

What is an Ecosystem?

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

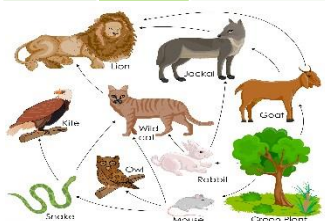
Ecosystem's Components

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.

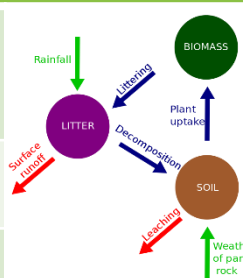


Food Web and Chains

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- by Gersmehl

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**.

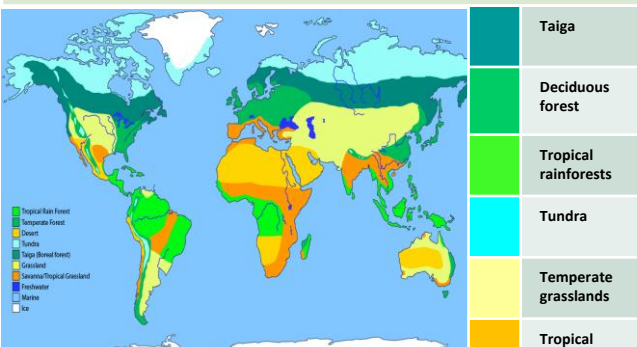


Litter This is the **surface layer** of vegetation, which over time breaks down to become **humus**.

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.



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

Biome's of the world- location and characteristics

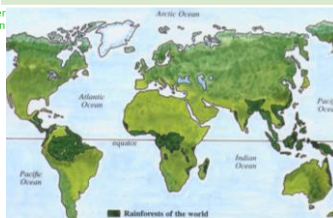
Biome	Location	Temperature	Rainfall	Flora	Fauna
Tropical rainforest	Centred along the Equator.	Hot all year (25-30°C)	Very high (over 200mm/year)	Tall trees forming a canopy; wide variety of species.	Greatest range of different animal species. Most live in canopy layer
Tropical grasslands (savannah)	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 hoofed 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 (deciduous)	Between latitudes 40°- 60° north of Equator.	Warm summers + mild winters (5-20°C)	Variable rainfall (500-1500m /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.
Taiga forest (boreal)	Northern hemisphere- Russia, Scandinavia and parts of North America.	Wide range (-10-15°C)	500mm/year	Evergreen trees with needles, thick bark with shallow roots.	. Deer, wolves and black bears.

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.

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**.

Ecosystems in the UK- terrestrial

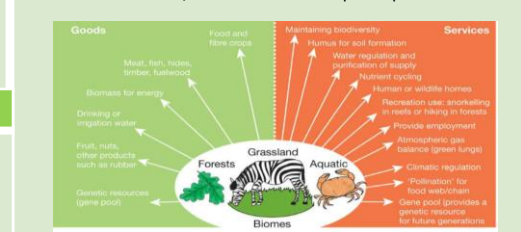
- **Moorland**- Land which is not intensively farmed, found in upland areas. Tends to have acidic, peaty soils, plants are small such as heather, few trees.
- **Heathland**- Tends to be open countryside in lowland areas. Plants are small shrubs e.g. heather & gorse with a few silver beech trees.
- **Wetlands**- Areas of low-lying land that is wet and boggy.
- **Woodland**- Areas predominately composed of trees. In England this is mainly deciduous.

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 .
U-Canopy	Consists of trees that reach 20 metres high .
Shrub Layer	Lowest layer with small trees that have adapted to living in the shade .

Goods and services

Goods – things the biosphere gives us (products)
Services – a service / action that the biosphere provides for us



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.

UK Marine ecosystems

Important for tourism, food, energy (HEP & windfarms), employment and leisure

Threats to UK Marine ecosystems

Overuse/exploitation, oil spills, overcrowding, litter (especially plastic), trawling and overfishing.

Tropical Rainforests: located example- Madagascar



Located off the East coast of Africa, Madagascar is the world's fifth largest island; at 144 million acres, it's almost the size of Texas. There are **social** (relating to people) & **economic** (relating to money and jobs) causes of deforestation

Deciduous Forest: located example- The New Forest. UK



Located in Hampshire, the **National Park** was set up in 2005, and is 480 square km in size. 175,000 people live in the area. It is mainly comprised of **deciduous trees**. The area comprises towns and villages such as Lyndhurst and Hythe, close to the M27.

