Environment

1: What is Biodiversity?

Biodiversity is the range or variety of species in an area.

Biodiversity includes all living organisms including plants, animals (invertebrates and vertebrates), fungi and bacteria.

Scotland has many different types of living organisms, such as the red squirrel, osprey, adder, scots pine and birch trees. Some species like the Scottish primrose and the Scottish crossbill are only found in scotland.

Trees release oxygen into the atmosphere, they also provide wood for building materials. Nature and being outdoors helps maintain physical and mental health.

2: Classification of Living Things

Classification involves putting living organisms into groups

Some living organisms are made of one cell (unicellular) and others are made of more than one cell (multicellular).

Plant Classification

- Flowering plants produce seeds and flowers e.g. roses
- Non-flowering plants produce spores e.g. ferns and mosses

Animal Classification

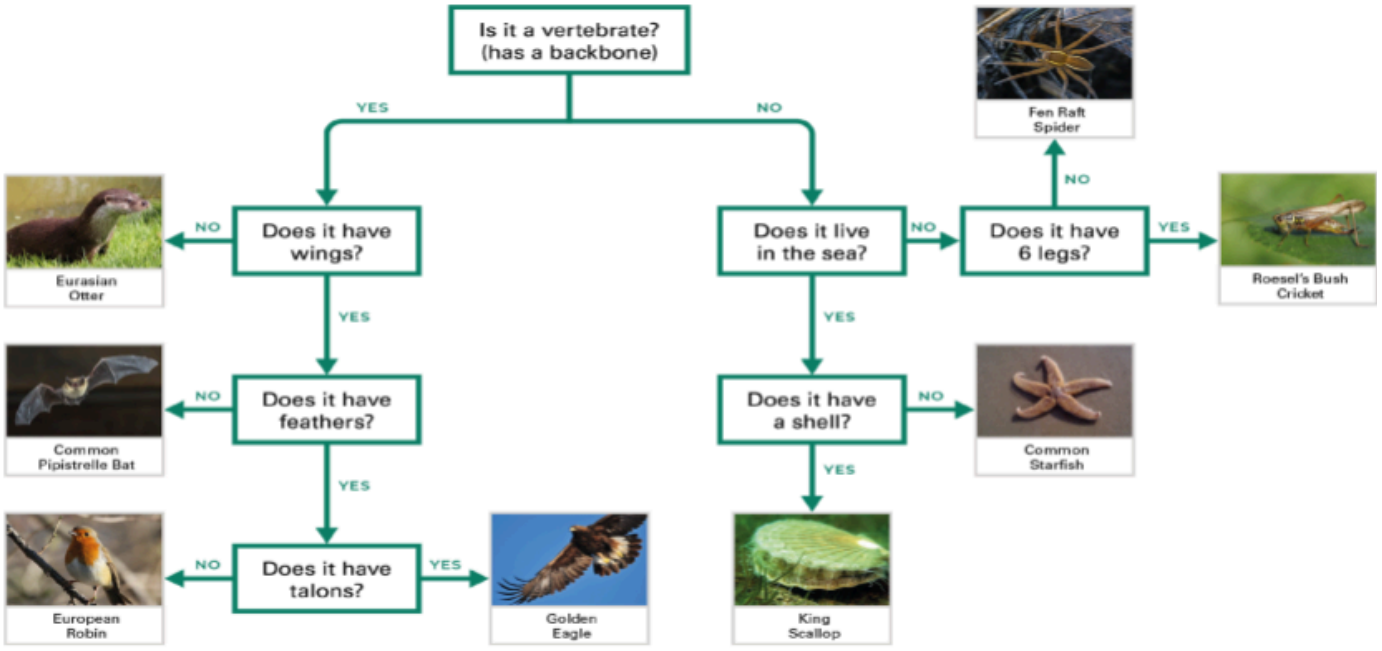
- Vertebrates are animals with a backbone e.g. squirrel, adder
- Invertebrates are animals without a backbone e.g. worm, bee, snail

Vertebrate classification

- There are five groups of vertebrates
    - Mammals - Breathe with lungs, Feed their young with milk, Body hair/fur
    - Birds - Breathe with lungs; Lay eggs with hard shells; Feathers
    - Fish - Breathe with gills; Lay eggs in water; Fins and scales
    - Amphibians - Born with gills then develop lungs; Lay eggs in water; Damp skin
    - Reptiles - Breathe with lungs; Lay eggs on land; Dry scaly skin

3: Identification Keys

Identification keys can help scientists identify and name living things



4: Sampling Living Organisms

The place where a living organism lives is called its **habitat.** By increasing habitats and food sources you can attract more wildlife into a garden.

