

2.0 The flow of energy and the cycling of matter can be traced and interpreted in ecosystems.

2.1 Ecosystems Have interactions among Predators, Consumers and Decomposers

- **You And Other Animals Are Food Consumers**

All of the organisms within an ecosystem have different roles. These roles are called **niches**. Organisms can have more than one niche and knowing the niches of an organism can help to explain why they act and interact the way they do. To determine an organism's niche, you need to identify what it eats, where it lives and how it interacts with the other organisms in the same ecosystem. Niches include:

- **Producers** - produce food energy for themselves and others
- **Consumers** - consume the food made by the producers
- **Herbivores** - eat producers (plant eating niche)
- **Carnivores** - eat other consumers (meat eating niche)
- **Predators** - eat *prey*
- **Omnivores** - eat both producers and consumers

- **Food Consumers Depend On Food Producers**

The Process of Photosynthesis

The raw materials needed by plants to produce their own food -with the energy from the Sun - are water and carbon dioxide. The products produced are food (sugars) and oxygen, which is released back into the atmosphere. The food making process is called photosynthesis.

The Importance of Photosynthesis

Light Energy + Carbon Dioxide + Water → Food (Sugars and Starches) + Oxygen

This is important for 2 reasons: the sun's energy can be converted into a form you can use and oxygen is made available for you to breathe.

Oxygen Is For More Than Just Breathing

Plants need oxygen as well. All living things are able to release the energy that is stored in food through the process of cellular respiration.

Food (Sugars & Starches) + Oxygen → Carbon Dioxide + Water + **Energy (used by living things)**

A Vital Interaction

The products of one chemical reaction (photosynthesis) are used by the other chemical reaction (cellular respiration)

- **A Special Group of Consumers:**



Scavengers are organisms that feed on dead or decaying plant or animal matter. They usually don't kill their own food. **Magpies, crows and Wolverines are examples.**

Decomposers are different from scavengers because they do not actually eat dead material. They grow on or in the dead or waste matter, absorbing the nutrients directly into their cells, which are then recycled back into the environment. **Bacteria and Fungi are examples.**

Decomposers can be Helpful or Harmful

| Helpful | | Harmful | |
|---|---|----------------------------|---|
| Baker's yeast | - produce a by-product that makes dough rise | Candida albicans | -cause a disease called thrush |
| E. coli (found in your large intestine) | -break down nutrients in food to make vitamins you need to stay healthy | E Coli bacteria 0157-H7 | - produce toxic chemicals that result in food poisoning |
| Nitrogen-fixing nodules | - home to bacteria which make nitrogen available to the plant | | |

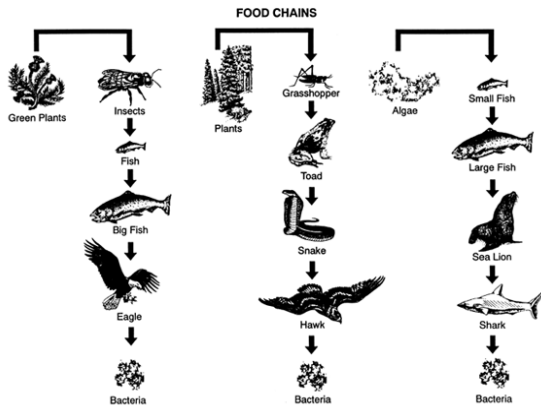
Decomposers Are Essential To All Ecosystems

Their actions make them the 'clean-up crew' and mean that plants will always have the nutrients they need to maintain life. They are the **bridge** between the biotic and abiotic parts of an ecosystem.

2.2 Food Chains Demonstrate the Flow of Energy in Ecosystems

- **Food Chains**

A food chain is a model that shows how energy stored in food passes from organism to organism. It starts with the original food source -a producer.

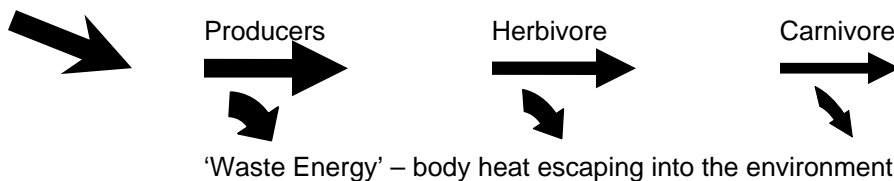


Energy flow is the movement of energy, starting with the sun, and passing from one organism to another.

As energy flows from one organism to another a food chain is established. Food chains usually involve more than three organisms.

- **Energy Flow In Ecosystems**

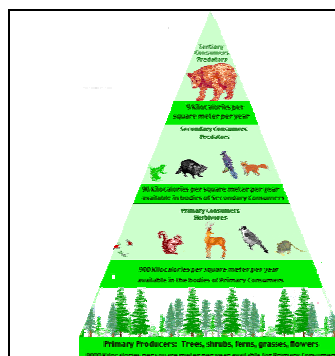
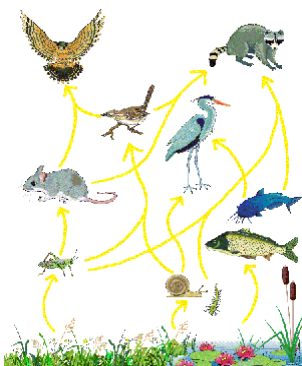
Ecosystems get energy originally from the Sun through the process of **photosynthesis**. Light energy is used by plants to make food, which contains the chemical energy that plants use for their life functions. 90% of this energy is used by the plant and the remaining 10% is available to the herbivore that eats the plant. The herbivore uses 90% of this energy to maintain life functions and provides the remaining 10% to the carnivore. Most of the energy is used to maintain body heat, which escapes into the environment and cannot be used. The flow of energy is one way.



