Ecology

Ecology - is the study of interactions between living things and their environment.

Biosphere - is the part of the planet containing living things.

Ecosystem - a group of organisms that interact with their environment together.

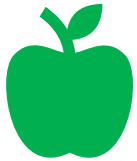
Habitat - the place where an organism lives.

Population - members of the same species living in an area.

Community - all the different populations (species) in an area.

ENVIRONMENTAL FACTORS

1. Biotic factors - **living** factors.



Examples - **Food**, competition, etc.

e.g. Animals might compete for scarce resources.

2. Abiotic factors - **non-living** factors.

Examples - **Altitude**, Aspect.

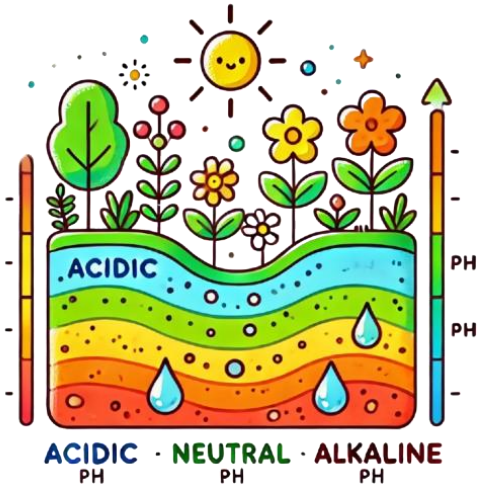
e.g. Higher altitudes are colder and hard to live in.

3. Climatic factors - weather over a long time.

Examples - **Temperature**, rainfall.

4. Edaphic Factors - Factors to do with **soil**.

Examples – Soil pH, temperature, etc.

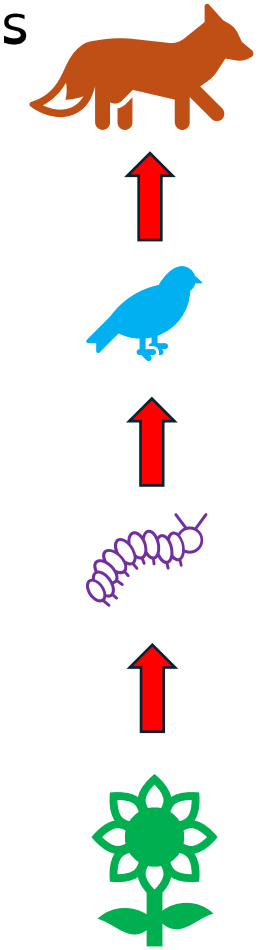


Energy Flow

Producers - Organisms that carry out photosynthesis, e.g. plants.

Consumers - take in food from another organism, e.g. animals

Food Chain - the order in which an organism is eaten by the next one in the chain.



In a **grassland habitat** an example of a food chain is:

Buttercup → Caterpillar → Thrush → Fox

The → shows the direction of **energy flow**.

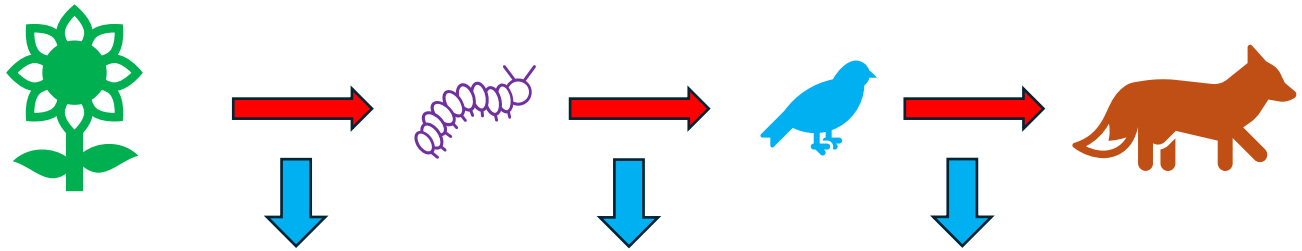
Almost all energy for food chains comes from the sun.

Plants (**producers**) catch the energy and change it into sugars.

The energy in the plants is then passed into **consumers**.

These consumers only get **10%** of the energy from the plant.

