TOPIC 4.1: SPECIES → ECOSYSTEMS

Ecological Organisation

Species:

A group of organisms that can interbreed and produce fertile, viable offspring



Population:

Group of organisms of the same species, living in the same area at the same time



Community:

A group of different populations living together and interacting in a given area



Habitat:

The environment in which a species lives or the normal location of an organism



Ecosystem:

A community and also its environment (all biotic and abiotic factors)



Modes of Nutrition

Living organisms can obtain chemical energy by one of two methods of nutrition (a few species can use both methods):

Autotrophs

Autotrophs synthesise organic molecules from inorganic nutrients within the environment, using energy from either:

- Light (photoautotrophs)
- Oxidation reactions (chemoautotophs)

Heterotrophs

Heterotrophs obtain their organic molecules from other organisms via a variety of feeding methods and food sources

- Consumers ingest other living organisms
- Detritivores ingest detritus (decomposing matter and faeces)
- Saprotrophs externally digest dead organisms (decomposers)

Autotrophs are commonly referred to as **producers**, as they are responsible for the production of organic molecules

Heterotrophs could not survive without autotrophs

Nutrient Cycling

Nutrients are materials required by organisms for survival

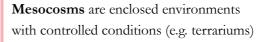
The supply of inorganic nutrients within the environment is finite and therefore must be constantly recycled:

- Autotrophs convert inorganic nutrients into organic molecules (i.e. they are producers)
- Heterotrophs ingest organic molecules and may release inorganic byproducts (e.g. carbon dioxide)
- Saprotrophs break down the nutrients in dead organisms and return them to the soil (i.e. they are decomposers)

Mesocosms

Ecosystems have the potential to be sustainable over long periods of time, however this requires three conditions:

- Energy availability (e.g. light source)
- Nutrient availability (e.g. decomposers)
- Waste recycling (e.g. detoxifying bacteria)



• They can be used to study sustainability



Species Associations

The presence of species in a habitat may be dependent on the interactions between them (either positive or negative)

If species are always found in the same habitat, this suggests a **positive association** (such as):

- Predator / prey relationships
- Symbiotic interaction (mutualism, commensalism, parasitism)

If species do not share the same habitat, this suggests there is a **negative association** (such as):

• Competition (niche partitioning or competitive exclusion)

Quadrat Sampling

The presence of a species in a given area can be determined via quadrat sampling (to assess sessile/non-motile species)

- Rectangular frame placed in an area (+ repeat sampling)
- Species numbers within the frame are counted/estimated

