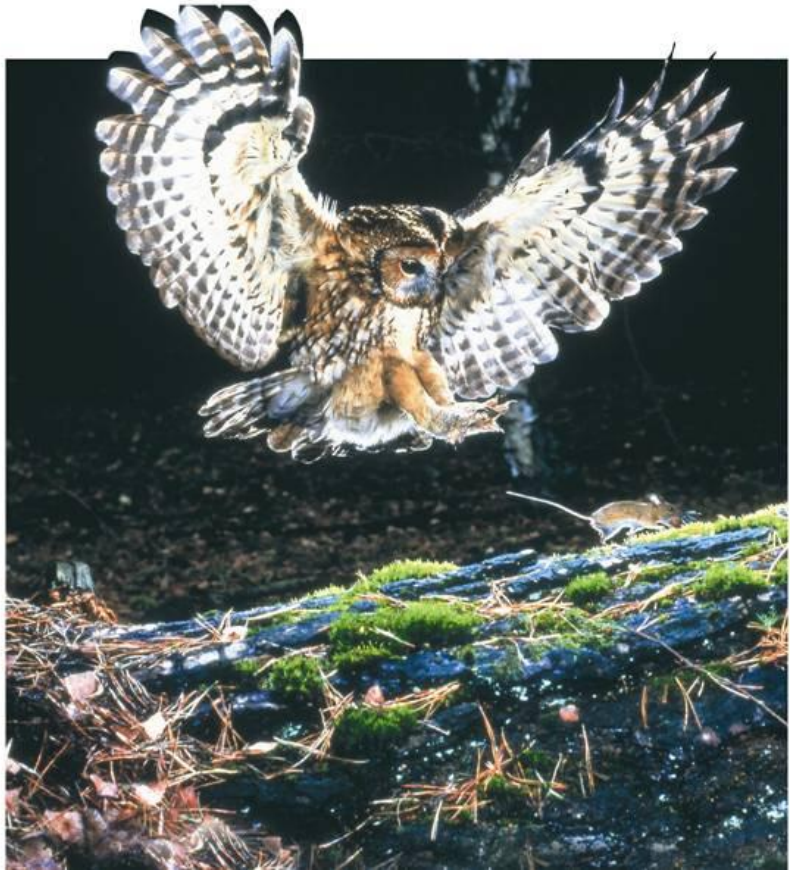
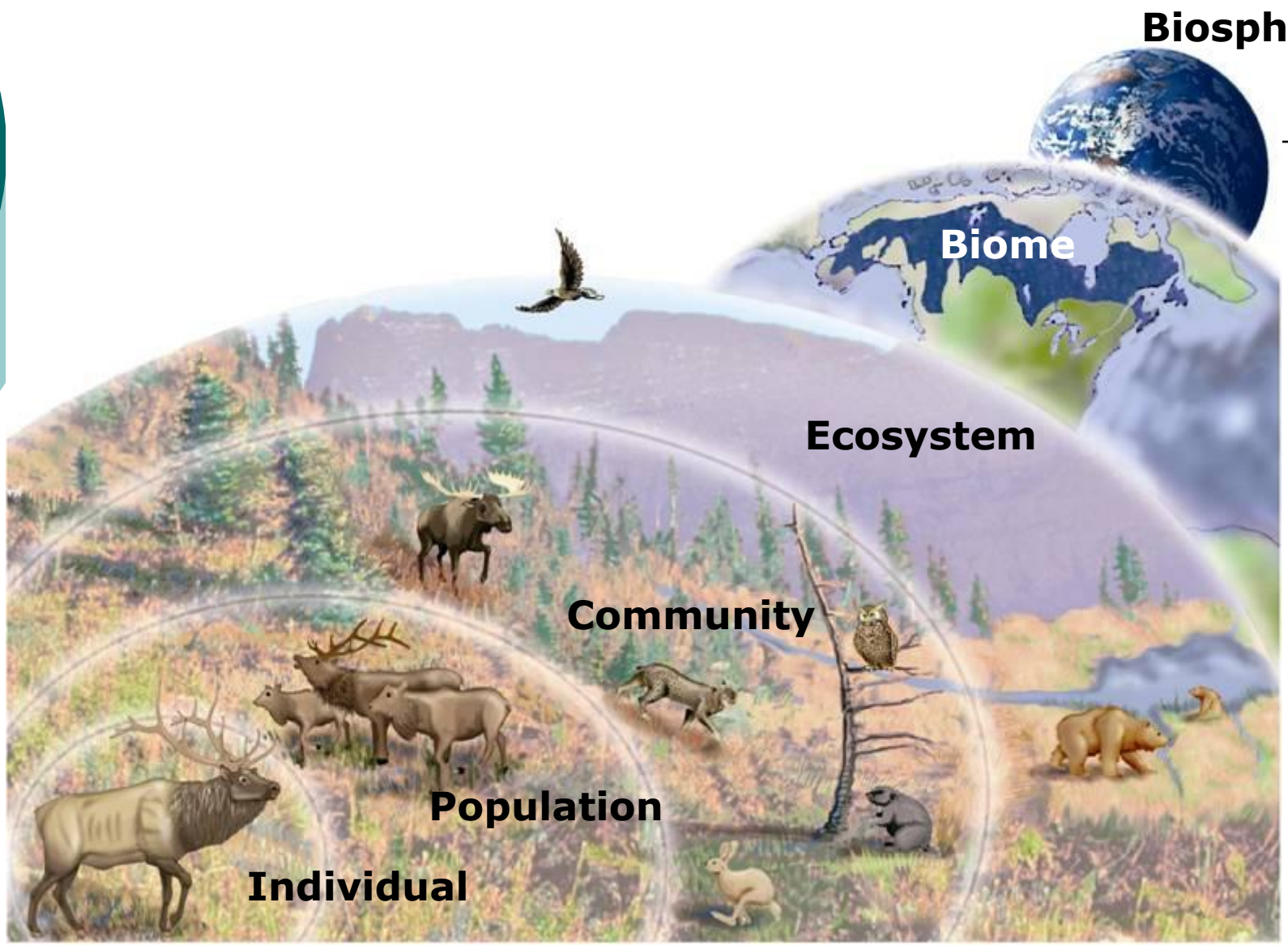
Ecology & Energy Flow



