

Chapter 17: Organising an ecosystem

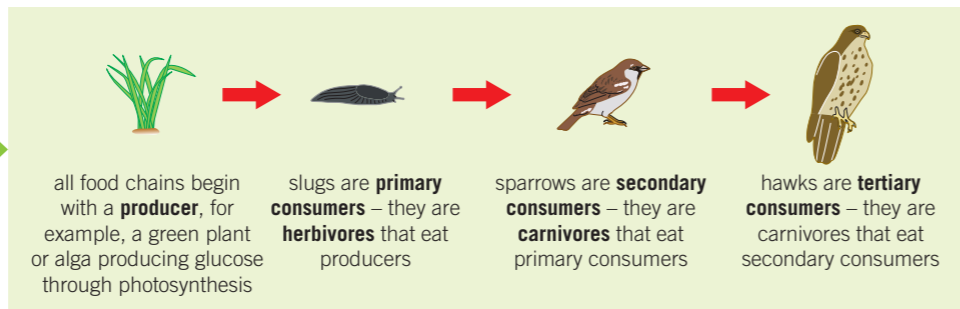
Knowledge organiser

Levels of organisation

Feeding relationships within a community can be represented by **food chains**.

Photosynthetic organisms that synthesise molecules are the producers of all **biomass** for life on Earth, and so are the first step in all food chains.

A range of experimental methods using transects and quadrats are used by ecologists to determine the distributions and abundances of different species in an ecosystem.



Consumers that kill and eat other animals are predators, and those that are eaten are **prey**.
Apex **predators** are carnivores with no predators.

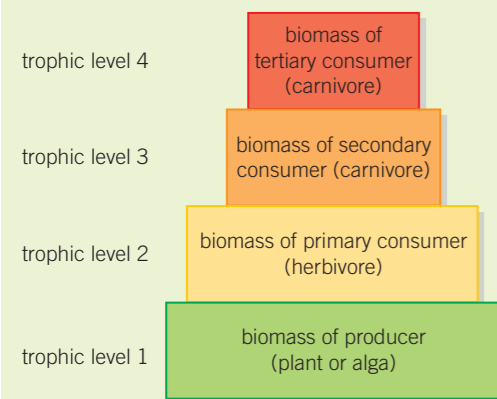
Organisms usually have more complex feeding relationships, with more than one predator or more than one food source. These can be shown in a **food web**.

Pyramids of biomass

The **trophic level** of an organism is the number of steps it is from the start of its food chain.

Pyramids of biomass represent the relative amount of biomass at each trophic level of a food chain.

Biomass is the amount of living or recently dead biological matter in an area. Biomass is transferred from each trophic level to the level above it in the food chain.



Producers transfer about 1% of the incident light energy used for photosynthesis to produce biomass.

Approximately 10% of the biomass from each trophic level is transferred to the level above it.

This loss of biomass moving up the food chain is due to several factors:

- use in life processes, such as respiration
- not all of the matter eaten is digested, some is egested as waste products
- some absorbed material is lost as waste
- energy is used in movement and to keep animals warm.

