

# What is an Ecosystem?

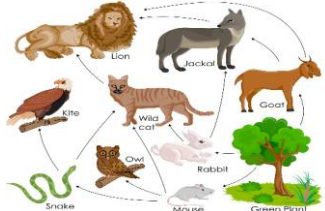
An ecosystem is a system in which organisms interact with each other and with their environment.

## 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.

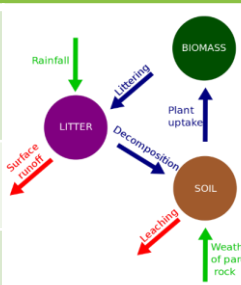


## Food Web and Chains

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**.

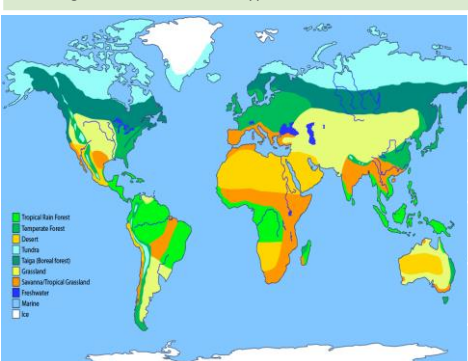


**Litter** This is the **surface layer** of vegetation, which over time breaks down to become **humus**.

**Biomass** The total **mass of living organisms** per unit area.

## Biomes

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.



- Coniferous forest
- Deciduous forest
- Tropical rainforests
- Tundra
- Temperate grasslands
- Tropical grasslands
- Hot deserts.

The **most productive biomes** – which have the greatest biomass- grow in climates that are **hot and wet**.

# Biome's climate and plants

Biome	Location	Temperature	Rainfall	Flora	Fauna
<b>Tropical rainforest</b>	Centred along the Equator.	Hot all year (25-30°C)	Very high (over 200mm/year)	Tall trees forming a canopy; wide variety of species.	Greatest range of different animal species. Most live in canopy layer
<b>Hot desert</b>	Found along the tropics of Cancer and Capricorn.	Hot by day (over 30°C) Cold by night	Very low (below 300mm/year)	Lack of plants and few species; adapted to drought.	Many animals are small and nocturnal: except for the camel.

# Ecosystems



## CASE STUDY: UK Ecosystem: Epping Forest, Essex



This is a typical English lowland deciduous woodland. **70% of the area** is designated as a **Site of Special Scientific Interest (SSI)** for its biological interest, with **66%** designated as a **Special Area of Conservation (SAC)**.

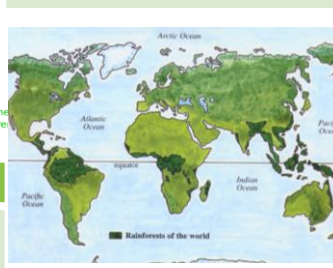
Components & Interrelationships		Management
<b>Spring</b>	<b>Flowering plants</b> (producers) such as bluebells store nutrients to be eaten by consumers later.	- Epping has been managed for centuries. - Currently now used for <b>recreation and conservation</b> .
<b>Summer</b>	Broad tree leaves grow quickly to <b>maximise photosynthesis</b> .	- Visitors <b>pick fruit</b> and berries, helping to <b>disperse seeds</b> .
<b>Autumn</b>	Trees shed leaves to <b>conserve energy</b> due to sunlight hours decreasing.	- Trees cut down to encourage <b>new growth for timber</b> .
<b>Winter</b>	Bacteria <b>decompose</b> the leaf litter, releasing the nutrients into the soil.	

## 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**.

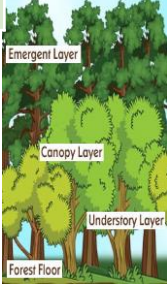
## Interdependence in the rainforest

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

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.