What is Ecology?

- **Ecology** - the scientific study of relationships between organisms and their environment.

- **Ecologists** study relationships between the different levels of organization.



- A **species**: a group of organisms that can breed and produce **successful** offspring.
- **Populations**: groups of individuals that belong to the same species and live in the same area.
- **Communities**: different populations that live together in the same area.

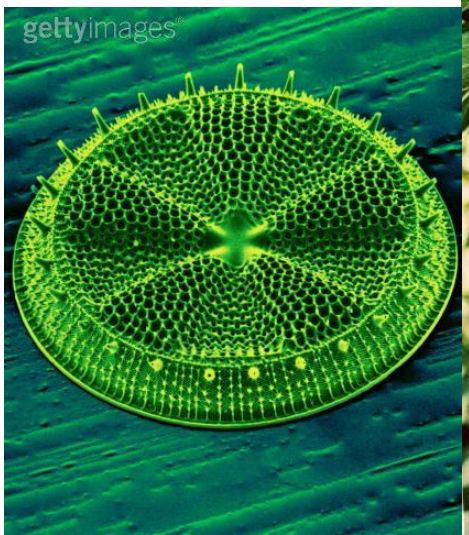
  Ecosystem: all the biotic and abiotic factors in the same area.
- **Biome**: a group of ecosystems that have the same climate and similar communities.
- **Biosphere**: all living things on Earth.

Energy in the environment

- Where does the energy for life's processes come from?
  - **Sunlight is the main energy source for life on Earth.**

Producers

- Only plants, some algae, and certain bacteria can get energy from sunlight or chemicals and use that energy to make food.
- These organisms are called **autotrophs**.

