

## Keywords

**Biodiversity** – the variety of living organisms in an area

**Biomass** – the amount of biological material

**Community** – group of interdependent living organisms in an ecosystem

**Competition** – where living organisms compete with each other for the same resource

**Decomposers** – microorganisms that break down waste products and dead bodies

**Deforestation** – the removal and destruction of trees in forests and woodlands

**Ecosystem** – interaction between living organisms and the factors affecting an environment

**Extremophile** – an organism that can survive and reproduce in extreme conditions

**Global warming** – the increase of the average global temperature

**Habitat** – where an organism lives

**Interdependence** – relationships between different organisms in a community eg. Species depend on each other for food, shelter, pollination, etc.

**Population** – the number of individual organisms of a single species living in a habitat

**Predators** – organisms which kill for food

**Prey** – the animals that are eaten by the predators

**Producers** – green plants/algae that convert the Sun's energy into glucose through photosynthesis

**Species** – organisms that can breed together to produce fertile offspring

## Abiotic and Biotic Factors

**Abiotic** factors are the non-living factors of an environment:

- moisture
- light intensity
- temperature
- CO<sub>2</sub> concentration
- wind intensity
- O<sub>2</sub> concentration
- pH

**Biotic** factors are the living factors of an environment:

- predators
- competition
- pathogens (disease)
- food availability

## Adaptations

**Structural adaptations** are features of an organism's body, eg. Colour for camouflage

**Behavioural adaptations** are how the organism behaves, eg. Migration patterns, courtship rituals

**Functional adaptations** are how the organism carries out processes eg. Lowering metabolism during hibernation

Polar Bear (Arctic)		
Oily fur: water resistant and prevents evaporation of sweat	A compact shape: small surface area to reduce heat loss	Thick layer of blubber: acting as insulation and an energy store when food is scarce
Rough paws: to help them grip to the ice and snow.		Excellent sense of smell: which makes it easier for them to hunt prey
White fur: match and blend in with surroundings (camouflage)	Large Feet: to spread it's weight so they don't sink into snow or break through the ice	Thick coat: traps a warm layer of air, acting as insulation

## Competition

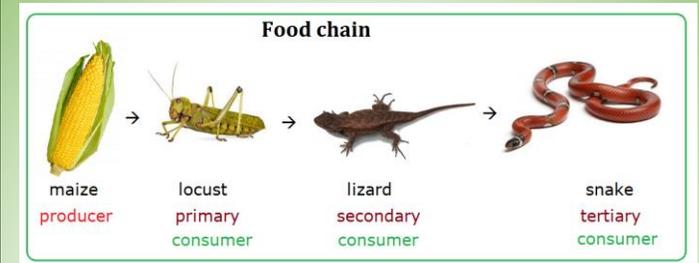
Species will compete with one another and within their own species to survive and reproduce.

Animals compete for food, water, territory/shelter, and within their own species, for mates

Plants compete for light, water, space and minerals.

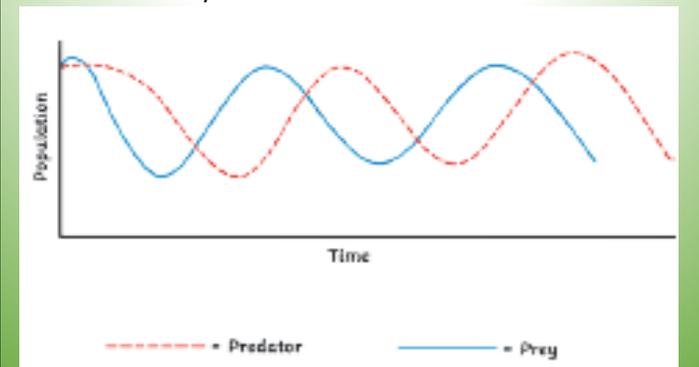
## Food Chains

The source of all energy in a food chain is the Sun's radiation. It is absorbed by plants and algae which use it for photosynthesis.



*Remember:* the arrow in a food chain indicates the direction of energy flow

Populations of predators and prey increase and decrease in cycles. The size of the predator population depends on the size of the prey population and vice versa. Overall, there is a stable community.



