

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.

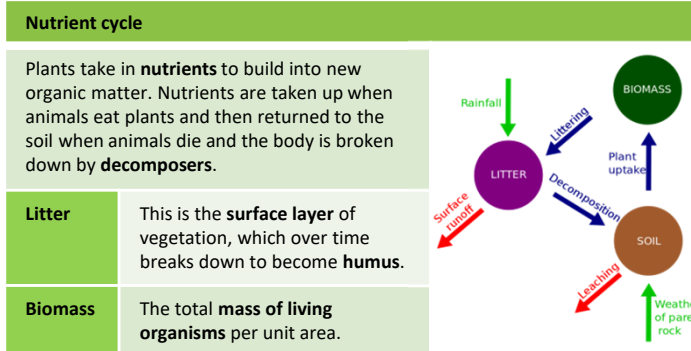
Flora	Plant life occurring in a particular region or time.
Fauna	Animal life of any particular region or time.

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.

Biome's climate and plants

Biome	Location	Temperature	Rainfall	Flora	Fauna
Tropical rainforest	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
Tropical grasslands	Between latitudes 5°- 30° north & south of Equator.	Warm all year (20-30°C)	Wet + dry season (500-1500mm/year)	Grasslands with widely spaced trees.	Large hooved herbivores and carnivores dominate.
Hot desert	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.
Temperate forest	Between latitudes 40°- 60° north of Equator.	Warm summers + mild winters (5-20°C)	Variable rainfall (500-1500mm/year)	Mainly deciduous trees; a variety of species.	Animals adapt to colder and warmer climates. Some migrate.
Tundra	Far Latitudes of 65° north and south of Equator	Cold winter + cool summers (below 10°C)	Low rainfall (below 500mm/year)	Small plants grow close to the ground and only in summer.	Low number of species. Most animals found along coast.
Coral Reefs	Found within 30° north – south of Equator in tropical waters.	Warm water all year round with temperatures of 18°C	Wet + dry seasons. Rainfall varies greatly due to location.	Small range of plant life which includes algae and sea grasses that shelters reef animals.	Dominated by polyps and a diverse range of fish species.



Unit 1b

The Living World

Example of a 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
Spring	Flowering plants (producers) such as bluebells store nutrients to be eaten by consumers later.
Summer	Broad tree leaves grow quickly to maximise photosynthesis .
Autumn	Trees shed leaves to conserve energy due to sunlight hours decreasing.
Winter	Bacteria decompose the leaf litter, releasing the nutrients into the soil.

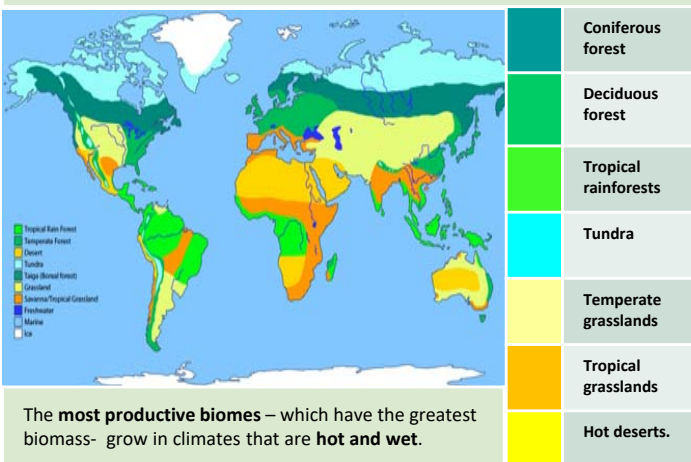
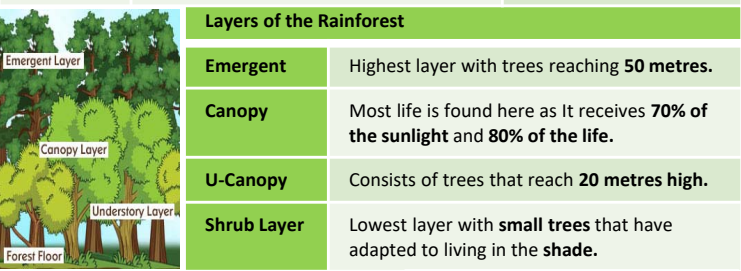
- Epping has been managed for centuries.
- Currently now used for **recreation and conservation**.
- Visitors **pick fruit** and berries, helping to **disperse seeds**.
- Trees cut down to encourage **new growth for timber**.

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**.

