

# Biology Knowledge Organiser

## B16 - Adaptation, interdependence and competition

### Ecology and Interdependence

Ecology is the study of everything from individual organisms to the whole biosphere (everywhere that life is found on Earth). An ecosystem is an interconnecting network of living organisms and their environment.

The feeding relationships are one way in which organisms depend on each other. To begin with, almost all organisms rely on the Sun as the original source of energy for their ecosystem. **Plants and algae** can make use of the Sun's energy to produce food molecules, in the process of photosynthesis. This is why they are called **producers**. Other types of organism can't do this, so they rely on the plants and algae. **Consumers** eat the producers, so the energy from the sun flows through the ecosystem. Molecules (which are stores of energy) also flow through, and get recycled when organisms produce waste (poo and wee!) and after they die and decay. The diagram helps to show this.

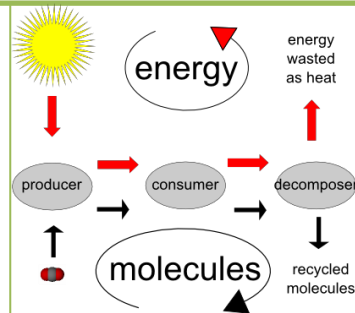
You can see that all the organisms in the ecosystem depend on each other. This is called **interdependence**. The consumers wouldn't survive without the producers capturing energy from the sun, the producers wouldn't survive without the decomposers recycling molecules for them to use (e.g. nutrients from the soil), and the decomposers need the waste from other organisms, and their bodies once they die. A stable community is one where all the species' populations and the abiotic factors are in balance; as a result, population sizes don't change much in stable communities.

### Biotic and abiotic factors affecting organisms

**Communities** of organisms are obviously affected by the environmental factors of their habitat. Factors that are non-living are called **abiotic** factors; those that are living are called **biotic** factors. These may affect the distribution of organisms (i.e. how they are spread out in the environment), their population size, their growth, behaviour or anything else really.

Examples of abiotic factors: light intensity; temperature; moisture levels; soil pH and mineral content; wind intensity and direction; carbon dioxide level for plants; oxygen levels dissolved in water for **aquatic** animals.

Examples of biotic factors: food availability; new predators arriving; new pathogens; competition between species. Competition can actually lead to extinction of a species – if another species outcompetes it, the first one may end up without sufficient numbers to breed.



Key Terms	Definitions
Biosphere	Wherever life is found on Earth (and in the atmosphere).
Biome	A large zone of life with particular characteristics – e.g. tropical rainforest, arctic tundra.
Ecosystem	A complex network of <b>communities</b> of organisms, which all depend on each other and which are adapted to the biotic and abiotic conditions they live in.
Community	A group of <b>interdependent</b> organisms. Communities interact with each other and with the physical environment – <b>ecosystem</b> refers to the interaction of living communities with the non-living environment.
Habitat	A specific set of conditions, usually a specific location, where an organism (or organisms) is adapted to live.
Population	A whole group of organisms – for instance, all the buffalo on the savannah, or all the greenfly on one rose bush.
Interdependence	All organisms in a community rely on one another – for food, shelter, pollination, seed dispersal, nutrient recycling and so on.
Biotic	Living factors affecting a community.
Abiotic	Non-living factors affecting a community (e.g. light intensity, temperature, soil pH).

### Adaptations

ALL organisms, now matter how simple they might seem, are adapted to their natural environment. Their features, or adaptations, enable survival in the particular conditions where they live. Adaptations can be:

- **Structural:** adaptations in terms of body form and shape. This would include examples like: streamlined shape for speed; long stem to maximise light exposure
- **Behavioural:** adaptations of behaviour – for instance, hunting behaviours, using tools, plants growing in the direction of a source of light.
- **Functional:** adaptations in terms of how the body works. For instance: being able to digest a certain food, maintaining a constant body temperature and so on.

Some organisms are adapted to live in what we would consider to be extreme environments – for instance, very high temperatures, high pressures, high salt concentration. The organisms that can survive in these kinds of conditions are called **extremophiles**. A great place to find extreme conditions and extremophiles is around and inside deep sea hydrothermal vents.