

Flow of Energy in Ecosystems



Essential Standard 2.7

Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere.

Learning Objective 2.7.2

Explain why biodiversity is important to the biosphere.

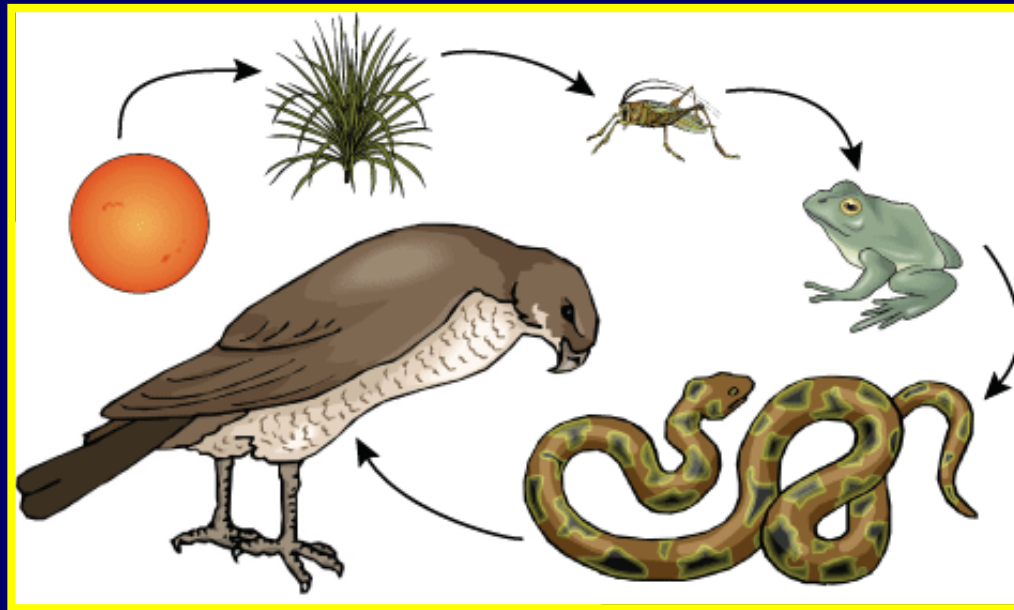
I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can describe how energy flows through ecosystems.
- I can list various trophic levels within ecosystems and describe the way they obtain their energy.
- I can explain why less energy is available to higher trophic levels.

Energy

All organisms need energy to grow, remain healthy, and to reproduce.

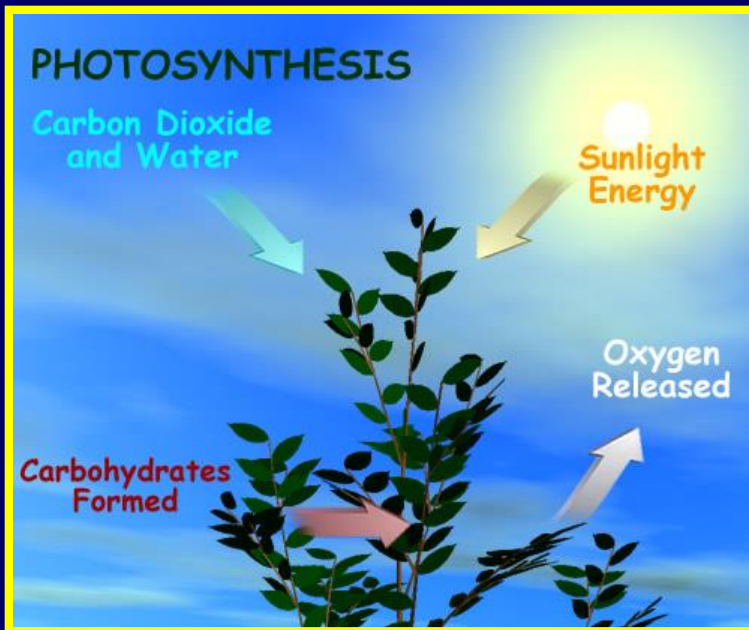


In any ecosystem, energy is transferred from one organism to another through what we call food.

