

Communities and Ecosystems (5.1)

Define the following terms (5.1.1)

Species: A group of organisms that can interbreed and produce fertile offspring

Habitat: The environment in which a species normally lives or the location of a living organism

Population: A group of organisms of the same species who live in the same area at the same time

Community: A group of populations living and interacting with each other in an area

Ecosystem: A community and its abiotic environment

Ecology: The study of the relationships between living organisms and between organisms and the environment

Distinguish between (5.1.2 / 5.1.3)

Autotroph: An organism that synthesises its organic molecules from inorganic substances

Heterotroph: An organism that obtains its organic molecules from other organisms

Consumer: An organism that ingests other organic matter that is living or recently killed

Detritivore: An organism that ingests non-living organic matter

Saprotroph: An organism that lives on or in non-living organic matter, secreting digestive enzymes into it and absorbing the products of digestion

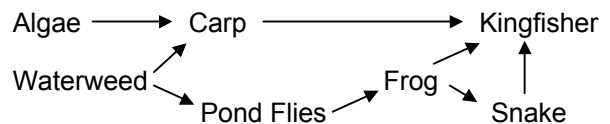
Food chains versus food webs (5.1.4 - 5.1.8)

- Food chains and food webs both describe the feeding relationships in a community
- Arrows represent the transfer of energy and matter (point in the direction of energy flow)
- The position an organism occupies is its trophic level (*1st = producer; 2nd = 1° consumer, etc.*)
- Food chains show linear relationships food webs show interconnected relationships

Food Chains

Algae → Carp → Kingfisher → Water Snake
 Waterweed → Pond Flies → Frog → Snake
 Phytoplankton → Zooplankton → Tuna → Orca

Food Webs

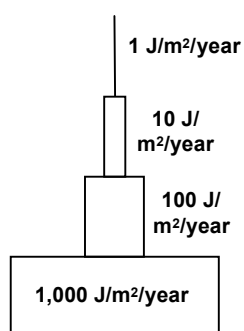


Explain energy flow in a food chain (5.1.9 - 5.1.11)

- The initial energy source for (almost) all communities is sunlight
- Autotrophs (producers) convert light energy into organic matter via photosynthesis
- Heterotrophs consume this organic matter in order to meet their energy requirements
- Only ~10% of the energy is passed from one trophic level to the next, the rest is lost (as heat, used in cellular respiration, lost in faeces, etc.)
- Because of this, the length of a food chain is limited (terminates with a saprotroph)

Pyramids of energy (5.1.12)

- Pyramids of energy show the energy flow across trophic levels in a community (with producers at the bottom)
- They are expressed in units of energy per area per time (e.g. kJ/m²/year)
- They will always appear as a pyramid, as energy transformations are not 100% efficient, so higher trophic levels always have less energy (~90% less) than preceding levels



Nutrients (5.1.13 / 5.1.14)

Energy flows, nutrients recycle

- Energy flow is limited as it cannot be recycled and must be replaced by a continuous external source (the sun)
- Nutrients (material required by an organism) are constantly being recycled within an ecosystem as food
- Decomposers (saprotrophic bacteria and fungi) recycle nutrients by returning them to the soil for plants to use