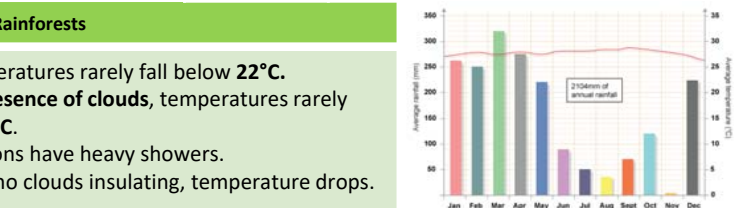
Interdependence in the rainforest

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.



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 Examples: Amazon Rainforest (REVISION GUIDE); Malaysia (TEXTBOOK);

Adaptations to the rainforest

Primates	Large arms to swing & support in the tree canopy.
Drip Tips	Allows heavy rain to run off leaves easily .
Lianas & Vines	Climbs trees to reach sunlight at canopy.

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.

Issues related to biodiversity

What are the causes of deforestation?

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**.

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.

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.

Energy Development

- The **high rainfall** creates ideal conditions for **hydro-electric power (HEP)**.
- Dams are key for creating energy in many developing countries, however, both people and environment have suffered.

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

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**.

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**.

Road Building

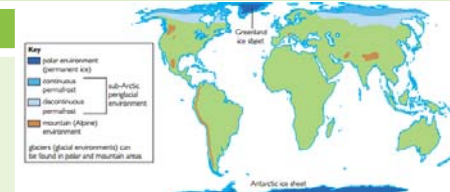
- Roads** are needed to bring supplies and **provide access** to new mining areas, settlements and energy projects.
- Logging companies use an **extensive network of roads** for heavy machinery and to transport wood.

Cold Environment

Case Studies Examples: Alaska (REVISION GUIDE); Svalbard (TEXTBOOK)

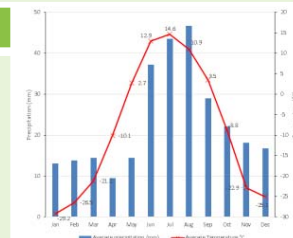
Distribution of the cold environments

Polar - The regions of Earth surrounding the North and South Poles. These regions are dominated by Earth's polar ice caps.
Tundra - The flat, treeless Arctic regions of Europe, Asia and North America, where the ground is permanently frozen. Lichen, moss, grasses and dwarf shrubs can grow here.



Cold Environ Inhabitants

- Polar environments** are almost uninhabited. Some indigenous people live in the Arctic.
- Tundra environments** are home to many people, including indigenous peoples, and oil/gas workers.

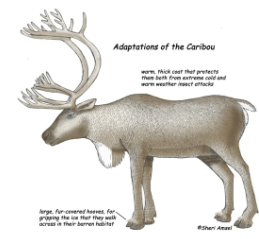


Climate of Cold environments

- Polar areas** are very cold, temperatures never normally above 0 °C.
- Tundra areas** are also cold but experience a maximum of 10 °C.
- Precipitation is low – between 100mm and 380mm.
- Clearly defined seasons.

Adaptations to the cold environments

Bear-berry	<ul style="list-style-type: none"> Very low growing to enable it to survive strong winds. Small leathery leaves help retain water.
Caribou	<ul style="list-style-type: none"> Dense insulating coat. Fur covered hooves for walking across ice.



Biodiversity

- Fewer species than most other environments.
- Low biodiversity means when the population of one species changes it can significantly affect a dependent species.

Opportunities and challenges in the Cold Environment

Opportunities

- Oil and Gas** – over half of Alaska's income is from oil & gas.
- Mineral resources** – gold, silver, copper. **Actively mined in Alaska, Antarctica is also mineral rich but protected from mining.**
- Fishing** – abundant fish in nutrient rich cold waters.
- Tourism** – tourists attracted to the wilderness landscape & extreme conditions.

Challenges

- Extreme temperature** – its very cold! **Exposure can lead to death.**
- Extremes in the amount of daylight** - winter is dark, summer is bright all day & night.
- Inaccessibility** – ice roads in winter; no roads in summer.
- Construction can only take place in summer.**
- Specially designed buildings** means its expensive to build there.

Areas worth conserving

Cold environments are worth conserving – natural ecosystems unaltered by humans.

Important areas for scientific research as they are uninhabited and undisturbed

Very fragile – if damaged they take a long time to recover. Plant growth is very slow.

Species are highly specialised and take time to adapt to change e.g. polar bears adapted to hunt on ice, but ice melts earlier each year.



Strategies to balance economic development

- Conservation groups** – pressure governments to protect cold environments.
- International Agreements** – Antarctica Treaty limits visitors and ensures only peaceful activities.
- Technology** – construction methods can minimise impacts e.g. elevated buildings.
- Governments** – make laws to protect cold environments.