Sampling techniques can be used to sample different organisms living in different habitats. Scientists can use sampling techniques to estimate the population size of living organisms. Scientists can use this information to analyse the distribution of organisms in different habitats.

Sampling Technique	**Used to sample**
quadrats	plants
Sweep net	Invertebrates living in long grass
Pitfall trap	Invertebrates living on the soil surface
Tree beating	Invertebrates living on branches

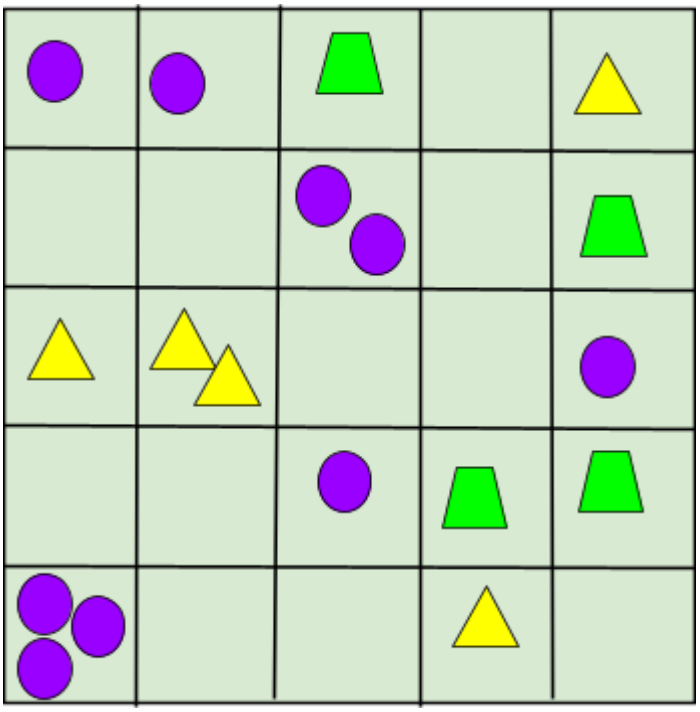
Abiotic factors are non-living environmental factors such as light intensity and temperature can affect where an organism lives

Biotic factors are interactions with living organisms such as competition, predation and food availability that can affect where an organism lives

Quadrat sampling

When scientists are investigating the abundance of plants in an area, they count the number of squares that contain the plant, not the total number of plants in the quadrat squares.

Example



Plant Species	Abundance
Daisy 	6
Buttercup 	4
Dandelion 	4

Pitfall trap sampling

Calculate the average number of each type of invertebrate found.

To calculate an average

- add up all the values to get a total
- Divide by the number of values

Distribution of living organisms

Scientists can measure abiotic factors like temperature and light intensity to analyse the distribution of species.

A transect can be used to measure how the distribution of plants change from grassland into woodland. At equal spaces along the transect line the scientists would put down a quadrat and measure the abundance of the species.

5: Adaptations For Survival

Plants and animals have **adapted** to help them survive.

Structural Adaptations include

- Polar bear - thick white fur which provides camouflage and insulation for life in the Arctic
- Camel - thick lips help it to eat thorny plants

Behavioural adaptations

- Some desert animals burrow underground to avoid the heat from the sun
- Dogs pant to help them cool down

6: Food Chains

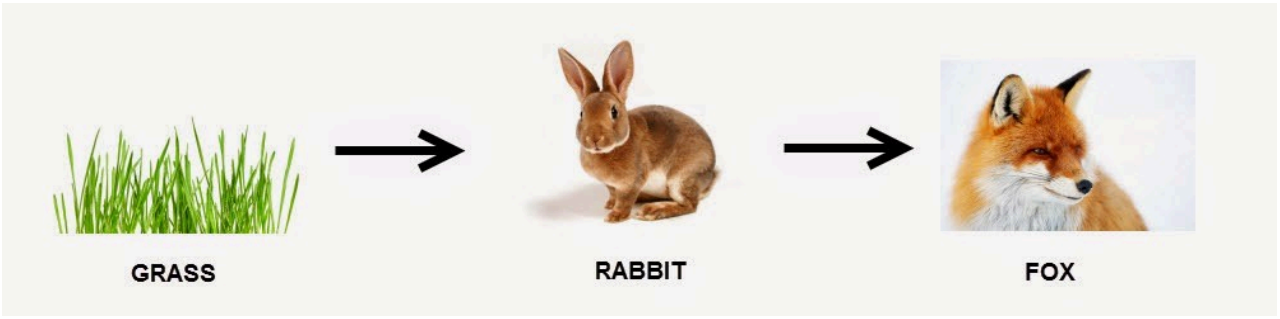
A **food chain** shows how each living thing gets its energy.

A food chain always starts with a **producer.**
A producer is a green plant which makes its own food from sunlight.

