

What is an Ecosystem?

An ecosystem is a system in which organisms interact with each other and with their environment.

Ecosystem's Components

Abiotic These are non-living, such as air, water, heat and rock.

Biotic These are living, such as plants, insects, and animals.



Flora **Plant life** occurring in a particular region or time.

Fauna **Animal life** of any particular region or time.

Food Web and Chains

Simple food chains are useful in explaining the basic principles behind ecosystems. They show only one species at a particular trophic level. Food webs however consists of a network of many food chains interconnected together.

Nutrient cycle

Plants take in nutrients to build into new organic matter. Nutrients are taken up when animals eat plants and then returned to the soil when animals die and the body is broken down by decomposers.

Litter

This is the surface layer of vegetation, which over time breaks down to become humus.

Biomass

The total mass of living organisms per unit area.

Biome

A biome is a large geographical area of distinctive plant and animal groups, which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region.

Location

Climate

Wildlife

Tropical Rainforest

Along the equator eg/ Amazon

Hot and wet all year – 12 month growing season. Average 2500mm rain a year

Structure of the rainforest – and the river means this is the most biodiverse place on land

Tropical grasslands

Between the tropics eg/ where the lions hang out in Africa

Rainy and dry seasons. Hot all year. 1200 mm rain a year

Long grasses, scattered scrubby trees, safari type animals

Hot Desert

Along the Tropics eg Sahara

Hot and dry all year. Rains less than 250mm a year. Short growing season when it does rain.

Cactus, Camels, other animals eg, fene fox are nocturnal

Temperate woodlands

Eg, UK

4 seasons. 1200 mm rain a year

Trees, birds, small mammals, wildflowers

Tundra

Eg/ Canada , Russia

Dry and cold all year. 500 mm rain a year

Small plants, mosses, lichens, bilberrys. Moose, polar bears, range of smaller mammals. Birds.

An example of a small UK ecosystem: Blott's Pit at Holme Pierrepont – a pond

Abiotic

Sun, water, stones, earth

Biotic

Producers

Water lilies, reed mace

Primary consumers

Snail Pond skater Water Boatman Dragonfly

Secondary consumers

Kingfisher Frog Heron

Decompoers

Bacteria. Fungi

Tropical Rainforest Biome

Tropical rainforest cover about 2 per cent of the Earth's surface yet they are home to over half of the world's plant and animals.

Interdependence in the rainforest

A rainforest works through **interdependence**. This is where the plants and animals **depend on each other** for survival. If one component changes, there can be **serious knock-up effects** for the entire ecosystem.

Distribution of Tropical Rainforests	Climate of Tropical Rainforests	Rainforest nutrient cycle
Tropical rainforests are centred along the Equator between the Tropic of Cancer and Capricorn. Rainforests can be found in South America, central Africa and South-East Asia. The Amazon is the world's largest rainforest and takes up the majority of northern South America, encompassing countries such as Brazil and Peru.	Evening temperatures rarely fall below 22°C. Due to the presence of clouds, temperatures rarely rise above 32°C. Most afternoons have heavy showers. At night with no clouds insulating, temperature drops.	The hot, damp conditions on the forest floor allow for the rapid decomposition of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots. However, as these nutrients are in high demand from the many fast-growing plants, they do not remain in the soil for long and stay close to the surface. If vegetation is removed, the soils quickly become infertile.

Layers of the Rainforest

Emergent	Highest layer with trees reaching 50 metres.
Canopy	Most life is found here as It receives 70% of the sunlight and 80% of the life.
Under Canopy	Consists of trees that reach 20 metres high.
Shrub layer	Lowest layer with small trees that have adapted to living in the shade.
Ground layer	Creatures that live in the soils eg, decomposers

Tropical Rainforests: Case Study Amazon

Brazil is a NEE in South America. 60% of the Amazon lies within Brazil. 6 other nations including Peru and Columbia also have sections. It is also home to the Amazon River and pink river dolphin.

Adaptations to the rainforest		Rainforest inhabitants eg. Kayapo
Sloths	Large arms to swing & support in the tree canopy.	Many tribes have developed sustainable ways of survival. The rainforest provides inhabitants with... Food through hunting and gathering. Natural medicines from forest plants. Homes and boats from forest wood.
Drip Tips	Allows heavy rain to run off leaves easily.	
Lianas & vines	Climbs trees to reach sunlight at canopy.	