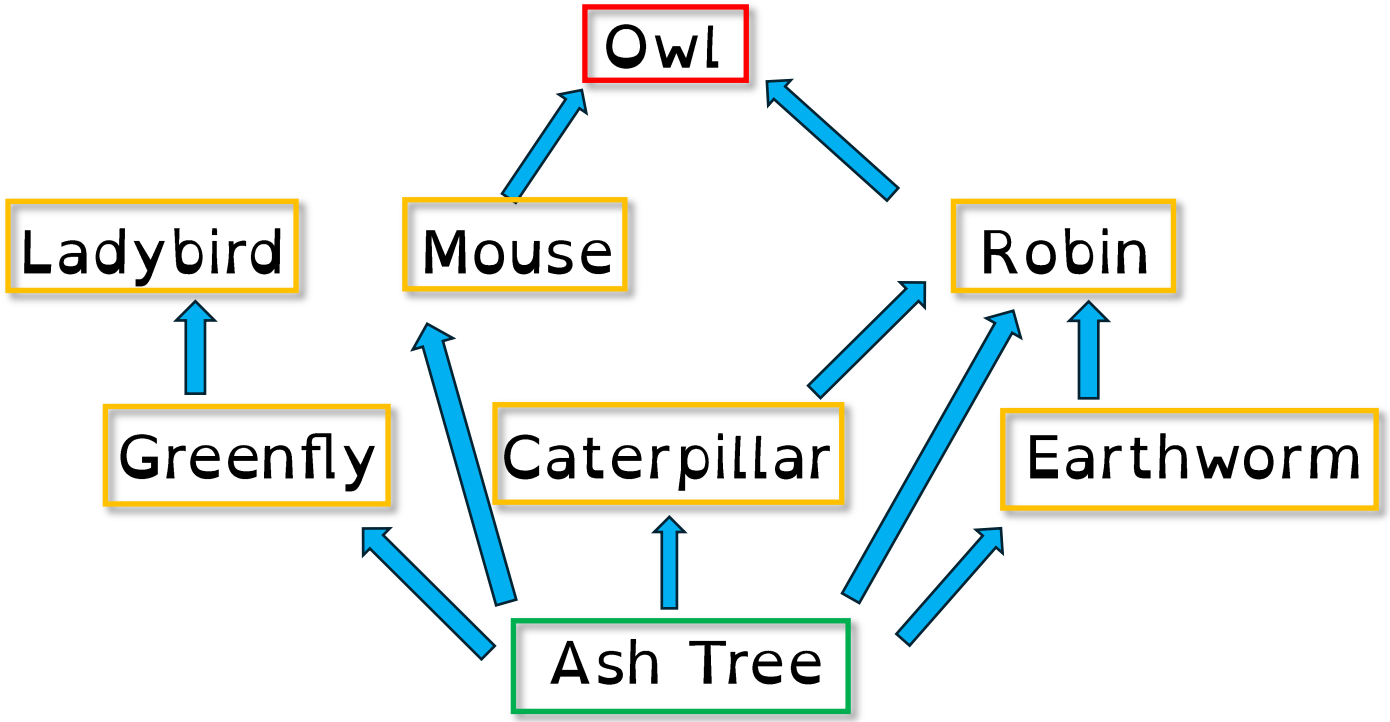
If they are eaten, they only pass on **10%** of their energy.



90% Energy lost

Food chains are short as the energy eventually runs out.

Food Web – made of interconnected food chains



Primary consumer = Caterpillar Herbivore = Mouse Omnivore = Robin

Ecological niche - is the role an organism plays in the community.

2 organisms with the same niche must compete.

An example is how birds eat.

Magpie eats from **fences** and gutters

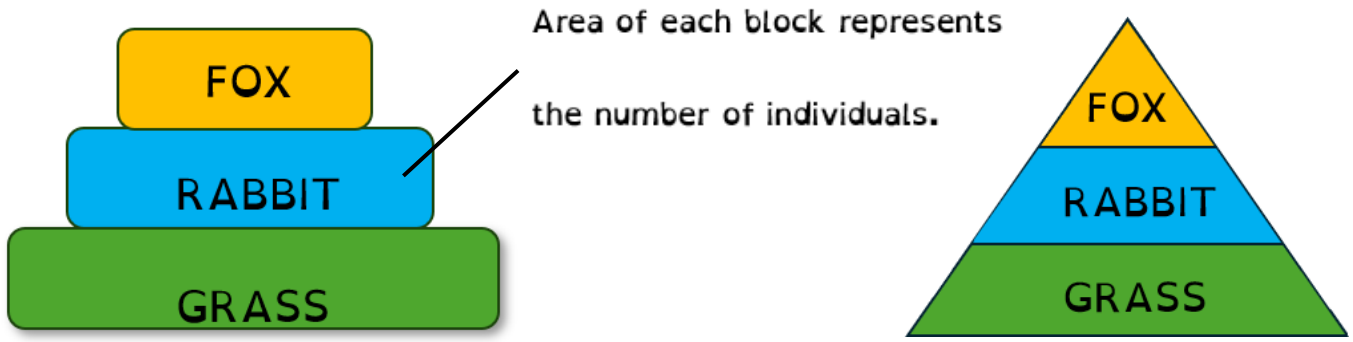
Swallow eats in **flight**

Thrush eats from the ground/**soil** – e.g. snails.

