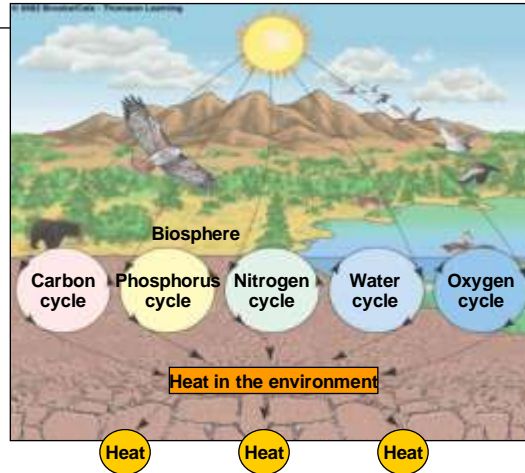


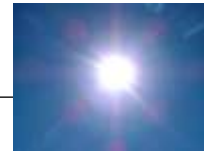
Sustaining Life on Earth...

Involves:

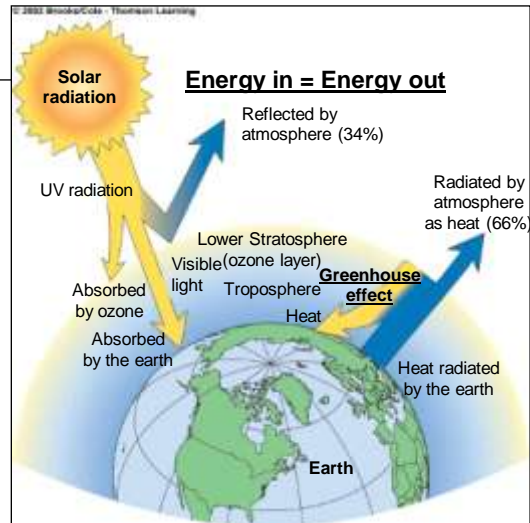
- 1. The one-way flow of high quality energy (sunlight)
- 2. The recycling of matter (raw materials)



Energy in Ecosystems

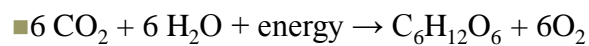


- Energy cannot be recycled – there must be a constant supply available to sustain life on earth.
- The source of all energy for ecosystems is the sun.
 - Warms the water and land, melts ice and snow, causes evaporation to occur, causes winds
 - Converted to food energy by producers
- Energy breakdown incoming energy from the sun
 - 70% - Warms the earth
 - 30% - reflected by clouds and earth's surface
 - Less than 1% is absorbed by green plants for photosynthesis



Energy for Life - Photosynthesis

■ Process by which green plants use solar energy to produce carbohydrates (sugars)

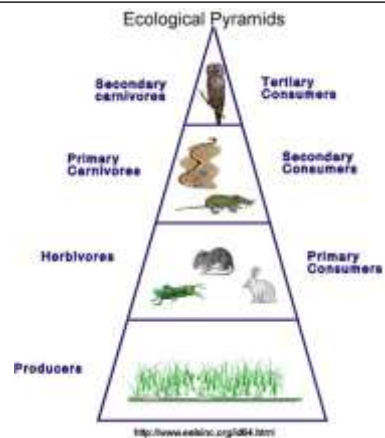


Laws of Thermodynamics

1. Although energy can be converted (transformed) from one form to another, it cannot be created or destroyed
2. During energy transformation, some energy is converted into an unusable form (mostly heat) that cannot be passed on. This also applies to food chains.

Pyramid of Energy

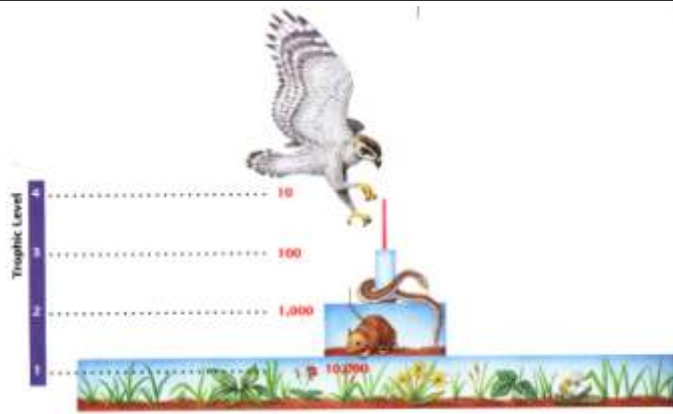
- As food energy is passed from one trophic level to the next, some of the energy is lost, mostly as heat
- This decrease in available energy is called the **pyramid of energy**