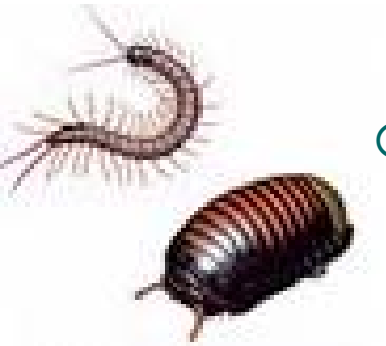


Consumers

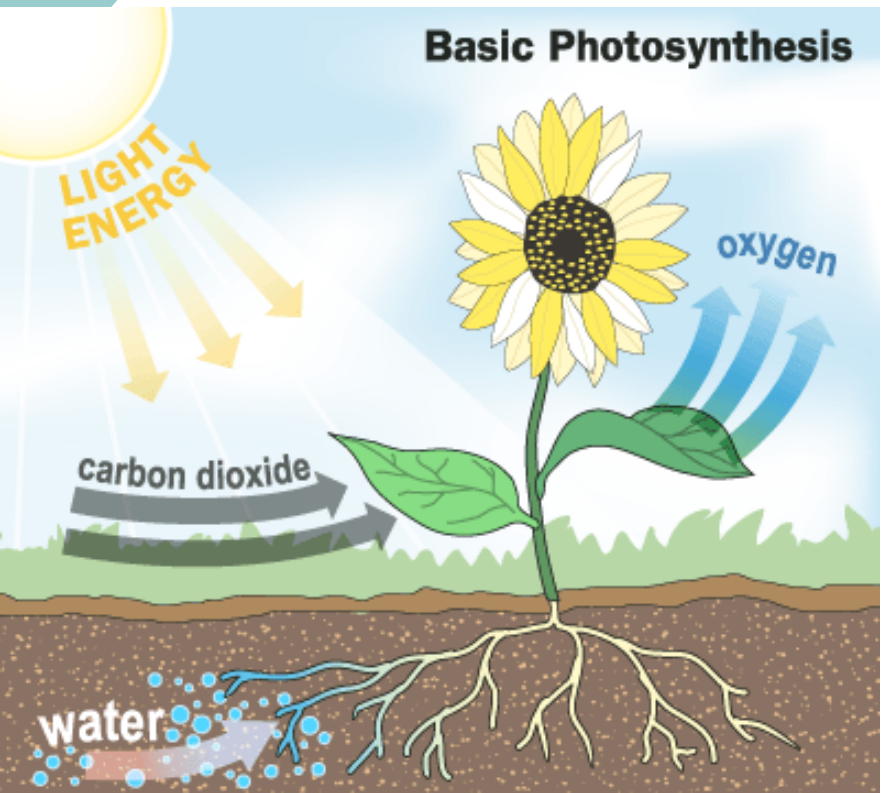
- Organisms that need other organisms for their energy and food are called **heterotrophs**.

Consumers

- There are many different types of heterotrophs:
  - **Herbivores** eat plants.
  - **Carnivores** eat animals.
  - **Omnivores** eat both plants *and* animals.
  - **Detritivores** eat dead plant and animal remains.
  - **Decomposers** break down organic matter (bacteria, fungi)