Causes of deforestation

Logging	Agriculture
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.	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	Tourism
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.	Roads are needed to bring supplies and provide access to new mining areas, settlements and energy projects. In Brazil, logging companies use an extensive network of roads for heavy machinery and to transport wood.
Energy Development	Road Building
The high rainfall creates ideal conditions for hydro-electric power (HEP). The Belo Horizonte dam in Brazil is key for creating energy in this developing country, however, both people and environment have suffered.	Roads are needed to bring supplies and provide access to new mining areas, settlements and energy projects. In Brazil, logging companies use an extensive network of roads for heavy machinery and to transport wood.

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.

Sustainability for the Rainforest

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

Strategies for sustainable use of the Amazon Rainforest:

Laws and agreements	Forestry Stewardship Council and debt reduction
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.
Eco tourism	Tourism that promotes the environments & conservation
Forest reserves	Areas protected from exploitation

Hot Desert: Case Study The Sahara, Northern Africa

The Sahara includes countries such as Algeria, Libya, Egypt and Mali. Most of the countries in the Sahara are LIC and rely on agriculture. Large families and put a strain on the land.

Distribution of the world's hot deserts	Major characteristics of hot desert	Climate of Hot Deserts
Most of the world's hot deserts are found in the subtropics between 20 degrees and 30 degrees north & south of the Equator. The Tropics of Cancer and Capricorn run through most of the worlds major deserts.	<ul style="list-style-type: none"> • Aridity – hot deserts are extremely dry, with annual rainfall below 250 mm. • Heat – hot deserts rise over 40 degrees. • Landscapes – Some places have dunes, but most are rocky with thorny bushes. 	<ul style="list-style-type: none"> • Very little rainfall with less than 250 mm per year. • It might only rain once every two to three years. • Temperate are hot in the day (45 °C) but are cold at night due to little cloud cover (5 °C). • In winter, deserts can sometimes receive occasional frost and snow.

Hot Deserts inhabitants	<u>Camel adaptations</u>	Cactus adaptations
<ul style="list-style-type: none"> - People often live in large open tents to keep cool. - Food is often cooked slowly in the warm sandy soil. - Head scarves are worn by men to provide protection from the Sun. 	<ul style="list-style-type: none"> • Hump for storing fat (NOT water). • Wide feet for walking on sand. • Long eyelashes to protect from sand. 	<ul style="list-style-type: none"> • Large roots to absorb water soon after rainfall. • Needles instead of leaves to reduce surface area and therefore transpiration.

Development in the Sahara Desert

As population grows and technology advances, there are lots of ways deserts can be developed to make life better for people and the environment – social, economic and environmental

Opportunities	Challenges
<ul style="list-style-type: none"> • There are valuable minerals for industries and construction (e.g copper/ manganese) • Energy sources such as coal and oil can be found in the Sahara. • Great opportunities for renewable energy such as solar power at the Sahara. • The Sahara attracts tourists • Desert agriculture due to irrigation technology 	<ul style="list-style-type: none"> • The extreme heat makes it difficult to work outside for very long. • High evaporation rates from irrigation canals and farmland. • Water supplies are limited, creating problems for the increasing number of people moving into area. • Access through the desert is tricky as roads are difficult to build and maintain.

Desertification: turning semi – arid areas into deserts.

Causes:

Fuel wood: People rely on wood for cooking and heating. The removal of trees causes the soil to be exposed to the heat of the sun and the desert winds.

Climate change: Longer dry periods followed by intense heavy rainfall and higher temperatures have meant less water for plants

Over-cultivation: If crops are grown in the same area too often, nutrients in the soil will be used up causing the soil to dry out and erode

Overgrazing: Too many animals mean plants are eaten faster than they can grow back. This removes shelter and nutrients for the soil causing it to dry out and erode

Population growth: A growing population puts pressure on the land leading to more deforestation, overgrazing and over-cultivation

Solutions in the Sahel region of North Africa

- **Appropriate Technology** – using less expensive, sustainable materials for people to maintain
- **Magic Stones** (bunds)- Lining up stones on contour lines to trap nutrient rich top soil, preventing soil erosion.
- **Tree Planting** - trees can act as windbreakers to protect the soil from wind and soil erosion.
- **Zai- Digging** a pit and encourage microorganism to break down compost and trap water..