



Biotic factors **1**

Biotic (living) factors which can affect a community are:

- availability of food
- new predators arriving
- new pathogens
- one species outcompeting another so the numbers are no longer sufficient to breed.

Abiotic factors **2**

Abiotic (non-living) factors which can affect a community are:

- light intensity
- temperature
- moisture levels
- soil pH and mineral content
- wind intensity and direction
- carbon dioxide levels for plants
- oxygen levels for aquatic animals.

Adaptations **3**

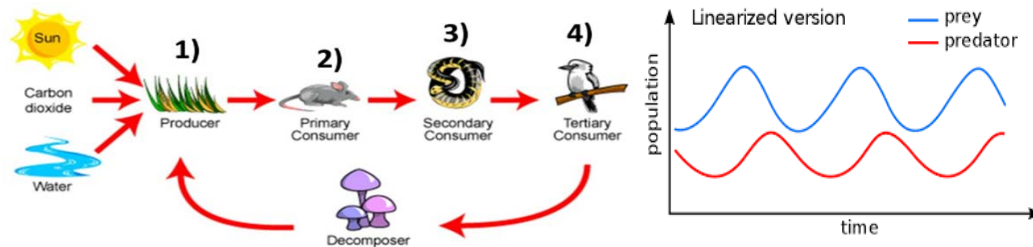
- Features that enable them to survive in the conditions in which they normally live.
- **These adaptations may be structural, behavioural or functional.**
- Some organisms live in environments that are very extreme, such as at high temperature, pressure, or salt concentration.
- **These organisms are called extremophiles.**

Land use/deforestation **4**

- The destruction of peat bogs, and other areas of peat to produce garden compost, reduces the area of this habitat and thus the variety species that live there (biodiversity).
- **The decay or burning of the peat releases carbon dioxide into the atmosphere.**
- **Deforestation means less carbon dioxide can be absorbed**

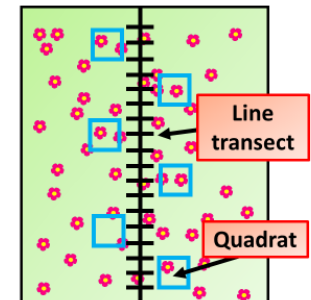
Levels of organisation **5**

All food chains begin with a producer which synthesises molecules. This is usually a green plant or algae which photosynthesise.

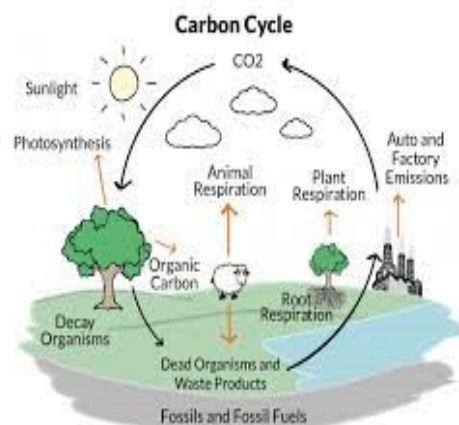


Population size (Required practical) **6**

1. Divide the sample area into a grid, or use a transect line
2. use random numbers to generate a set of coordinates to place your first quadrat, or place your quadrat down every 10m if using a transect
3. count the number of different plant species within this quadrat
4. Repeat steps two and three a further 14 times using different random numbers



Carbon cycle **7**



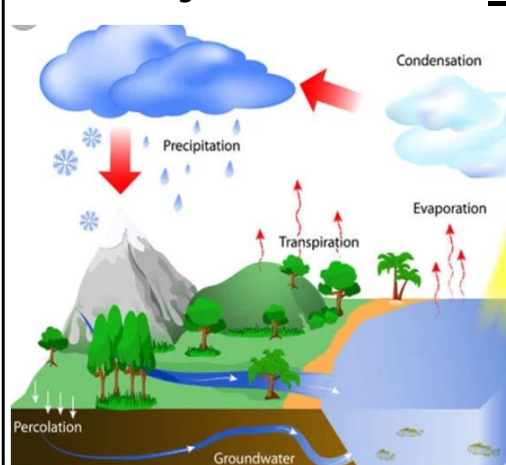
Waste management **8**

Unless waste and chemical materials are properly handled, more pollution will be caused. Pollution can occur:

- in water, from sewage, fertiliser or toxic chemicals
- in air, from smoke and acidic gases
- on land, from landfill and from toxic chemicals.

Pollution kills plants and animals which can reduce biodiversity.

