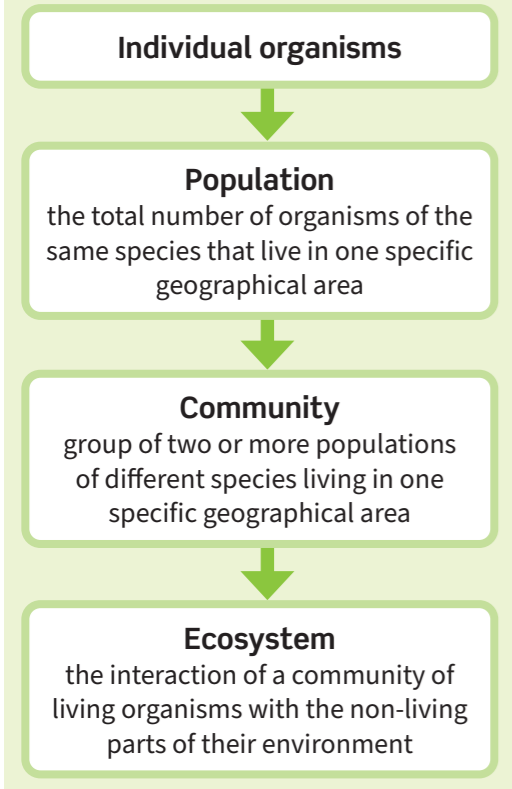


# Chapter 15: Adaptations, interdependence, and competition

## Knowledge organiser

### Ecosystem organisation



### Competition

To survive and reproduce, organisms require a supply of resources from their surroundings and from the other living organisms there.

This can create competition, where organisms within a community compete for resources.

There are two types of competition – **interspecific competition** is between organisms of different species and **intraspecific competition** is between organisms of the same species.

Animals often compete for:

- food
- mates
- territory.

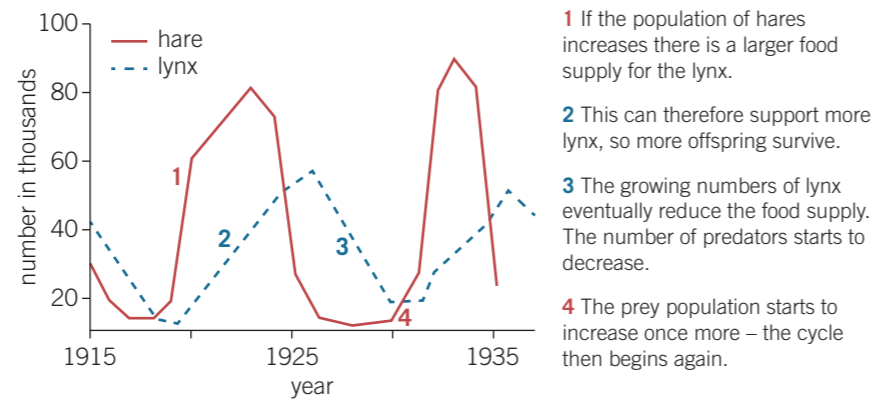
Plants often compete for:

- light
- space
- water and mineral ions from the soil.

### Interdependence

Within a community each species **interacts** with many others and may depend on other species for things like food, shelter, pollination, and seed dispersal.

If one species is removed it can affect the whole community – this is called **interdependence**.



A stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant.

An example of this is the interaction between predator and prey species, which rise and fall in a constant cycle so that each remains within a stable range.

### Abiotic factors

**Abiotic factors** are non-living factors in the ecosystem that can affect a community.

Too much or too little of the following abiotic factors can negatively affect the community in an ecosystem:

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

### Biotic factors

**Biotic factors** are living factors in the ecosystem that can affect a community.

For example, the following biotic factors would all negatively affect populations in a community:

- decreased availability of food
- new predators arriving
- new pathogens
- competition between species, for example, one species outcompeting another for food or shelter, causing a decline in the other species' population.

### Adaptations of organisms

Organisms have features – **adaptations** – that enable them to survive in the conditions in which they live. The adaptations of an organism may allow it to outcompete others, and provide it with an evolutionary advantage.