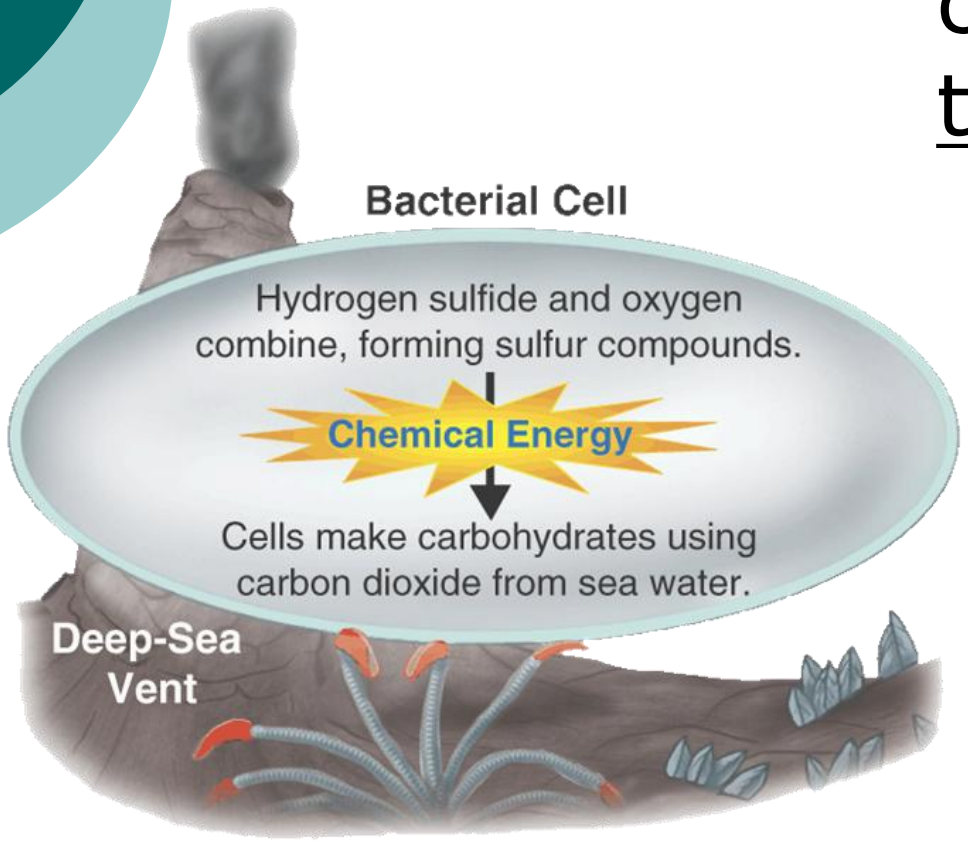


Photosynthesis



- **Most autotrophs get and use energy through <u>photosynthesis</u>.**
- During **photosynthesis**, autotrophs use light energy to <u>change CO_2 and H_2O into O_2 and high-energy carbohydrates</u>.

Chemosynthesis



CHEMOSYNTHESIS IN SULFUR BACTERIA

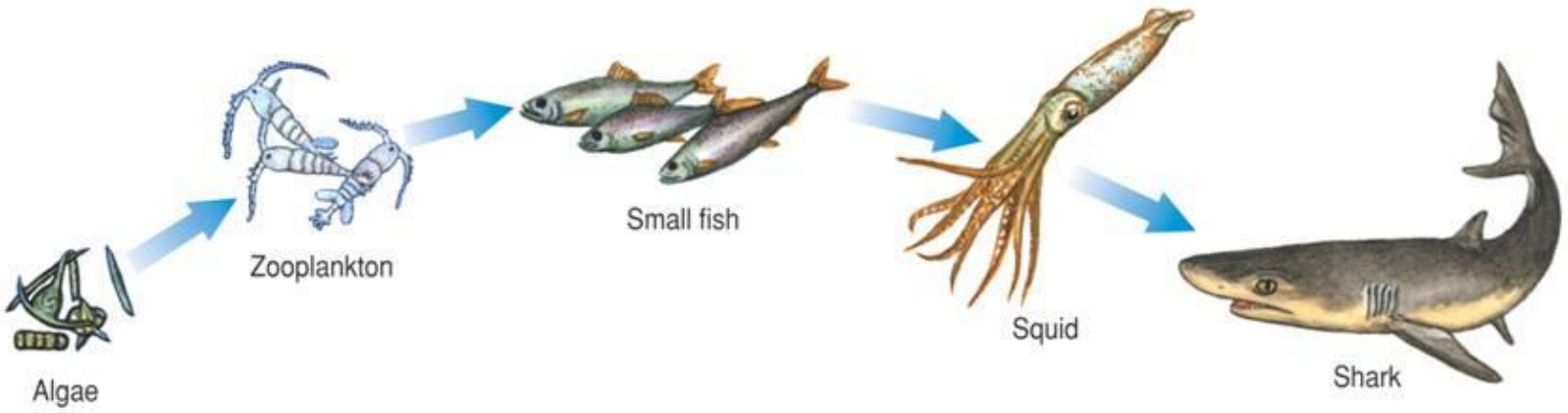
- Some autotrophs can <u>make food when there is NO LIGHT</u>.
  - When organisms <u>use chemical energy to make carbohydrates</u>, the process is called **chemosynthesis**.
  - Done by <u>many bacteria</u>.

Feeding Relationships

- The relationships between producers and consumers connect organisms into feeding networks **based on who eats whom**.