Radiant Energy



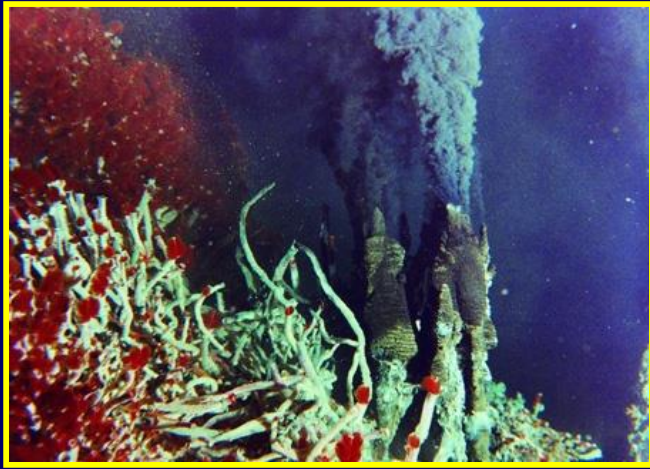
The energy in most ecosystems enters as radiation from the Sun



Plants, plankton, algae, and some bacteria use photosynthesis to convert sunlight energy into food.

Chemical Energy

In ecosystems, where there is no sunlight, bacteria use the energy stored in inorganic chemicals to produce food during a process called chemosynthesis.



Hydrothermal Vent

At the bottom of the ocean, where there is no sunlight, bacteria, that live inside mussels, are able to use the inorganic chemicals that are released from hydrothermal vents to produce food.



