

Communities and interdependence

Revision notes · Levels of organisation in an ecosystem, abiotic and biotic factors, interdependence, parasitism and mutualism.

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Communities and interdependence Spec 9.1-9.4

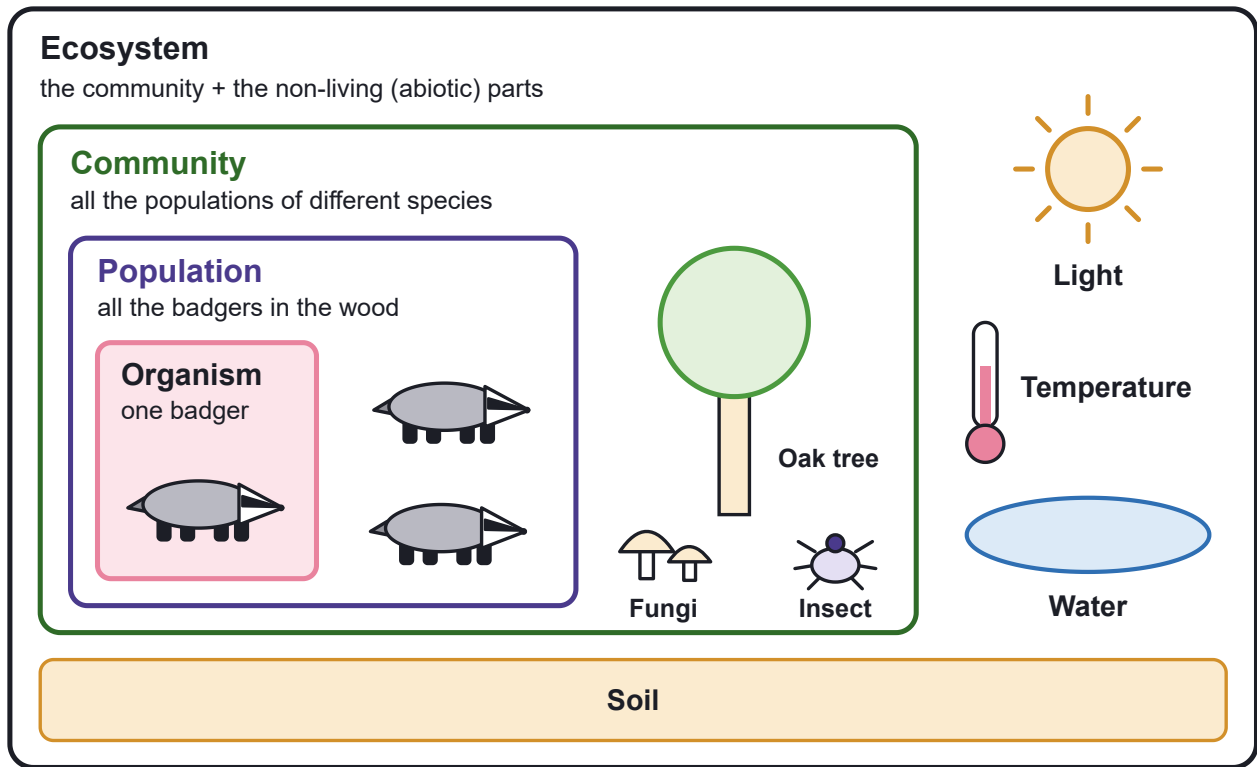
Levels of organisation Spec 9.1

Living things can be described at different levels of organisation, from a single organism up to a whole ecosystem. Each level contains the one before it.

Levels of organisation in ecology		
Level	What it means	Example
Organism	A single living thing	One badger
Population	All the organisms of one species living in the same area	All the badgers in a wood
Community	All the populations of different species living in the same area	The badgers, foxes, oak trees, insects and fungi in the wood
Ecosystem	A community together with the non-living (abiotic) parts of its environment	The wood, including its soil, water, light and temperature

An **ecosystem** is made of living (biotic) and non-living (abiotic) parts that interact with each other. Energy and materials move between them.

Common mistake: A population is one species only. If an answer mentions different species living together, it is describing a community.



Each level contains the one before it: **organism**, **population**, **community**, then **ecosystem** (the community plus its abiotic parts).

Abiotic and biotic factors Spec 9.2

The organisms in a community are affected by **abiotic factors** (non-living) and **biotic factors** (living). Changes in either can change which species live in a community and how many there are.

Factors that affect communities		
Type	Factor	How it can affect a community
Abiotic	Temperature	Affects the rate of enzyme-controlled reactions, so growth and survival. Species survive only within a range of temperatures.
Abiotic	Light	Plants need light for photosynthesis. Less light means fewer plants, and so less food for the animals that depend on them.
Abiotic	Water	All organisms need water. In dry conditions only organisms adapted to save water survive, so numbers and variety fall.
Abiotic	Pollutants	Pollutants such as sulfur dioxide in air or sewage in water can kill sensitive species, reducing the variety of organisms.
Biotic	Competition	Organisms of the same or different species compete for the same limited resources, such as food, water, light and space.
Biotic	Predation	Predators eat prey, so predator and prey numbers affect each other.

