plants and animals.
- Plants and animals have to adapt to survive in the extreme heat. Some animals are nocturnal, hibernating in the cooler ground during the daytime. Livestock, such as cattle and goats, need shade to protect them from the intense sun.



A Climate graph for the Thar Desert

Water supply

Why are there water shortages?

Water supply has become a serious issue in the Thar Desert. As the population has grown and farming and industry have developed, demand for water has increased. Water in this region is a scarce resource.

The desert has low annual rainfall, high temperatures and strong winds. This causes high rates of evaporation.

What are the sources of water?

There are several sources of water in the Thar Desert.

- ◆ Traditionally, drinking water for people and animals is stored in ponds, some of which are natural (tobas – photo **B**) and others are man-made (johads).
- ◆ There are a few rivers and streams that flow through the desert, such as the River Luni which feeds a marshy area called the Rann. But these are intermittent, and flow only after rainfall. Most settlements are found alongside these rivers.
- ◆ Some water can be obtained from underground sources (aquifers) using wells but this water is salty and not very good quality.

Accessibility

Due to the very extreme weather and the presence of vast barren areas there is a very limited road network across the Thar Desert. The high temperatures can cause the tarmac to melt and the strong winds often blow sand over the roads.

Many places are accessible only by camel, which is a traditional form of transport in the region. Public transport often involves seriously overladen buses (photo **D**).

Energy

The Thar Desert is a rich energy source.

- ♦ *Coal* – there are extensive lignite coal deposits in parts of the Thar Desert and a thermal energy plant has been constructed at Giral (map **A**).
- ♦ *Oil* – a large oilfield has been discovered in the Barmer district which could transform the local economy.
- ♦ *Wind* – recently there has been a focus on developing wind power, a renewable form of energy. The Jaisalmer Wind Park was constructed in 2001 (photo **C**). This is India's largest wind farm.
- ♦ *Solar* – with its sunny, cloudless skies, the Thar Desert offers ideal conditions for solar power generation. At Bhaleri solar power is used in water treatment.

Mineral extraction

The desert region has valuable reserves of minerals which are used all over India and exported across the world. The most important minerals are:

- ♦ gypsum (used in making plaster for the construction industry and in making cement)
- ♦ feldspar (used to make ceramics)
- ♦ phospherite (used for making fertiliser)
- ♦ kaolin (used as a whitener in paper).

There are also valuable reserves of stone in the region. At Jaisalmer the Sanu limestone is the main source of limestone for India's steel industry. Valuable reserves of marble are quarried near Jodhpur, to be used in the construction industry.

Tourism

In recent years that Thar desert, with its beautiful landscapes, has become a popular tourist destination. Tens of thousands visit the desert each year, many from neighbouring Pakistan. Desert safaris on camels, based at Jaisalmer, have become particularly popular with foreigners as well as wealthy Indians from elsewhere in the country. An annual Desert Festival held each winter is a popular attraction. Local people benefit by providing food and accommodation and by acting as guides or rearing and looking after the camels.

Farming

Most of the people living in the desert are involved in subsistence farming. They survive in the hot and dry conditions by grazing animals on the grassy areas and cultivating vegetables and fruit trees.

Commercial farming, which has grown in recent decades, has been made possible by irrigation. The construction of the Indira Gandhi Canal in 1958 (see page 73) has revolutionised farming and crops such as wheat and cotton now thrive in an area that used to be scrubby desert (photo D). Other crops grown under irrigation include pulses, sesame, maize and mustard.

 Growing wheat on irrigated land in the desert

Desertification

The process by which natural or human causes reduce the biological productivity of drylands (arid and semiarid lands).

Causes

Deforestation

Cutting down trees for firewood and settlements has left the soil unprotected. As it is exposed, the wind and rain washes the nutrients away leaving the soil infertile.

Climate Change and Drought

A change in global climate has caused more droughts than normal. This damages animal's habitats and the soil in many areas.

Over farming and poor farming methods

Over use of land to grow crops each year without allowing the nutrients in the ground to return leaves the soil of poor quality where nothing can grow.

Overgrazing due to farmers becoming less nomadic (they stay in one place now rather than moving around)

Farmers rely on the water and land around them more. This means that farmers don't regularly move to new fertile areas.

Over use of Fertilisers

This leads to a breakdown of the soil quality. The soil becomes salty and crops can't be planted.

Population growth

This leads to the need for more food. Increase in population and the need for more homes put's pressure on the land.

Lack of water

This causes crops to die and poor farming methods to be used.

Strategies to reduce desertification

Desertification can be reduced by adopting the following strategies:

Planting more trees - the roots of trees hold the soil together and help to reduce soil erosion from wind and rain.

Improving the quality of the soil - this can be managed by encouraging people to reduce the number of grazing animals they have and grow crops instead. The animal manure can be used to fertilise the crops grown. Growing crops in this way can improve the quality of the soil as it is held together by the roots of plants and protected from erosion. This type of farming is more sustainable.

Water management - water can be stored in earth dams in the wet season and used to irrigate crops during the dry season. This is an example of using appropriate technology to manage water supplies in the desert environment.

The name Zai pits refers to small basins in which seed of annual or perennial crops are planted. They are beneficial for soil conditions because they increase termite activity that leads to a higher water infiltration when it rains. This intervention is most suitable for flat or gently sloped terrains (0-5%) with a precipitation range of 350-600 mm/y.