**Extremophiles**

**Extremophiles** are organisms that live in the most extreme conditions – they are part of the Archaea domain.

Eg. Thermophiles can survive at very high temperatures as their enzymes are not denatured

**Deforestation & Land Use**

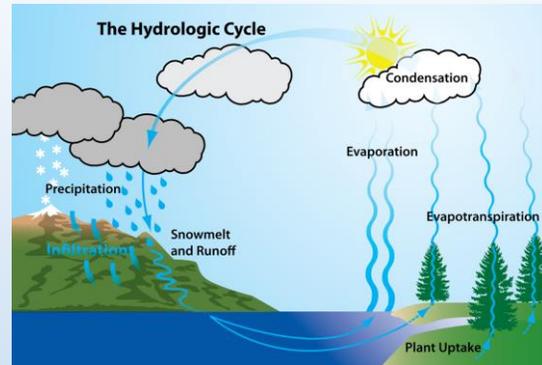
Humans use land for building, quarrying, mining, agriculture and landfill. As the human population increases and we take more land, there is less space for other organisms to live – decreasing **biodiversity**.

**Deforestation** (to use wood as a fuel/material or to clear space for other use) destroys habitats where other organisms live.

**Peat bogs** are produced when decomposition occurs over a very long time. Peat stores a lot of carbon and can be extracted to make compost or burnt as an energy source. Burning peat releases a huge amount of CO<sub>2</sub> into the atmosphere, contributing to the **greenhouse effect**.

Trees absorb CO<sub>2</sub> for photosynthesis so if they are removed less CO<sub>2</sub> is removed from the atmosphere. If they are burned, this also releases more carbon dioxide. This can lead to **global warming** and the changes to the ecosystem reduce biodiversity.

**Water Cycle**



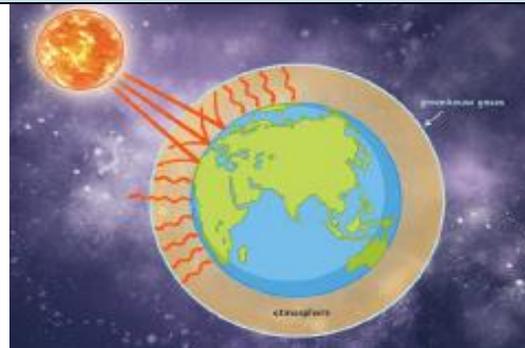
**Transpiration and respiration** – loss of water vapour from plants and animals directly to the atmosphere.

**Evaporation** – The Sun heats the Earth’s surface and water is turned from a liquid into water vapour, forming warm, moist air.

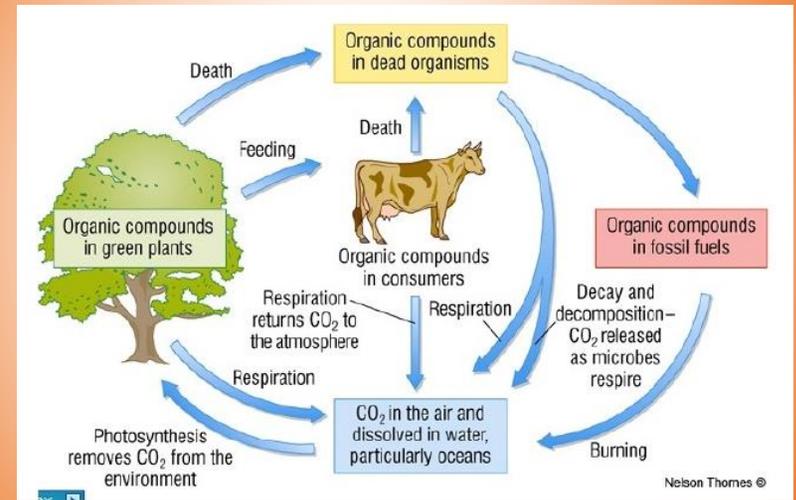
**Condensation** – As moist air rises it cools. Water vapour condenses back into liquid water droplets producing clouds.

**Precipitation** – As water droplets in clouds get heavier they fall as rain, snow or hail.

**Percolation** – Water trickles through gaps in soils and rocks



**Carbon Cycle**



**Global Warming**

The **greenhouse effect** is the natural process where some of the Sun’s radiation is trapped within the insulating layer of the atmosphere. This maintains a temperature suitable to support life of Earth. Human activities have contributed to the rise in these greenhouse gases, causing global warming.