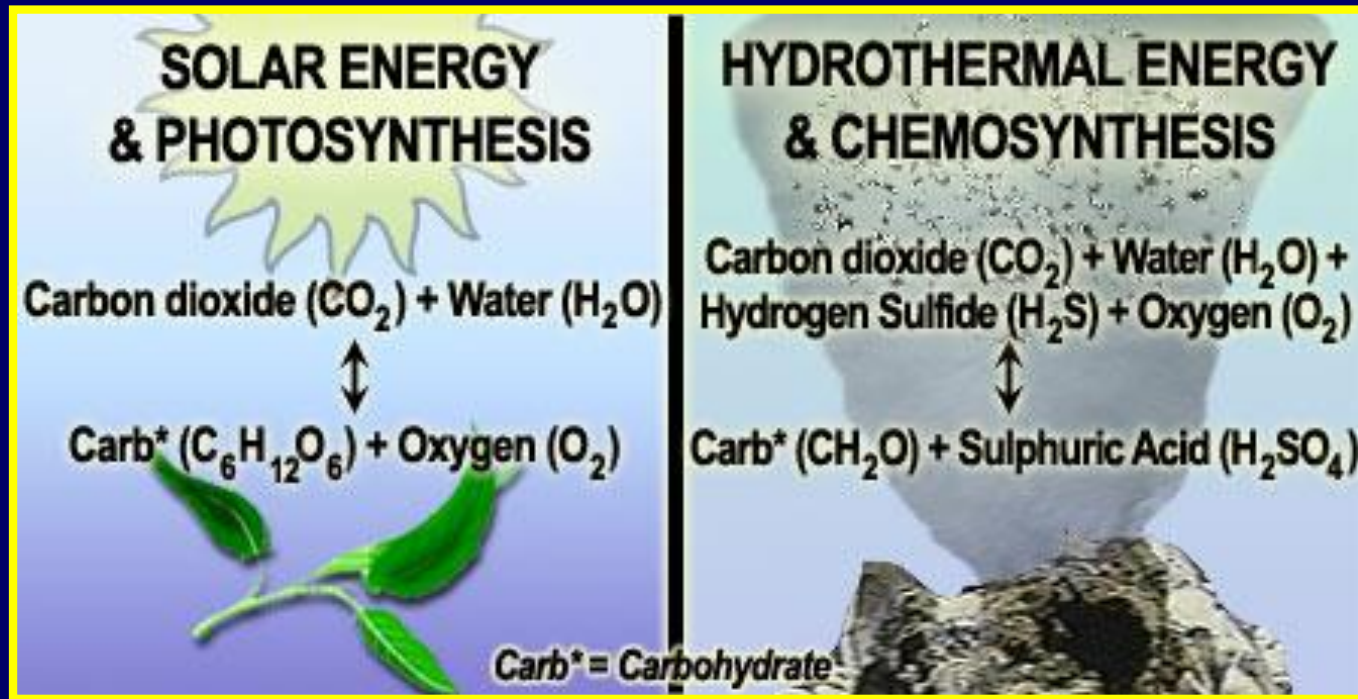
Bacteria



Mussels

Autotrophs and Producers

Organisms capable of producing their own food are called autotrophs or producers.



Photosynthetic plants, plankton, algae, and bacteria.

Chemosynthetic Bacteria

Heterotrophs & Consumers

Heterotrophs or consumers must obtain energy from the food they consume or eat.



Types of Heterotrophs



Carnivores eat other animals



Herbivores eat only plants



Omnivores eat both plants and animals



Types of Heterotrophs



Detritivores are insects that eat plant wastes such as leaf litter, and dead branches.

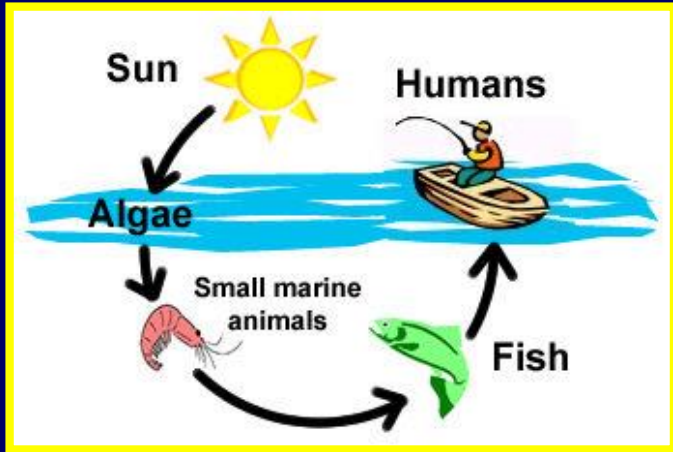
Decomposers play an important role in the ecosystem because recycle the nutrients back into the soil.



Decomposers include fungi, bacteria, insects, and worms,



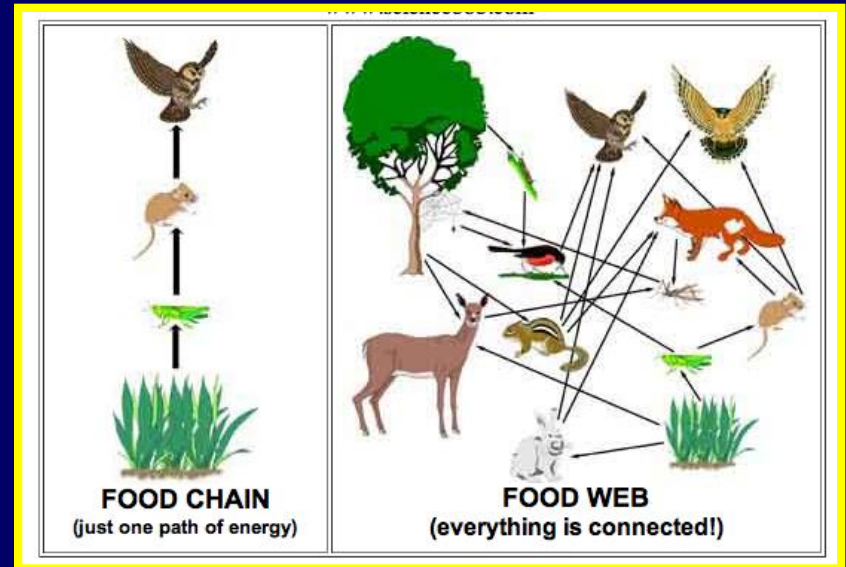
Food Chains



Food Chains are models used to show the direction matter and energy flow through an ecosystem.