Water cycle **9**



Maintaining biodiversity

programmes to reduce the negative effects of humans on ecosystems and biodiversity.

- **breeding programmes** for endangered species
- **protection and regeneration of rare habitats**
- reintroduction of field margins and **hedgerows in agricultural areas** where farmers grow only one type of crop
- **reduction of deforestation and carbon dioxide emissions** by some governments
- **recycling resources** rather than dumping waste in landfill.

B7 Knowledge Organiser – 4.7.1 – Ecology (Biology only)

Food production

Biological factors which are threatening food security include:

- the **increasing birth rate** has threatened food security in some countries
- **changing diets** in developed countries means scarce food resources are transported around the world
- **new pests and pathogens** that affect farming
- environmental changes that affect food production, such as **widespread famine** occurring in some countries if rains fail
- the **cost** of agricultural inputs
- conflicts that have arisen in some parts of the world which affect the availability of water or food. **Sustainable methods must be found to feed all people on Earth**

1

Decomposition

- **Temperature, water and availability of oxygen affect the rate of decay of biological material.**
- Gardeners and farmers try to provide optimum conditions for rapid decay of waste biological material.
- **The compost produced is used as a natural fertiliser for growing garden plants or crops.**
- Anaerobic decay produces methane gas. Biogas generators can be used to produce methane gas as a fuel.

2

Farming/Sustainable fisheries

The efficiency of food production can be improved by restricting energy transfer from food animals to the environment.

This can be done by limiting their movement and by controlling the temperature of their surroundings. Some animals are fed high protein foods to increase growth.

Fish stocks in the oceans are declining. It is important to maintain fish stocks at a level where breeding continues or certain species may disappear altogether in some areas.

Control of net size and the introduction of fishing quotas play important roles in conservation of fish stocks at a sustainable level.

3

Trophic levels

Trophic levels can be represented by numbers, starting at level 1 with plants and algae.

Level 1: Plants and algae make their own food and are called producers.

Level 2: Herbivores eat plants/algae and are called primary consumers.

Level 3: Carnivores that eat herbivores are called secondary consumers.

Level 4: Carnivores that eat other carnivores are called tertiary consumers.

4

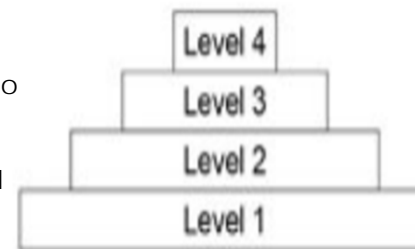
Pyramids of biomass/Transfer of biomass

Pyramids of biomass can be constructed to represent the relative amount of biomass in each level of a food chain. **Trophic level 1 is at the bottom of the pyramid.**

Producers are mostly plants and algae which transfer about 1% of the energy from light for photosynthesis. Only approximately 10% of the biomass from each trophic level is transferred to the level above it.

Losses of biomass are due to:

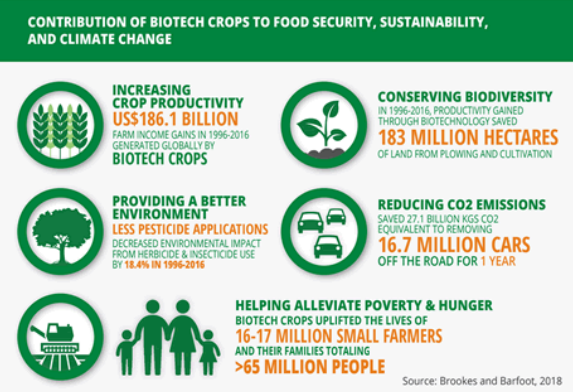
- not all the ingested material is absorbed, some is egested as faeces
- some absorbed material is lost as waste, such as carbon dioxide and water in respiration and water and urea in urine. Large amounts of glucose are used in respiration.



5

Role of biotechnology in food production

- Some possible biotechnical and agricultural solutions to , including genetic modification, to the demands of the growing human population. Modern biotechnology techniques enable large quantities of microorganisms to be cultured for food.
- The fungus *Fusarium* is useful for producing mycoprotein, a protein-rich food suitable for vegetarians.
- The fungus is grown on glucose syrup, in aerobic conditions, and the biomass is harvested and purified.
- A genetically modified bacterium produces human insulin. When harvested and purified this is used to treat people with diabetes.
- GM crops could provide more food or food with an improved nutritional value such as golden rice.



6