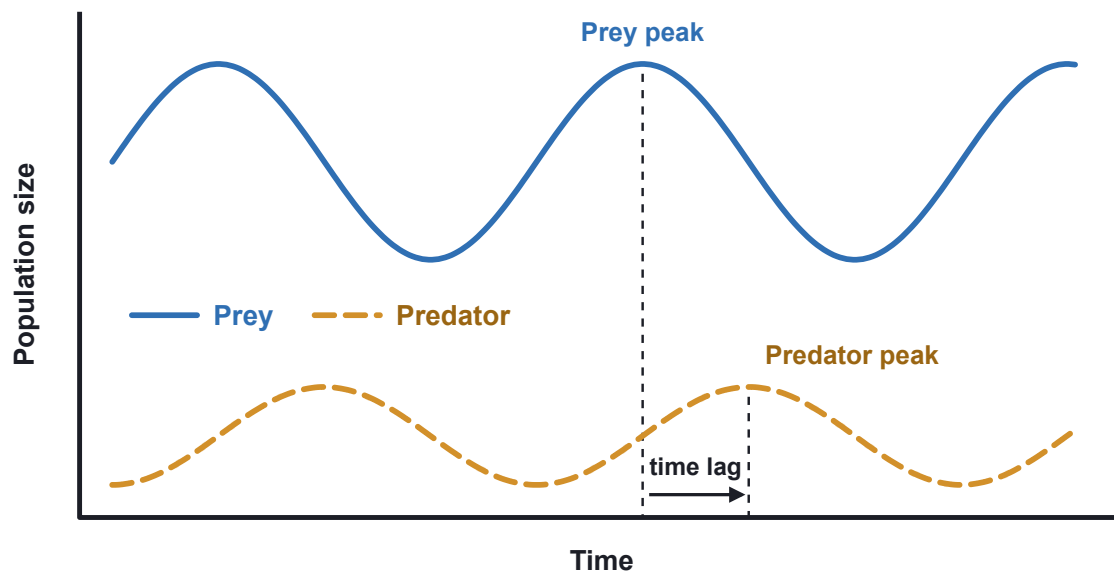
Competition

Competition happens when organisms need the same resource and there is not enough for all of them. Plants compete for light, water and mineral ions. Animals compete for food, water and territory. The better-adapted species gets more of the resource, so it survives and reproduces more, and the numbers of the other species may fall.

Predation

In a stable community, predator and prey numbers rise and fall in a repeating pattern. When prey numbers rise, predators have more food, so predator numbers rise. More predators eat more prey, so prey numbers fall. With less food, predator numbers then fall, and the prey can recover.

Exam tip: On a predator-prey graph, the predator peak comes after the prey peak, because predator numbers rise only once there is more food.



Predator and prey numbers cycle: the predator peak comes after the prey peak.

Interdependence Spec 9.3

In a community, species depend on one another. This is **interdependence**. Organisms depend on other species for food, shelter, pollination and seed dispersal.

- Animals depend on plants and other animals for food.
- Plants depend on insects and other animals for pollination and seed dispersal.
- Many species depend on trees for shelter and nesting sites.

Because of this, a change to one population can affect many others. If a species is removed or its numbers fall, species that feed on it may starve, while species it feeds on may increase in number. A community with many different species is more stable, because the loss of one species is less likely to cause the whole community to fail.

Exam tip: When asked about a change in a food web, follow the effect through at least two steps: what happens to the species that eats it, and what happens to the species it eats.

Parasitism and mutualism Spec 9.4

The survival of some organisms depends on a close relationship with another species. Two important types are parasitism and mutualism.

Parasitism and mutualism compared

	Parasitism	Mutualism
Meaning	One organism (the parasite) lives on or in another organism (the host) and takes food from it	Two organisms of different species live closely together and both benefit
Who benefits	The parasite benefits and the host is harmed	Both benefit
Examples	A tapeworm in the human gut. A flea on a dog.	Nitrogen-fixing bacteria in the root nodules of legume plants. Cleaner fish that eat parasites off larger fish.

In mutualism, nitrogen-fixing bacteria in root nodules get sugars from the legume plant, and the plant gets nitrogen compounds from the bacteria. Neither can do as well alone.

Common mistake: Say that the host is harmed in parasitism. Do not just say that the parasite lives on the host.

Quick check

1. Put in order from smallest to largest: ecosystem, population, organism, community.
2. Name two abiotic factors that affect communities.
3. What is meant by competition?
4. What is the difference between parasitism and mutualism?

Quick check answers

Communities and interdependence

1. Organism, population, community, ecosystem.
2. Any two of: temperature, light, water, pollutants.
3. Organisms needing the same limited resource, such as food, light or water.
4. In parasitism the parasite benefits and the host is harmed. In mutualism both organisms benefit.