TOPIC 4.2: ENERGY FLOW

Energy Flow

Energy Source

Light is the initial energy source for *almost* all communities

- Some producers derive energy from chemical processes

Light energy is converted into chemical energy (i.e. organic compounds) via the process of **photosynthesis**

Energy Transfer

Heterotrophs obtain their chemical energy by feeding

- The energy stored in organic molecules is released via **cellular respiration** (in heterotrophs *and* autotrophs)

Trophic Levels

An organism's trophic level refers to the position it occupies within a feeding sequence

- Producers always occupy the first trophic level

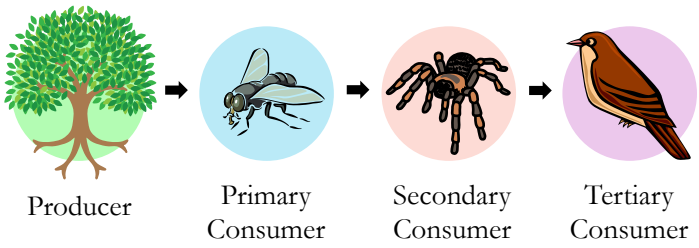
Trophic Level	Organism
1	Producer
2	Primary Consumer
3	Secondary Consumer
4	Tertiary Consumer

Feeding Patterns

Food Chains

Food chains show linear feeding patterns between the species in a community

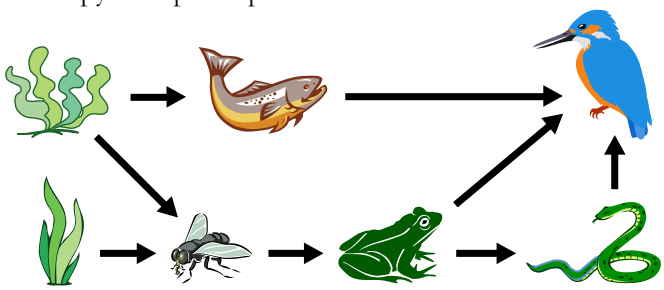
- Arrows indicate the direction of energy flow



Food Webs

Food webs show interrelated feeding patterns

- Most species have multiple food sources and hence will occupy multiple trophic levels



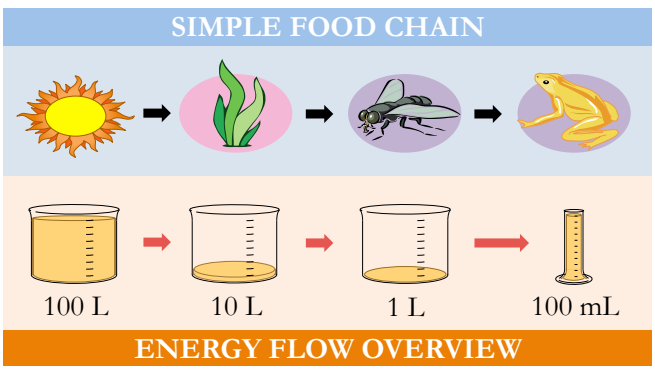
Energy Loss

Not all the stored energy is transferred upon feeding – most of the energy released via cell respiration is lost as **heat**

- Organisms cannot convert heat into other energy forms and hence the heat is lost from the ecosystem

Only ~10% of energy is transferred from one trophic level to the next (90% is lost as heat or is unconsumed)

- These energy losses restrict the length of food chains and limit the biomass of higher trophic levels



Pyramids of Energy

Pyramids of energy are representations of the amount of energy available at each trophic level

- Measured in energy units per area per time (kJ m^2 $year^{-1}$)

Pyramids of energy can never be inverted and their levels should differ by a factor of ~10

- Because energy transformations are ~10% efficient