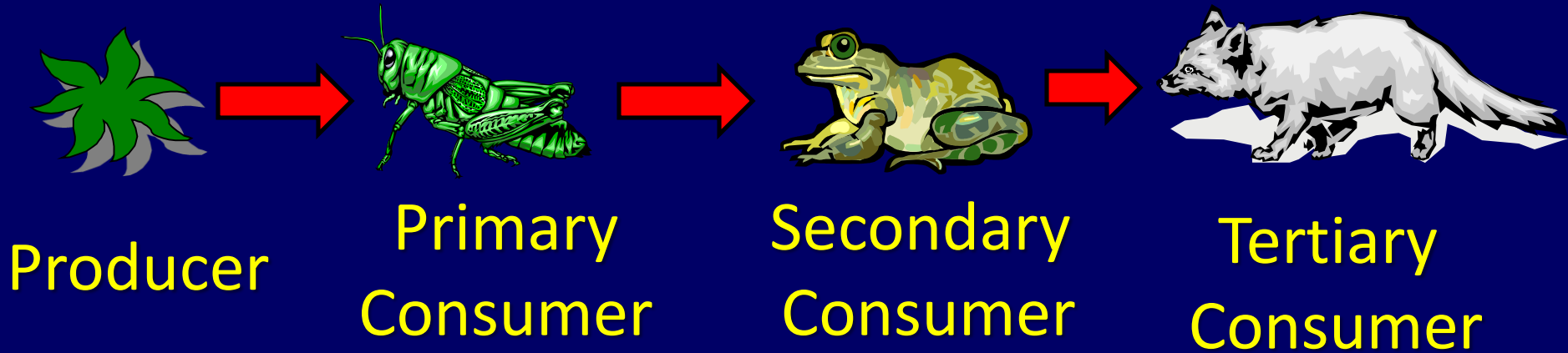
Arrows point to where the energy goes

Food Webs are interconnected food chains and are more realistic because most things eat more than one thing.