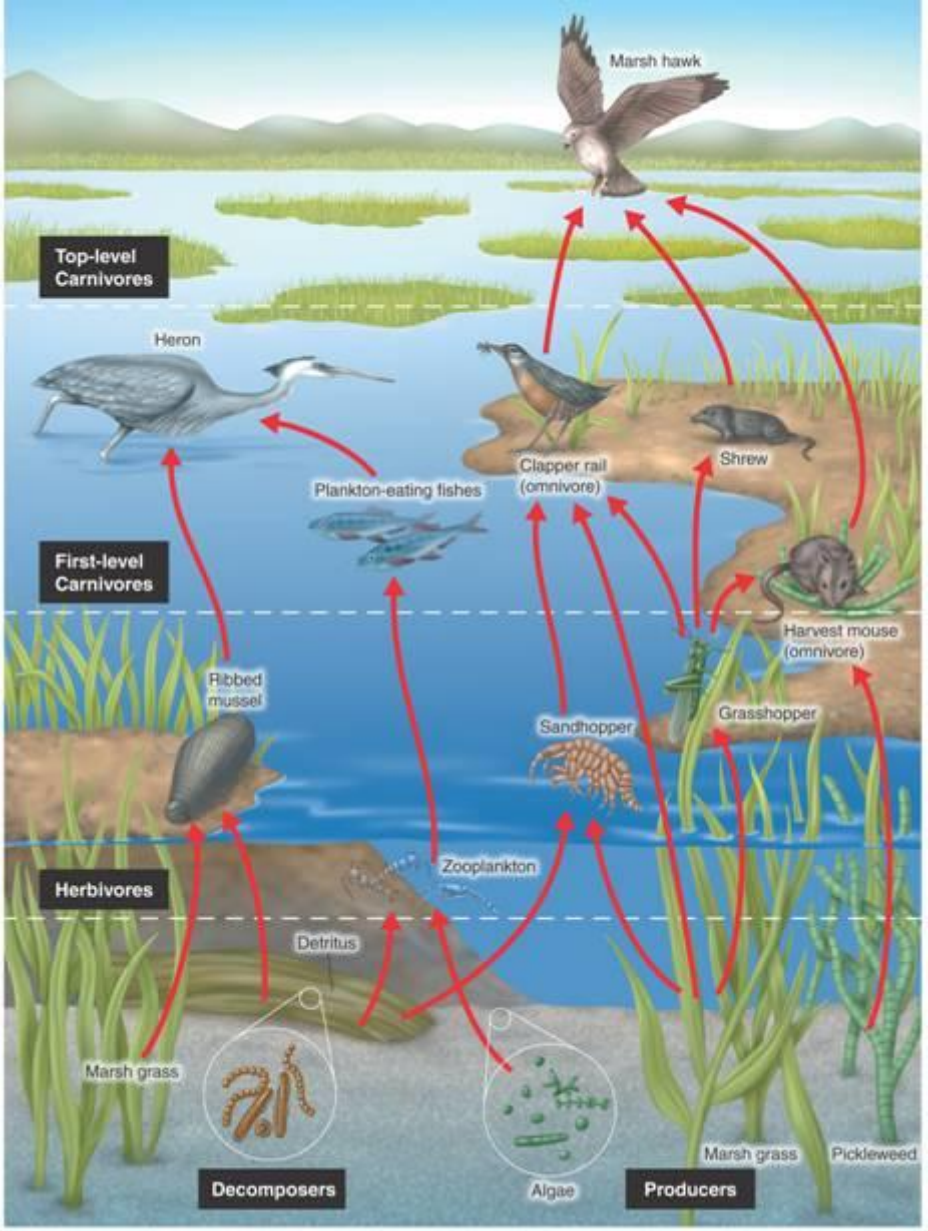
Food Chains

- A **food chain** shows the path of energy being transferred from one organism to another.
- - Energy flows through an ecosystem in **one direction**: from producer to consumers.



Food Webs

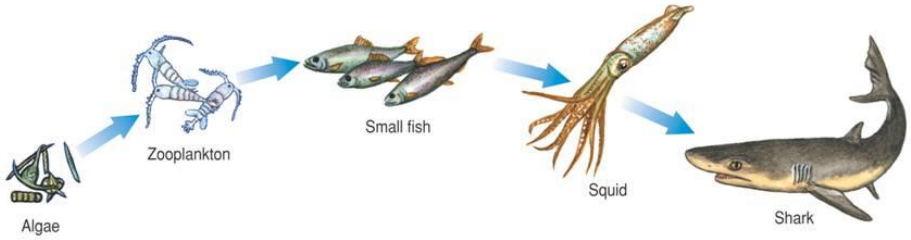
- Food webs link all of the <u>food chains in an ecosystem together</u>.



Feeding Relationships

- **Trophic Levels**
  - Each step in a food chain or food web is called a **trophic level**.
  - Producers make up the first trophic level.
  - Consumers make up the second, third, or higher trophic levels.
  - Each consumer depends on the trophic level below it for energy.

How energy is lost:



- When one organism eats another organism, **only 10%** of the energy stored in the organism is transferred to the other.
- Each organism uses some of the energy for life processes such as:
  - **Respiration** (breathing)
  - **Movement**
  - **Reproduction**
- Some of the energy is **lost to the environment as heat**.

Trophic Pyramids

- Trophic pyramids show the amount of energy or matter in an ecosystem.
- As you move up the pyramid, <u>energy is LOST</u>
- <u>The MOST energy is at the BOTTOM</u>
- <u>The LEAST energy is at the TOP.</u>