Adaptations to the rainforest		Rainforest inhabitants
Orangutans	Large arms to swing & support in the tree canopy.	Many tribes have developed sustainable ways of survival. The rainforest provides inhabitants with... <ul style="list-style-type: none"> • 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.	

Adaptations to the rainforest		Goods and services
Oak trees	Lose leaves in autumn- conserve energy/moisture. Deep roots to search out nutrients & water.	<ul style="list-style-type: none"> • The range of goods & services is smaller than tropical rainforests. • Goods- wood pellets for fuel, timber e.g. oak for building. • Services- carbon store, recreation, habitat for rare and endangered species.
Bluebells	Appear in early spring to take advantage of light.	
Hedgehogs & squirrels	Hibernate to save energy and store nuts for colder months.	

Issues related to biodiversity	What are the causes of deforestation?	
Why are there high rates of biodiversity?	Logging <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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.

Structure of deciduous forests	Nutrient cycle deciduous	Nutrient cycle rainforest
<p>The deciduous woodland ecosystem has four layers: canopy layer, sub-canopy layer, herb layer and ground layer.</p>	<p>Temperate deciduous forest - balance between stores - moderate transfers between stores</p>	<p>Tropical rain forest - biomass is main store - rapid transfer between stores and environment</p>

Main issues with biodiversity decline	Mineral Extraction & Energy	Tourism
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. • The high rainfall creates ideal conditions for hydro-electric power (HEP). 	<ul style="list-style-type: none"> • 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.

Comparing the nutrient cycle- rainforest Vs deciduous

Biomass store – Bigger in TRF as more nutrients are held in the vegetation because of the high biodiversity in the system so there are more available nutrients, as there is more photosynthesis, meaning a greater amount of productivity.
Soil store – Smaller in TRF – as the nutrient uptake is higher in TRF and there is greater amount of leaching due to more rainfall in TRF.
Litter store – Smaller in the TRF as the rate of decomposition is much greater because of the high humidity.

Arrows are generally larger in TRF as the rate of nutrient recycling is much faster between stores due to climatic and biodiversity, meaning that transfer is more preferable in TRF.

Impacts of deforestation	Population Pressure	Road Building
Economic development <ul style="list-style-type: none"> + 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. 	<ul style="list-style-type: none"> • Growth of towns and cities- urbanisation leads to the destruction of rainforest. Uncontrolled settlement occurs on fringes of rainforest. 	<ul style="list-style-type: none"> • Roads are needed to bring supplies and provide access to new mining areas, settlements and energy projects.

Issues facing the New Forest- deciduous woodland

Soil erosion	Sustainability for the Rainforest
<ul style="list-style-type: none"> - 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. 	<p>Uncontrolled and unchecked exploitation can cause irreversible damage such as loss of biodiversity, soil erosion and climate change.</p>

Challenges (threats)	Approaches (management)
<ul style="list-style-type: none"> • Over use of pesticides and herbicides which impacts on native wildlife and gets washed into rivers polluting them.. • The visitors can do damage by: trampling delicate plants; causing erosion by walking, cycling, horse riding and car parking on verges; starting fires with barbeques; scaring wildlife and farm animals with their dogs; and dropping litter. • Animals are run over by visitors driving too fast through the Forest. The ponies can also be dangerous to approach if they have young foals. • Conflict between groups of people (stakeholders) e.g. walkers, bikers, farmers who want to use the same area. • Erosion of footpaths due to large number of visitors. • Visitors parking on grass verges. Increase in congestion and accidents. • Building work can scare and interfere with the breeding of animals and birds in the forest. 	<ul style="list-style-type: none"> • The Forest Marque certifies that local wood products are made from sustainable Forest timber. • There are a lot of car parks in the New Forest so that people do not park on roadside verges; special cycle routes and paths have been set up through the Park, which guide visitors away from vulnerable areas; barriers are used to stop access to areas, for example while forestry work is carried out. • Green Leaf businesses are local businesses that have signed up to a scheme to use local products where possible, to encourage walking and cycling, to set aside 10% of their grounds for local wildlife and generally to support sustainable use of the Forest. • A visitor leaflet called '5 Ways to Love the New Forest' suggests why visitors should drive slowly through the Forest or leave the car behind, and explains about Green Leaf business and the Forest Marque. • Pesticides and herbicides are used sparingly to avoid damaging the ecosystem.

Climate Change	Possible strategies include:
<ul style="list-style-type: none"> -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. 	<ul style="list-style-type: none"> • 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.