2.3 Food Webs

A **Food Web** is a combination of many different food chains, showing the interrelationships between and among many different producers and consumers in an ecosystem.

A **Food Pyramid** is a model representing the numbers of organisms consumed at each successive level of the pyramid. The size of the level indicates the number of organisms at that level. There are always more animals being eaten than are eating.



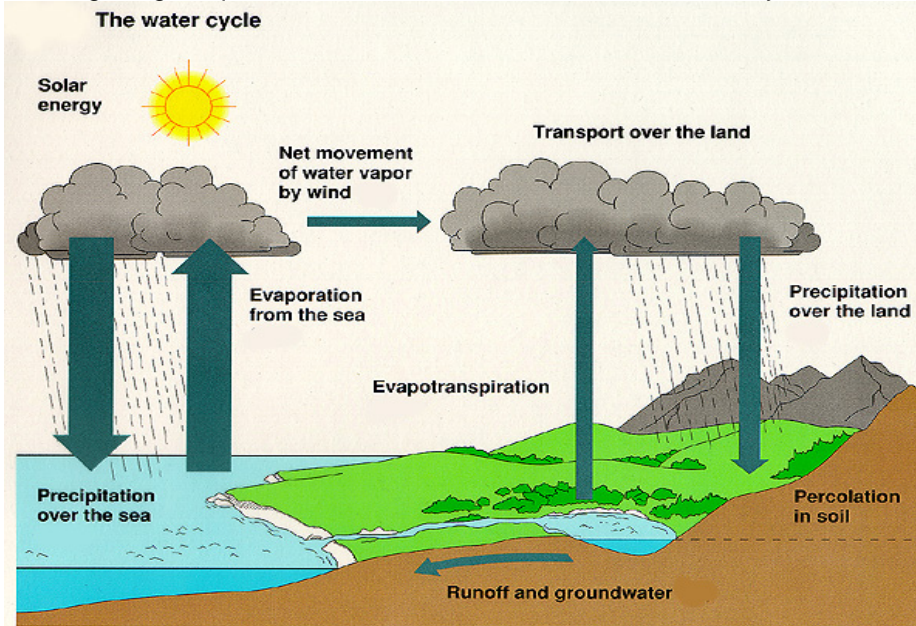
To find out how much energy is being transferred from one level of the pyramid to the other, **biomass** needs to be calculated. **Biomass** is the total of all the organisms in the ecosystem. As you move up the pyramid, there is less biomass. The most biomass is found at the base, where the producers are.

2.4 Matter Cycles in Ecosystems

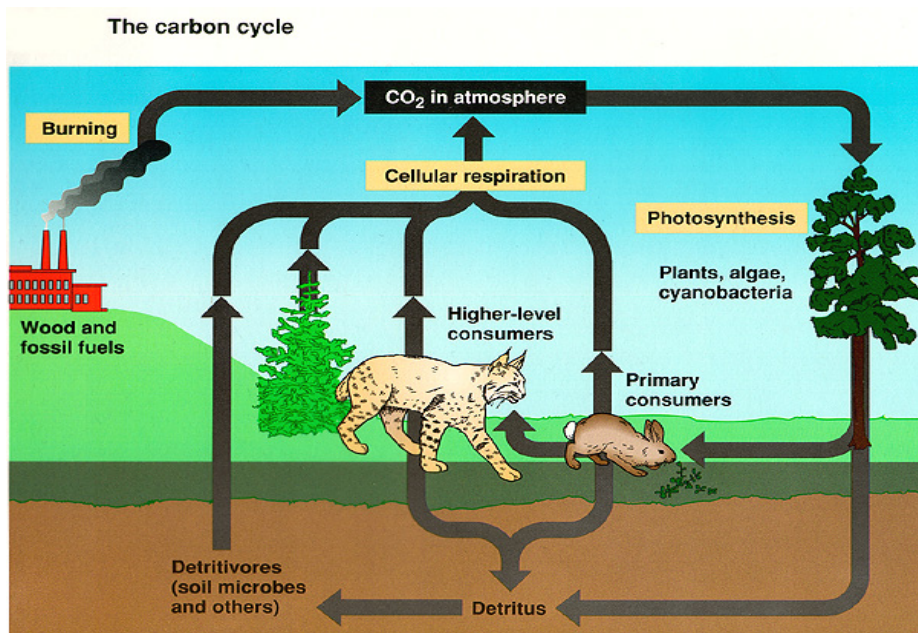
When organisms breathe, the gases are recycled in the air and used by other organisms. When organisms die, the nutrients they are composed of are recycled back into the environment and used as well.

- **Water and Carbon Cycles**

All living things require water to survive and this water is also recycled over and over again.



The water cycle (as illustrated) contains 4 processes: evaporation and transpiration – move water from the Earth to the atmosphere, condensation and precipitation return the water to Earth.



Carbon is necessary for all life to exist and is recycled in the environment.