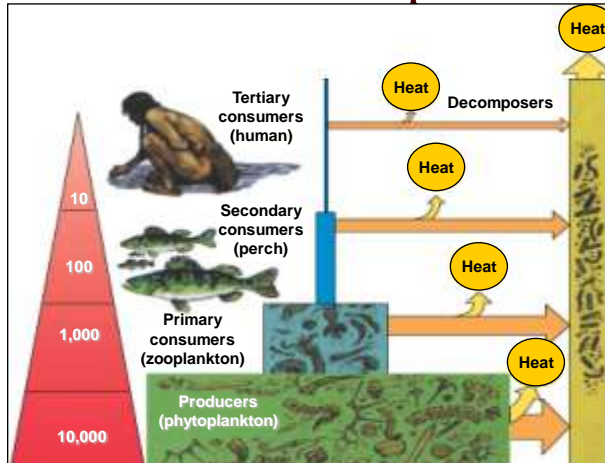
The 10% Rule

- In most food chains, only about 10% of the energy is transferred from one trophic level to the one above it.
- Some energy is lost as heat in catching, eating and digesting food
- Some energy is lost to decomposers..

Energy Pyramid for 10% Rule



One More Example



How much energy is available for the humans at the top of the food chain?

What does this mean?

Link: [Energy Flow](#)

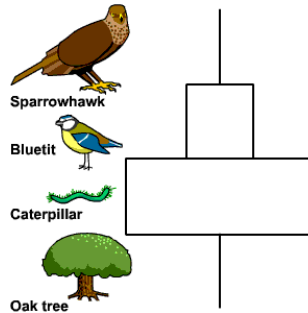
Pyramid of Numbers

- Number of organisms decreases at each level of a food chain.
- This is due to the decreasing amount of energy available
- Organisms at higher levels tend to be larger, and therefore need many food organisms at the level below



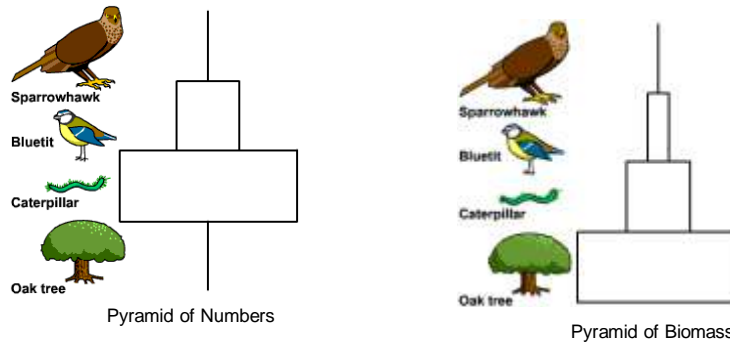
Numbers vs Biomass

Note: Numbers pyramids can sometimes take “odd” shapes. For example, take the case of a pyramid that begins with one tree.



Biomass – total mass of dry organic matter in a feeding level

By converting “numbers” to “biomass”, a pyramid shape is produced. This agrees with the decrease in energy at successive levels of the food chain.

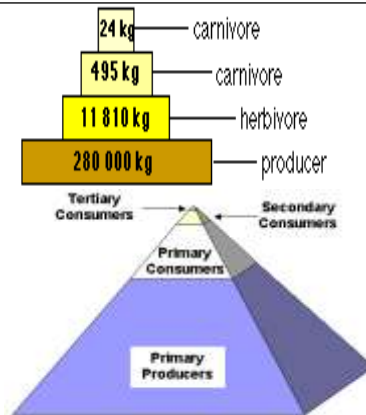


Pyramid of Biomass

• Each tier represents the standing biomass (**total dry weight of all organisms**) in a trophic level.

• Decrease in biomass is due to the decrease in energy

• See text page 38, figure 9



Other Ecological Concepts:

- **Ecological Niche**
 - The role that a species plays in an ecosystem
 - Includes everything it does to survive and reproduce
- **Community** –
 - a group of plants and animals living in a particular area
- **Habitat**
 - - the place where a species lives. Plants and animals live where they can satisfy their needs. (food, shelter, water, etc)



Link

- <http://www.mhhe.com/biosci/genbio/espv2/data/ecology/004/index.html>