#### Structural adaptations

The physical features that allow an organism to successfully compete:

- sharp teeth to hunt prey
- colouring that may provide camouflage to hide from predators or hunt prey
- a large or small body-surface-area-to-volume ratio.

#### Behavioural adaptations

The behaviour of an organism that gives it an advantage:

- making nests to attract a mate
- courtship dances to attract a mate
- use of tools to obtain food
- working together in packs.




#### Functional adaptations

Adaptations related to processes that allow an organism to survive:

- photosynthesis in plants
- production of poisons or venom to deter predators and kill prey
- changes in reproduction timings.

You can work out how an organism is adapted to where it lives when given information on its environment and what it looks like.

For example, without the following adaptations the organisms below would be at a disadvantage in their environment.

Organism	Example adaptations
	<ul style="list-style-type: none"> <li>• white fur for camouflage when hunting prey</li> <li>• feet with large surface area to distribute weight on snow</li> <li>• small ears to reduce heat loss</li> <li>• thick fur for insulation</li> </ul>
	<ul style="list-style-type: none"> <li>• feet with large surface area to distribute weight on sand</li> <li>• hump stores fat to provide energy when food is scarce</li> <li>• tough mouth and tongue to allow camel to eat cacti</li> <li>• long eyelashes to keep sand out of eyes</li> </ul>
	<ul style="list-style-type: none"> <li>• spines instead of leaves to reduce surface area and therefore water loss, and to deter predators</li> <li>• long roots to reach water underground</li> <li>• large, fleshy stem to store water</li> </ul>

Some organisms are **extremophiles**, which means they live in environments that are very extreme where most other organisms could not survive. For example, areas with:

- very high or low temperatures
- extreme pressures
- high salt concentrations
- highly acidic or alkaline conditions
- low levels of oxygen or water.

Bacteria that live in deep sea vents are extremophiles.

Deep sea vents are formed when seawater circulates through hot volcanic rocks on the seafloor. These environments have very high pressures and temperatures, no sunlight, and are strongly acidic.

### Key terms

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

abiotic factor adaptation biotic factor community ecosystem extremophile  
interaction interdependence interspecific competition intraspecific competition population

# Chapter 15: Adaptations, interdependence, and competition

## 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.

### B15 questions

### Answers

1	What is a population?	Put paper here	total number of organisms of the same species that live in a specific geographical area
2	What is a community?	Put paper here	group of two or more populations of different species living in a specific geographical area
3	What is an ecosystem?	Put paper here	the interaction of a community of living organisms with the non-living parts of their environment
4	What is competition?	Put paper here	contest between organisms within a community for resources
5	What is interdependence?	Put paper here	when species in a community depend on others for resources and shelter
6	What do animals often compete for?	Put paper here	food, mates, and territory
7	What do plants often compete for?	Put paper here	light, space, water, and mineral ions
8	What is an abiotic factor?	Put paper here	non-living factor that can affect a community
9	List the abiotic factors that can affect a community.	Put paper here	<ul style="list-style-type: none"><li>• carbon dioxide levels for plants</li><li>• light intensity</li><li>• moisture levels</li><li>• oxygen levels for animals that live in water</li><li>• soil pH and mineral content</li><li>• temperature</li><li>• wind intensity and direction</li></ul>
10	What is a biotic factor?	Put paper here	living factor that can affect a community
11	List the biotic factors that can affect a community.	Put paper here	<ul style="list-style-type: none"><li>• availability of food</li><li>• new predators</li><li>• new pathogens</li><li>• competition between species</li></ul>
12	What is a stable community?	Put paper here	when all species and environmental factors are in balance, so population sizes remain fairly constant
13	How do adaptations help an organism?	Put paper here	they enable the organism to survive in the conditions in which it lives
14	What are the three types of adaptations?	Put paper here	structural, behavioural, and functional
15	What is an extremophile?	Put paper here	an organism that lives in a very extreme environment
16	What makes an environment extreme?	Put paper here	<ul style="list-style-type: none"><li>• very high or low temperatures</li><li>• extreme pressures</li><li>• high salt concentrations</li><li>• highly acidic or alkaline conditions</li><li>• lack of oxygen or water</li></ul>