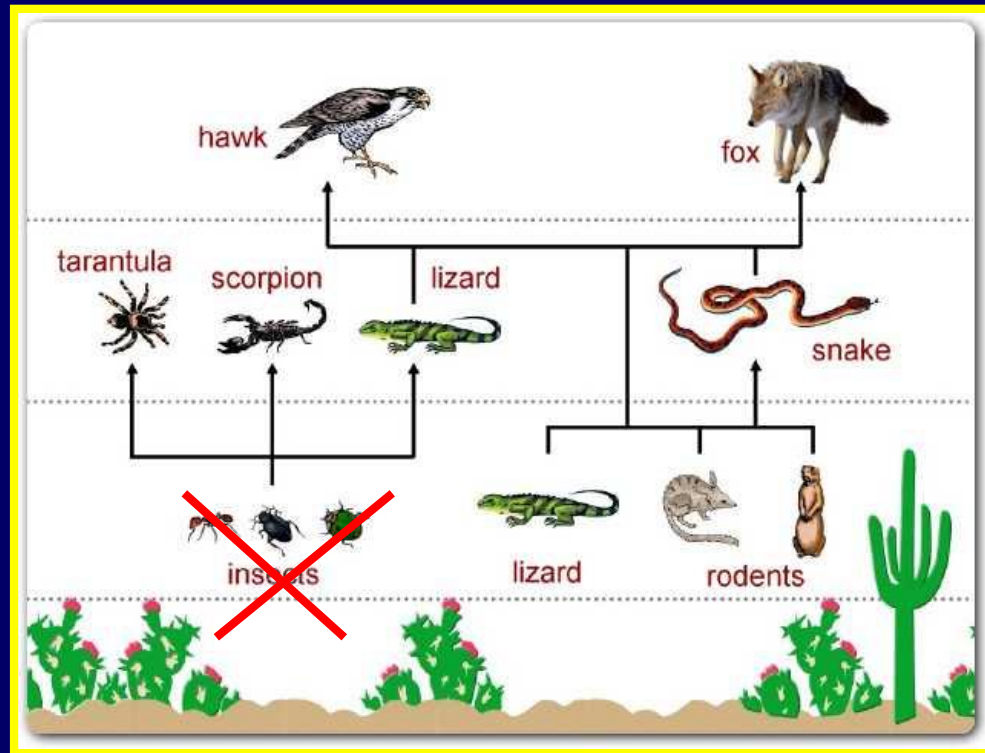
Trophic Levels

Trophic Levels refer to each step in the transfer of energy.



Changes in Food Webs

Any change in a food web will affect all the other trophic levels.



Removing the insects would decrease the amount of higher consumers but increase the producers.

Inefficient Energy Transfer

During energy transfers, not all the energy in one trophic level is passed up to the next trophic level.



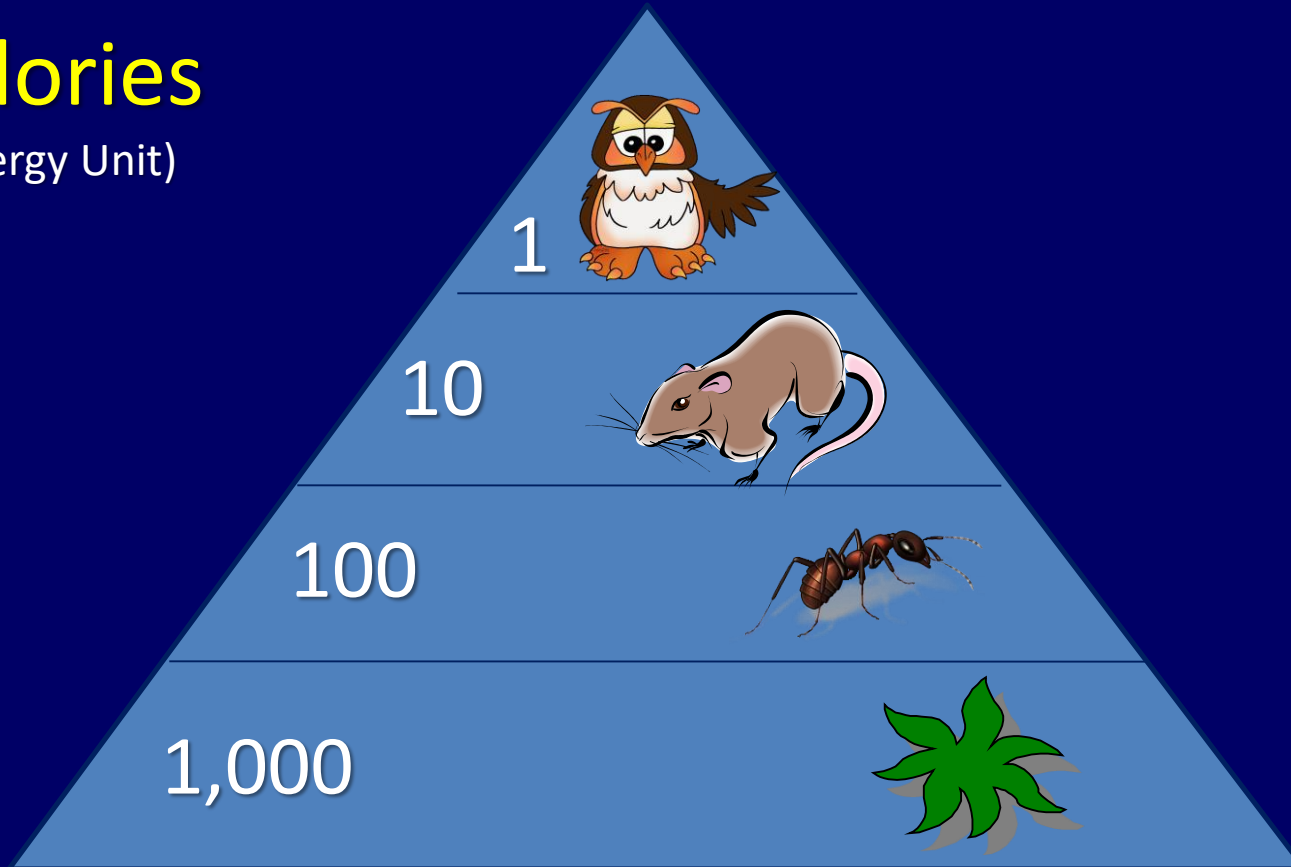
Some energy is stored in indigestible parts of the organism, and some energy is changed into heat energy that escapes into the environment.