**Global warming** leads to:

- ✓ Melting of ice caps
- ✓ Rising sea levels
- ✓ Flooding
- ✓ Changes to climate
- ✓ Changes in migration patterns
- ✓ Changes in species distribution
- ✓ Reduction in biodiversity

**Important Gases**

Carbon dioxide and methane increase causes **global warming**

Sulphur dioxide and nitrogen oxides cause **acid rain**

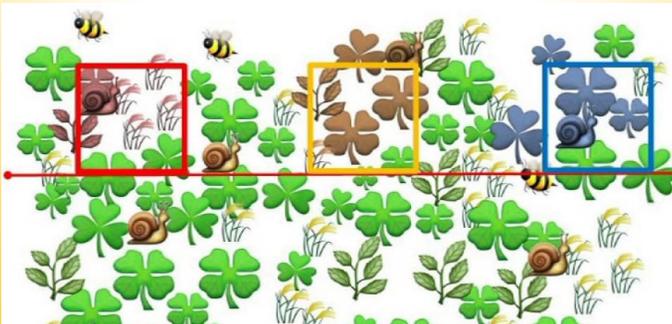
### Required Practical: Field Techniques

The **distribution** (where organisms are found in an environment) and **abundance** (how common an organism is in an environment) of an organism is affected by the environment and abiotic factors.

**Quadrats** can be used to measure the frequency (number) of an organism in a given area and should be placed *randomly*.

**Transects** are used to measure the change of distribution across an area

Mean =  $\frac{\text{total number of organisms}}{\text{number of quadrats}}$



### Human Population & Pollution

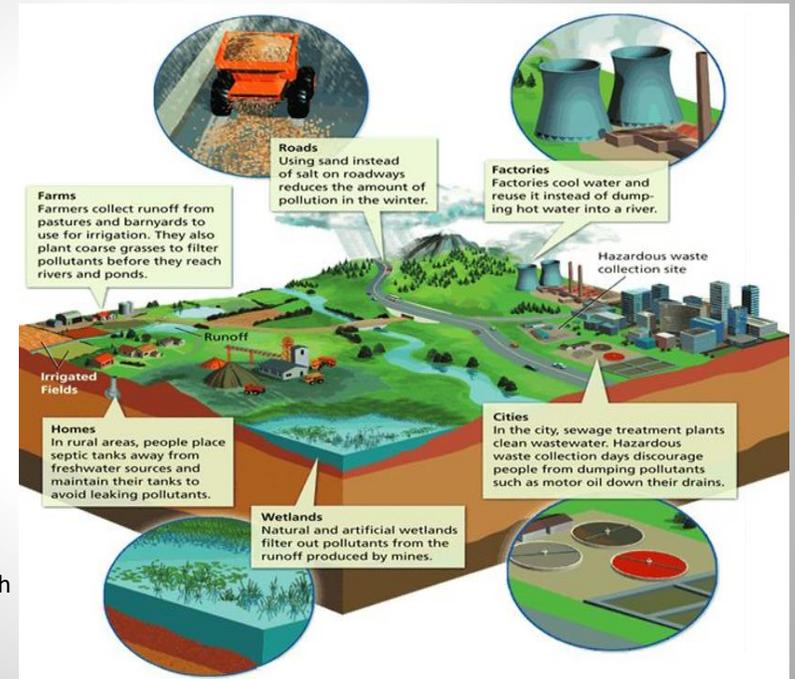
The global human population is more than 7.5 billion. There is more demand for food, resources and water; but also means more waste and emissions are created. Human population has increased due to:

- Modern medicine
- New farming techniques
- Reducing famine
- Fewer deaths from disease
- Increased quality of life

**Bioaccumulation:** the gradual accumulation of chemicals/toxins in an organism

**Acid rain:** Caused by sulphur dioxide and nitrogen oxides from emissions

**Eutrophication:** When a body of water becomes overly enriched with minerals and causes excessive growth of algae



### Maintaining Ecosystems & Biodiversity

There are many ways that biodiversity and ecosystems are maintained:

- Breeding programmes.
- Protection and regeneration
- Reintroduction of hedgerows and field margins
- Reducing deforestation
- Reducing carbon emissions
- Recycling resources

Unfortunately, many of these schemes can be difficult to manage, are expensive and difficult to regulate, especially in developing countries.