Pyramid of numbers

Represents the number of organisms at each trophic level.

The number of organisms at each level normally decreases as you go up. This is due to the **decrease in energy**.



In the examples above, there is a lot of grass, less rabbits, and even fewer foxes.

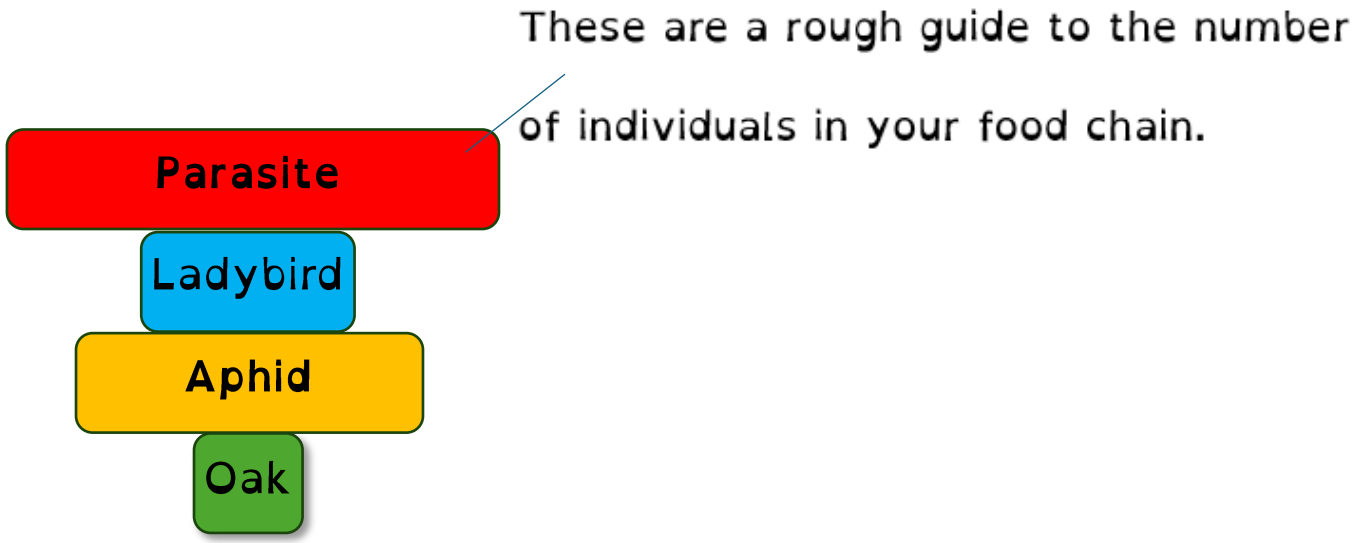
Sometimes you can have an **inverted** pyramid of numbers.

Where the number of organisms may **increase** as you go up.

An inverted pyramid means you have,

1. **Parasites** or

2. All the organisms live in **one tree**.



Questions on this topic

Q.1 What is a population?