Ten Percent Law

Ten Percent Law states that only 10% of the energy in one trophic level is passed on to the next trophic level.

Calories

(Energy Unit)



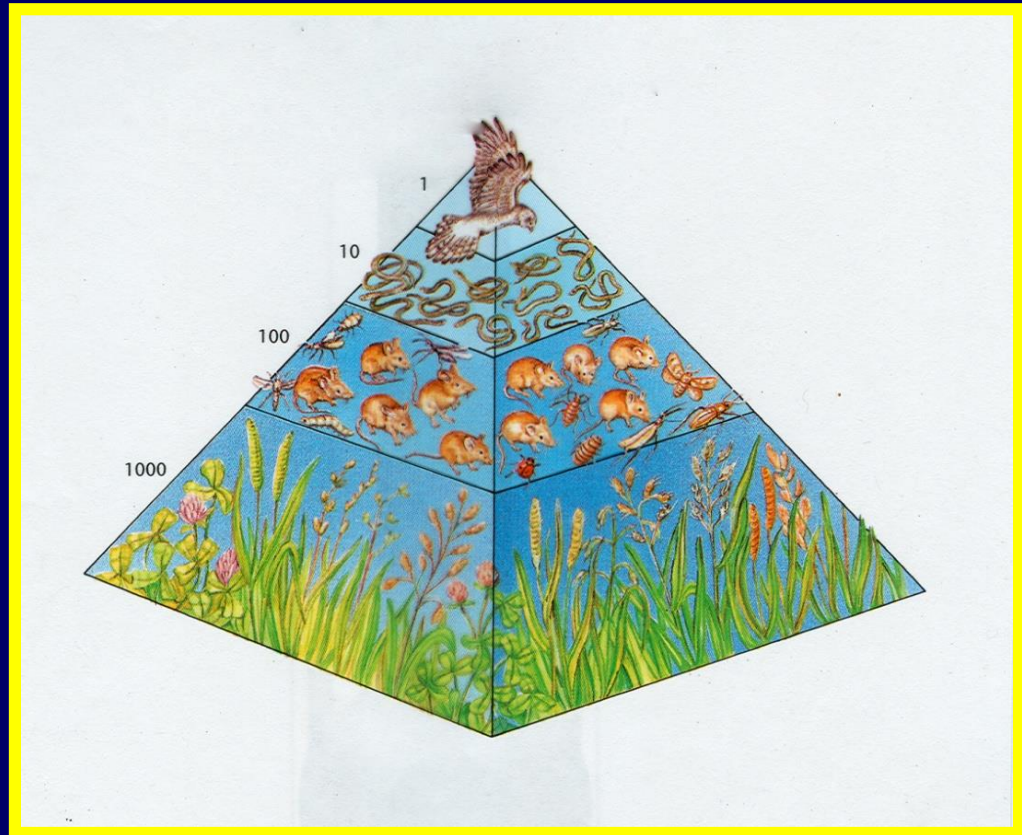
Ecological Pyramid

Since there is less energy on higher trophic levels, there are also less organisms and less biomass.

Calories

Number of
Organisms

Biomass



The End