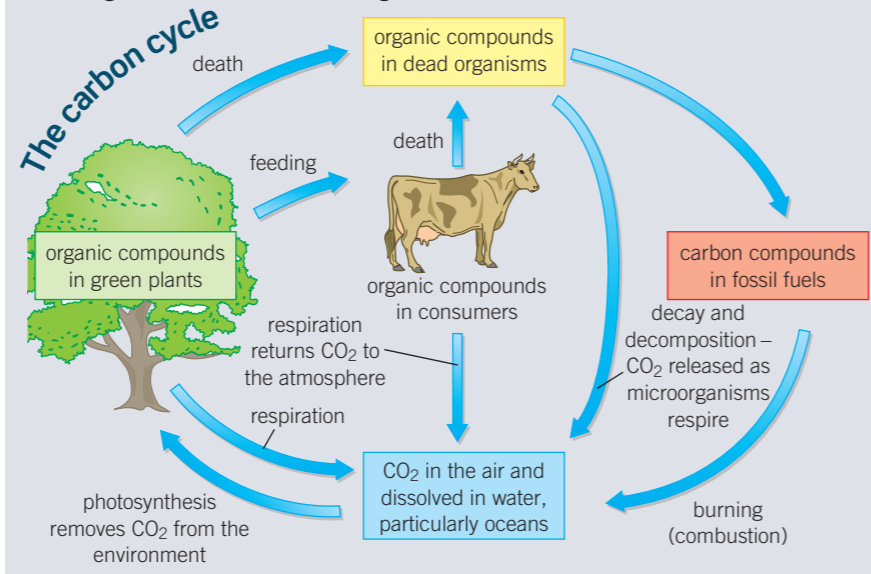
Key terms

Make sure you can write a definition for these key terms.

biomass carbon cycle carnivore
consumer decomposer
evaporation fertiliser food chain
food web herbivore precipitation
predator prey producer
trophic level water cycle

How materials are cycled

All materials in the living world are recycled, which provides the building materials for future organisms.



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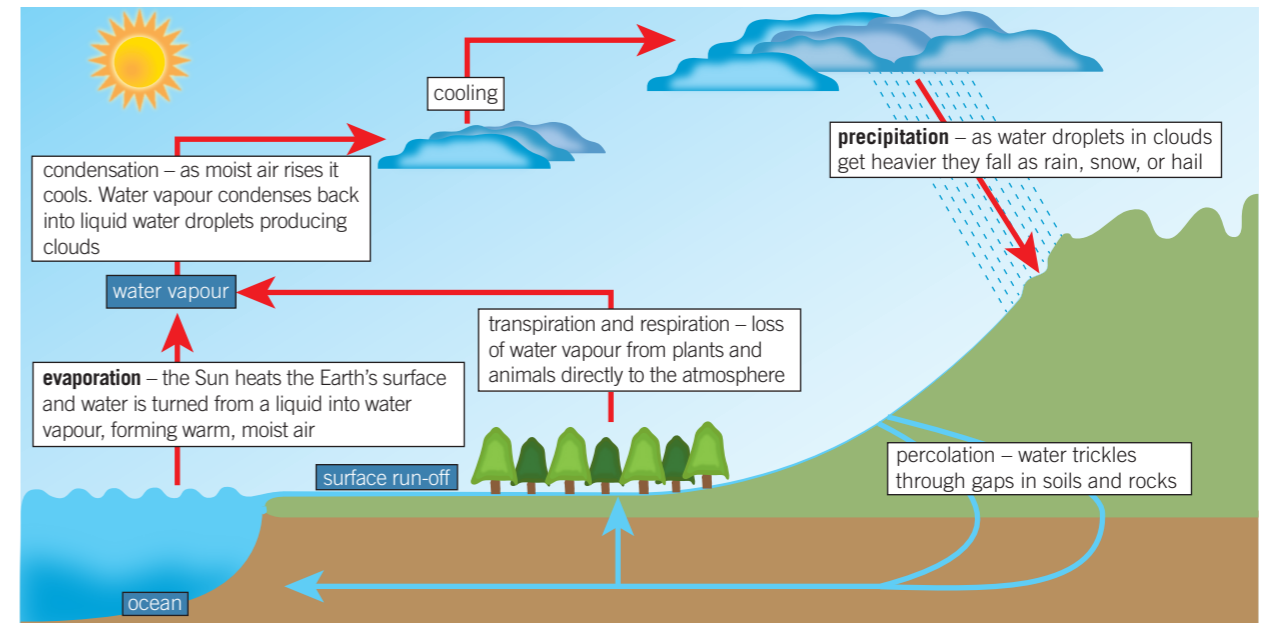
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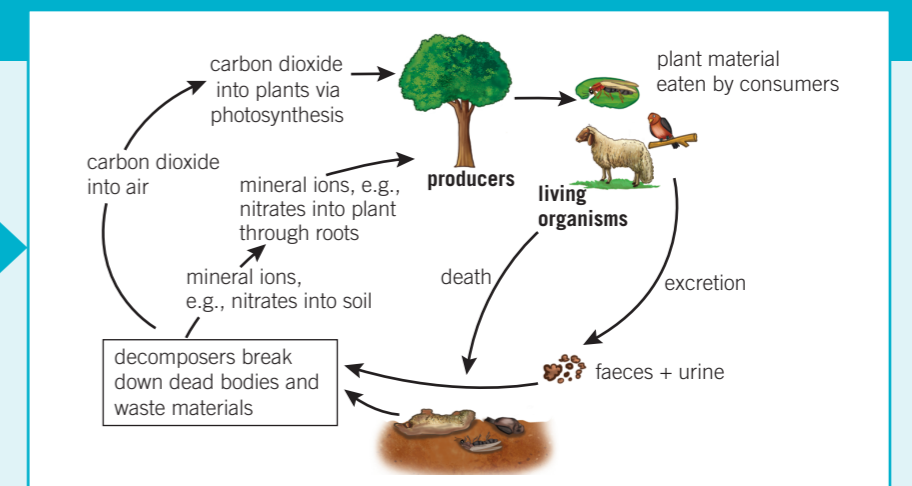
The water cycle