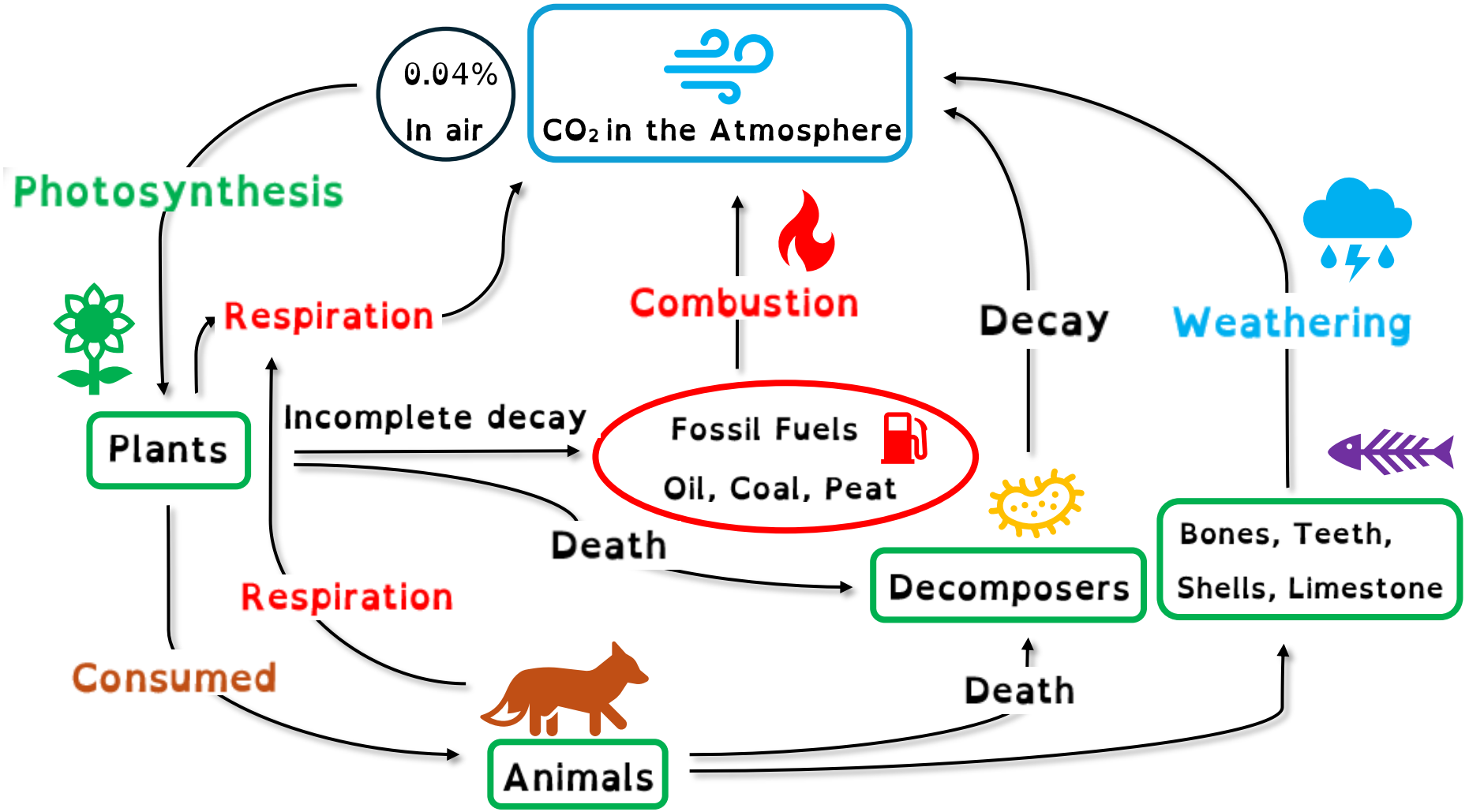
Q.2 Give an example of 2 abiotic factors and 2 biotic factors?

Q.3 What does Edaphic mean?

Q.4 What is a food chain?

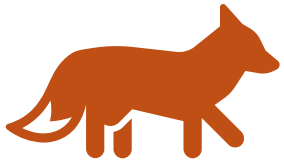
Q.5 Give an example of one from a habitat you studied.

The Carbon Cycle



Nutrient Recycling is essential as it releases previously locked up Carbon. It can then be reused by other organisms.

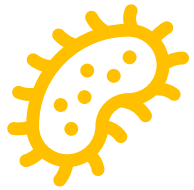
Plants take in Carbon Dioxide during photosynthesis. During Respiration, they release carbon dioxide.



Animals get carbon from eating other organisms. When they respire, they release carbon dioxide.