## Layers of the Rainforest

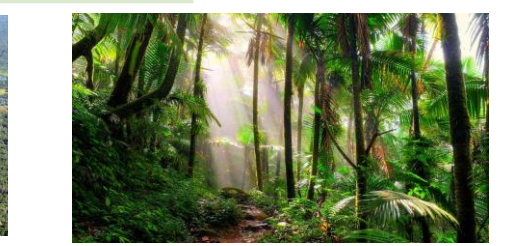
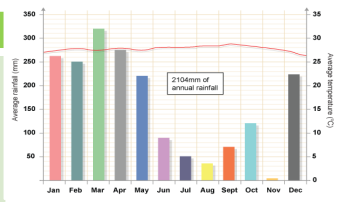
<b>Emergent</b>	Highest layer with trees reaching <b>50 metres</b> .
<b>Canopy</b>	80% of life is found here as it receives <b>most of the sunlight and rainfall</b> .
<b>U-Canopy</b>	Consists of trees that reach <b>20 metres high</b> .
<b>Shrub Layer</b>	Lowest layer with <b>small trees</b> that have adapted to living in the <b>shade</b> .

## Climate of Tropical Rainforests

- 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.

## Rainforest nutrient cycle

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**.



## Tropical Rainforests: Case Study Malaysia



Malaysia is a LIC country in south-east Asia. 67% of Malaysia is a tropical rainforest with 18% of it not being interfered with. However, Malaysia has the fastest rate of deforestation compared to anywhere in the world

### Adaptations to the rainforest

<b>Orangutans</b>	Large arms to swing & support in the tree canopy.
<b>Drip Tips</b>	Allows heavy rain to <b>run off leaves easily</b> .
<b>Lianas &amp;</b>	<b>Climbs</b> trees to reach sunlight at canopy.

### Issues related to biodiversity

#### Why are there high rates of biodiversity?

- **Warm and wet climate** encourages a wide range of vegetation to grow.
- There is **rapid recycling of nutrients** to speed plant growth.
- Most of the rainforest is **untouched**.

#### Main issues with biodiversity decline

- **Keystone species** (a species that are important of other species) are extremely important in the rainforest ecosystem. Humans are threatening these vital components.
- **Decline in species** could cause tribes being unable to survive.
- **Plants & animals** may become **extinct**.
- Key medical **plants** may become **extinct**.

#### 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**.

### Rainforest inhabitants

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.

#### 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)**.
- The **Bakun Dam** in Malaysia is key for creating energy in this developing country, however, both people and environment have suffered.

##### Road Building



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

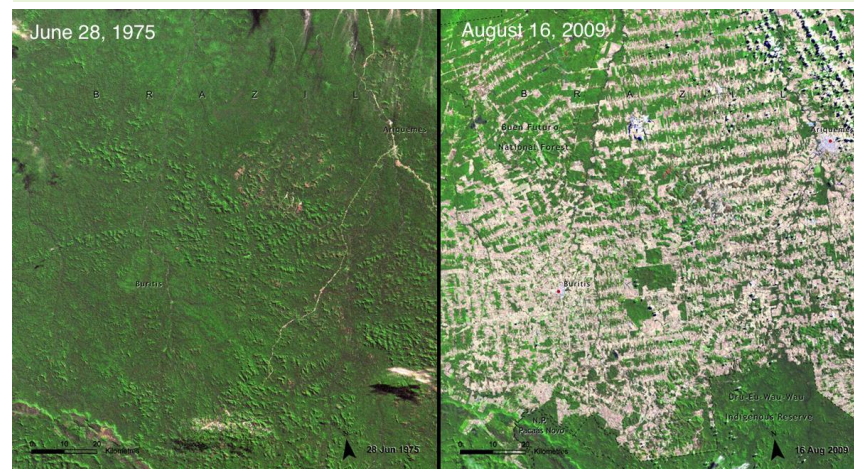
### Sustainability for the Rainforest

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

## Rate of Deforestation



### Tasks...

1. What is the difference between biotic and abiotic factors?
2. Draw an example of a food web.
3. Explain and describe the features of a small scale ecosystems.
4. Using a named example, explain how change can have short term and long term effects on an ecosystem.
5. Describe the global pattern of tropical rainforests and hot deserts.
6. Explain the main plant adaptations in a tropical rainforest.
7. Evaluate two possible environmental impacts of developments like the Bakun Dam.
8. Describe and explain two benefits of international cooperation in sustainably managing tropical rainforests.

Question: "The rainforest is more valuable when left intact than when destroyed." Using a case study, use examples to support or challenge this view.

1. **BUG** the question by boxing the command word and underlining the content you need to write about.
2. List the key vocabulary you will use.
3. Create a plan of what you would write in each paragraph.
4. Practice writing your answer from memory.