Decomposition

Decomposers, such as bacteria and fungi, break down dead plant and animal matter by secreting enzymes into the environment. The small soluble food molecules produced then diffuse into the decomposer.

These materials are cycled through an ecosystem by decomposers returning carbon to the atmosphere as carbon dioxide and mineral ions to the soil.



Gardeners and farmers try to provide optimum conditions for the rapid decay of waste material by decomposers.

Decomposition will occur faster in warm temperatures, when oxygen and moisture levels are high, and there is a neutral pH.

The compost produced from this decay is then added to soil as a natural **fertiliser** for growing garden plants and crops.

When there is a lack of oxygen, waste is decomposed anaerobically.

Anaerobic decay produces methane gas. Biogas generators use anaerobic decay to produce methane for use as a fuel.

Impacts of environmental change

Environmental changes affect the distribution of species in ecosystems.

These changes may be seasonal, geographic, or caused by humans, and include:

- temperature – varies greatly between locations and seasons, and warming temperatures have contributed to species migrating away from the Equator
- availability of water – during droughts animals have to move away from their usual habitats to areas with more water, and cannot survive if this is not possible
- composition of atmospheric gases – human activities release greenhouse gases and pollutants, which cause harmful effects like climate change and acid rain.

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Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

B17 questions

Answers

1	What is a producer?	Put paper here	organism that makes its own food, usually by photosynthesis
2	What is a food chain?	Put paper here	representation of the feeding relationships within a community
3	What is a consumer?	Put paper here	organism that eats other organisms for food
4	What is a herbivore?	Put paper here	organism that only eats producers (plants/algae)
5	What is a predator?	Put paper here	organism that kills and eats other organisms
6	What is a prey organism?	Put paper here	organism that is killed and eaten by another organism
7	What is an apex predator?	Put paper here	carnivore with no predators
8	What proportion of biomass is transferred from each trophic level to the one above?	Put paper here	approximately 10%
9	Why is biomass lost between trophic levels?	Put paper here	<ul style="list-style-type: none">• some ingested material is egested• some material is lost as waste (carbon dioxide and water in respiration, water and urea in urine)• used in life processes, such as respiration• energy is used in movement and to keep animals warm
10	What is the carbon cycle?	Put paper here	process that returns carbon from organisms to the atmosphere as carbon dioxide, which can then be used by plants
11	What is the water cycle?	Put paper here	process that provides fresh water for plants and animals on land before draining into seas and rivers
12	What is a decomposer?	Put paper here	organism that breaks down dead plant and animal matter
13	What is the role of decomposition?	Put paper here	returns carbon to the atmosphere and mineral ions to the soil from dead matter
14	What factors affect the rate of decay by decomposers?	Put paper here	oxygen levels, moisture levels, temperature, and pH
15	What gas does anaerobic decay produce?	Put paper here	methane gas
16	How can this gas be used?	Put paper here	as a fuel
17	Give the environmental changes that can affect the distribution of organisms.	Put paper here	temperature, availability of water, and composition of atmospheric gases