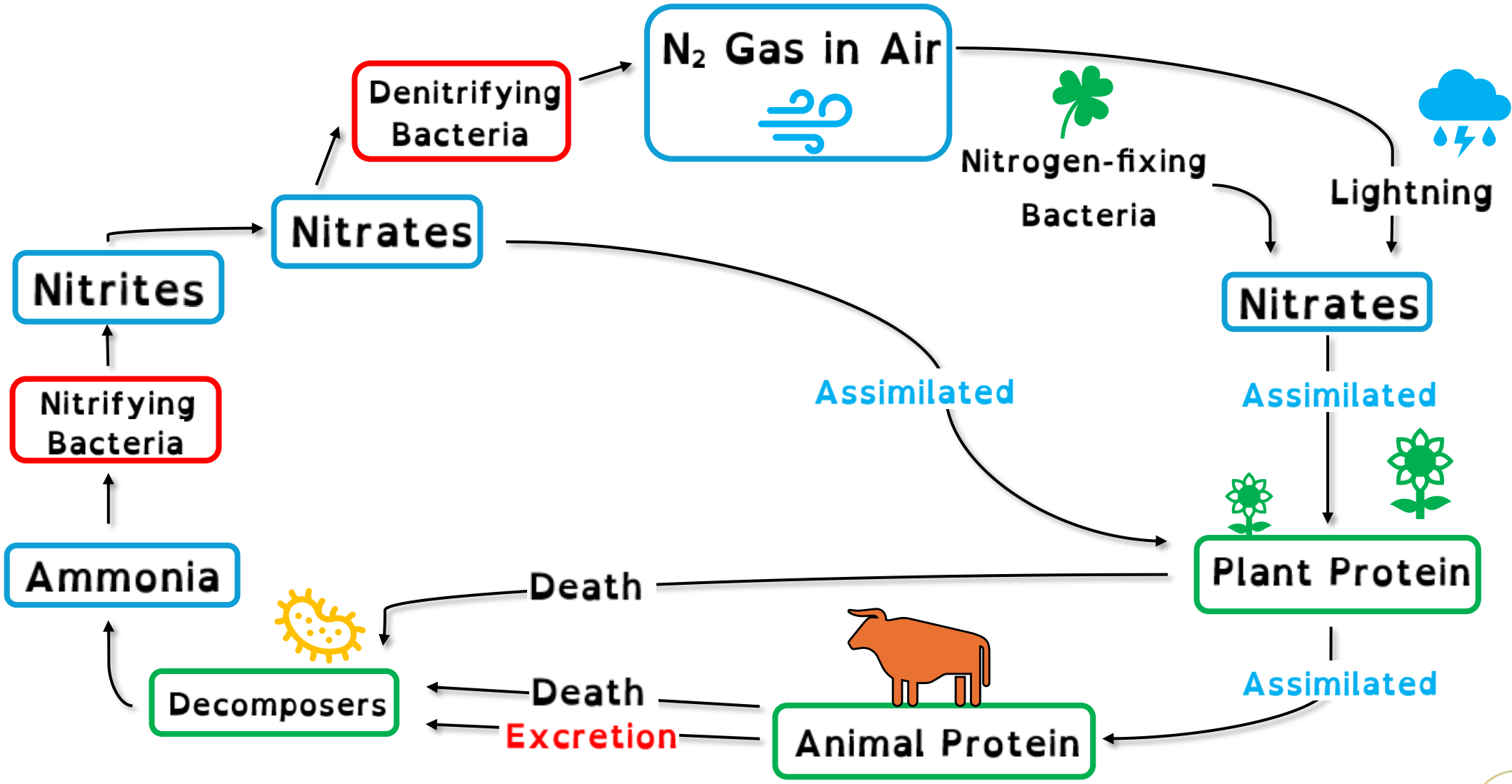
When animals die, their bones, teeth and shells are slowly weathered back into the atmosphere.

Micro-organisms, like fungi and bacteria return carbon dioxide to the air by decomposing dead plants and animals.



We burn partially decayed plants as **fossil fuels** and release CO_2.

The Nitrogen Cycle



The Nitrogen Cycle

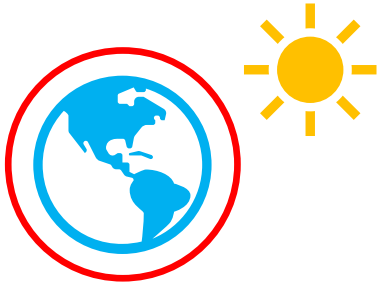
78% of the air is Nitrogen gas, N_2. It must be turned into a useable form by **lightning** or **Nitrogen-fixing bacteria**. These are found in **Clover** and in the **Legumes** family.

The bacteria live on the roots of plants. They get food from the plants, and they give the plants Nitrates converted from the air. This type of relationship is called **symbiotic or mutualistic** as both organisms benefit. The **Nitrates** are used in **DNA** and **proteins**. **Animals** assimilate the plant protein to make their own proteins.