Producers are eaten by **consumers**.
A consumer is an animal which eats plants and other animals to gain energy.
There are different types of consumers:

- **herbivores** only eat plants.
- **carnivores** only other animals
- **omnivores** eat both plant and animal material.
- **predators** will hunt and kill **prey**.

The arrows in a food chain show the direction of energy flow.

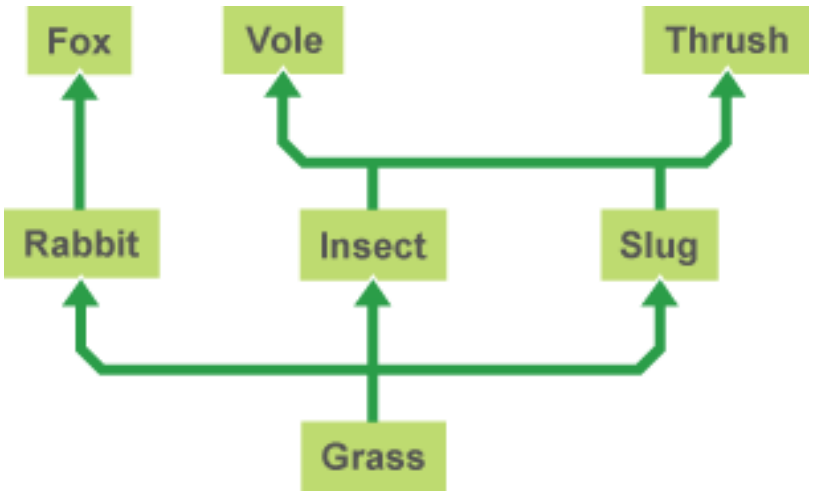


Producer | **Primary consumer** | **Secondary consumer**

Herbivore | **carnivore**

7: Food Webs

In a habitat, animals can have more than one food source. Food chains can be linked together to make a **food web.**



If one species is removed from a food web - it can have an effect on the other species.

If the **rabbits were removed** from this food web, the number of **foxes would decrease** as foxes eat rabbits meaning they would have less food to eat.

If the **rabbits were removed** from the food web, the number of **slugs would increase** as rabbits and slugs both eat grass, meaning that the slugs would have more grass to eat.

If the **voles were remove**d from the food web, the number of **insects would increase** as voles eat insects and less of them would be eaten by predators.

8: Photosynthesis

Plants are our largest source of food, medicine and raw materials. The raw materials that plants produce are used for building materials and clothes. Plants provide **habitats** for thousands of species and balance the gases in our atmosphere by absorbing carbon dioxide and releasing oxygen.

Plants have the ability to make their own food, they are **producers**. Plants use light energy from the sun in the process of **photosynthesis** to produce sugar. The light energy is absorbed by a green pigment called **chlorophyll** in the **chloroplasts** of plant **leaves**.

The raw materials for photosynthesis are **water** and **carbon dioxide**.

The products of photosynthesis are **sugar** and **oxygen**. The plants change the sugar into **starch** for storage and the oxygen gas is released to the air.

9: Food Production

Food security is the ability for all people to access food in a way that does not harm the environment. Modern farming uses fertilisers and pesticides to help grow crop plants and increase food production. The growing human population means that there is a growing demand for increased food production.

Fertilisers contain minerals that help plants grow
Pesticides kill insects and pests that cause crop damage
Herbicides are applied to kill the weeds that compete with crop plants

Chemicals used in farming can cause a loss in **biodiversity**. Pesticides can kill bees which do not harm crops and can build up to toxic levels in food chains. The top consumer can receive a lethal dose of pesticides as a result of **bioaccumulation**.

Alternatives to chemical pesticides include

- **genetically modified crops** contain genes from other species that give them improved features e.g. natural insecticide, faster growth
- **Biological control** of pest species by using natural predators
- **Organic methods** of control including crop rotation and the use of natural fertilisers like compost and manure

10: Climate change

Life on Earth depends on the natural process of 'the Greenhouse Effect'.

The natural greenhouse effect creates the perfect conditions for life on Earth. Gases in the atmosphere, called the **greenhouse gases,** act like a filter, letting energy in, but trapping outgoing infrared energy keeping the Earth 33°C warmer. Increasing the greenhouse gases in the atmosphere leads to an increase in the greenhouse effect and increasing surface temperature.

The average surface temperature of the Earth has risen by 1°C which has led to

- Increasing storm activity
- Increasing frequency of natural disasters
- Melting of polar ice caps and sea level rise

Climate change is already happening;

- Species are becoming extinct
- Weather systems are changing and becoming more extreme
- Our planet is getting warmer

We all have the power to make choices and changes which will limit the impact of climate change