Decomposers release Ammonia. Bacteria change this back into Nitrates, to be reused, or converted back into N_2 gas.

Global Warming/Climate Change

Since the 1970's, scientists have realised that the world's CO_2 has been increasing. CO_2 is produced from burning fossil fuels. In the atmosphere CO_2 traps heat and warms up the planet. That's why it is called a **'greenhouse'** gas.



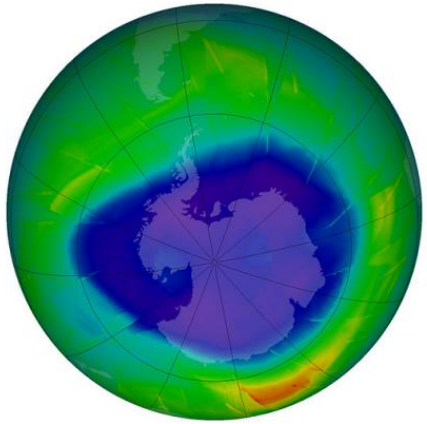
Warming oceans store the heat and ocean currents change. When the currents heat and change, they also change the weather. This causes floods and droughts, stronger hurricanes and storms.

The 10 warmest years in the 175-year record have all occurred during the last decade (2014–2024).

Ozone

Ozone depletion is an example of **air pollution**.

Ozone (O_3) is a gas that absorbs harmful ultraviolet (UV) light. A hole was first noticed in 1984 over Antarctica. Ozone loss is caused by **CFCs** (**C**hloro**f**luoro**c**arbons) in aerosols, freon gas in fridges and others.



A decrease in Ozone causes, skin cancers, damage to crops, damage to animals and Plankton loss.

CFCs were **banned** in 1986, and fridges are recycled carefully and not just dumped. The holes should be repaired by around 2050.

Pollution

Pollution is any harmful addition to the environment.

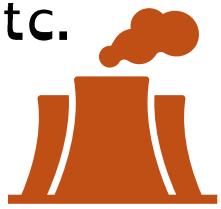
Pollutants are substances that cause pollution.

Types of pollution:

- **Domestic pollution** - from houses, must be collected.

- **Agricultural pollution** - sprays, slurry on fields and in rivers.

- **Industrial pollution** - smoke and fumes, acid rain etc.

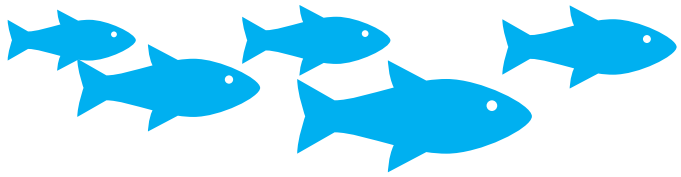


Conservation

Conservation is the wise management of our existing natural resources.

Fisheries

- Using larger meshed (holes) in nets allows young fish to escape, mature and reproduce.
- Diamond mesh netting - closes under tension and prevents young fish escaping so Square-mesh is now used.



Waste Management in Agriculture

The main problems are:

- Slurry – excrement from animals, rich in Nitrogen
- Silage effluent – liquids from cut and gathered wet grass
- Overuse of chemical fertilisers and animal manures - **Eutrophication** is a condition where waterways become full of nutrients, algae grow using up Oxygen and the fish suffocate.

Solutions:

- Slurry – must be measured and sprayed carefully
- Silage – must be correctly wrapped to prevent leaks
- Crop Rotation – reduces the need for extra fertilisers and clover can be planted to produce more Nitrates naturally.

Waste Management in Domestic Setting

- Lack of availability of suitable landfill sites – produce less waste
- The toxic fumes from incineration (CO_2 and other oxides) – burn wastes at a very high temperature
- Decaying waste produces methane gas which contributes to the "greenhouse effect" – collect the gas and use it for energy

Waste Management Approach:

Brown Bins - Composting uses micro-organisms to decompose organic matter into compost. This recycles all the nutrients required for plant growth. 25% of food produced ends up being wasted. More composting reduces waste in other bins.

Grey/Black Bins – We try to produce as little waste as possible. Any waste that can't be brought to a recycling centre is put in this bin. It is usually crushed, wrapped and buried or burnt.

Green Bins – We can place plastics and paper in these bins. Bottles and cans are now recycled separately. The waste gathered can be recycled into other paper and plastic products.

Waste Minimisation

Reduce - use less, minimise waste.

Reuse - use again for different purpose.

Recycle - recover some material and use again.