Ch 18, Sections 3-4

03.05.08 / 03.06.08

Control of Internal Conditions

- What are conformers and regulators?
  - Regulators use energy to control some aspect of their internal conditions, while the internal condition of conformers changes as a result of their environments.
  - Mammals are warm-blooded, which means they use energy to control internal temperature; reptiles are conformers.
  - Some sea organisms control the salinity of their cells, while other sea organisms are conformers.

Biophilic Design

- Biophilia = love (*philos*) of nature (*bio*); term coined by Edward Wilson who defined it as “the connections that human beings subconsciously seek with the rest of life.”
- Stephen Kellert, who worked with Wilson, wrote biophilia is “a complex of weak genetic tendencies to value nature that are instrumental in human physical, material, emotional, intellectual, and moral well-being. Because biophilia is rooted in human biology and evolution, it represents an argument for conserving nature based on long-term self-interest.”

Biophilia

- According to researchers:
  - Hospital patients heal faster if they can see nature outside their windows
  - School students learn more if there are plants in classrooms
  - Business employee work harder and call in sick less often if there are plants in their offices

Biophilic Design

- Biophilic Design – designing buildings and artificial environments to give people a feeling of connection with nature

Biophilic Design

At Christus St. Michael Health Care Center in Texarkana, TX, every patient's room has a view of nature

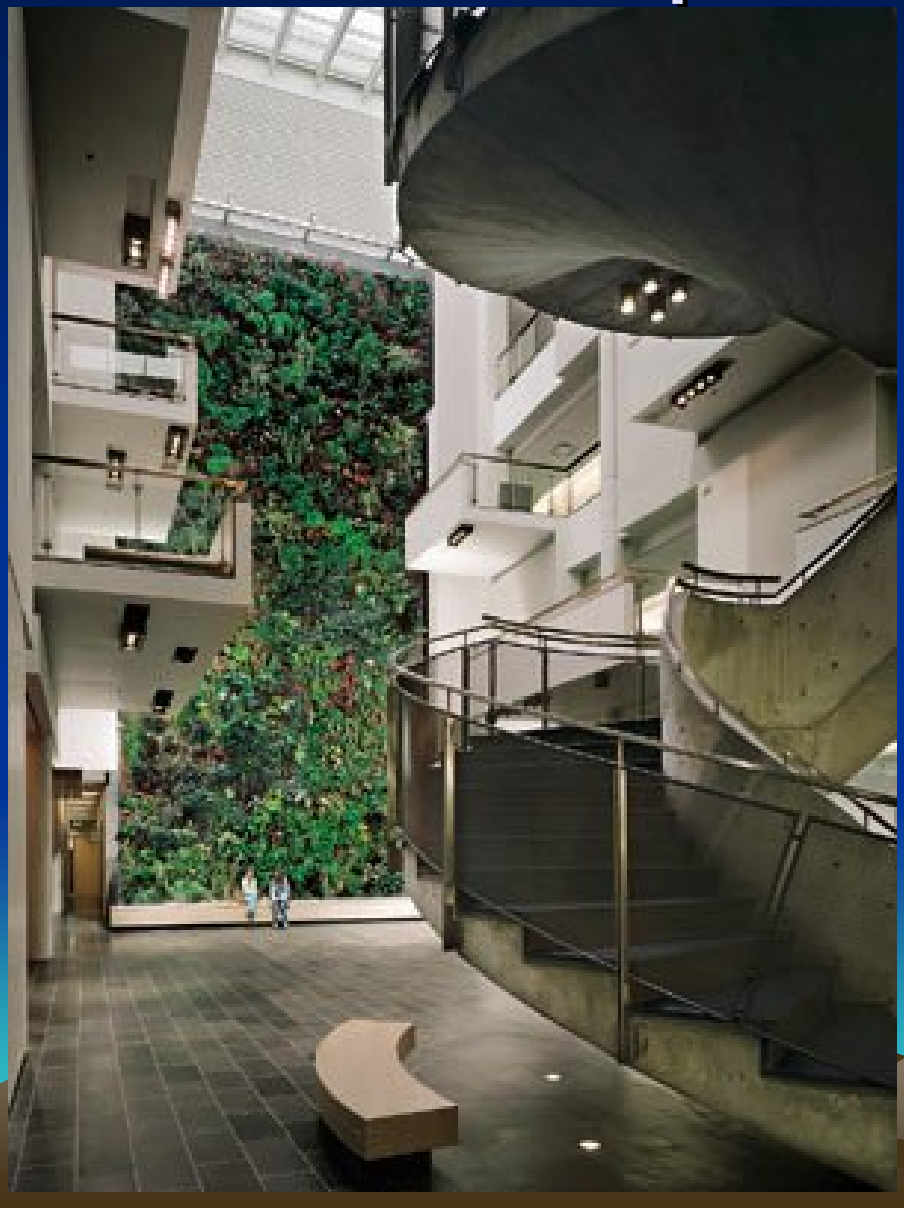
Biophilic Design

Bronson Methodist Hospital, Kalamazoo, MI

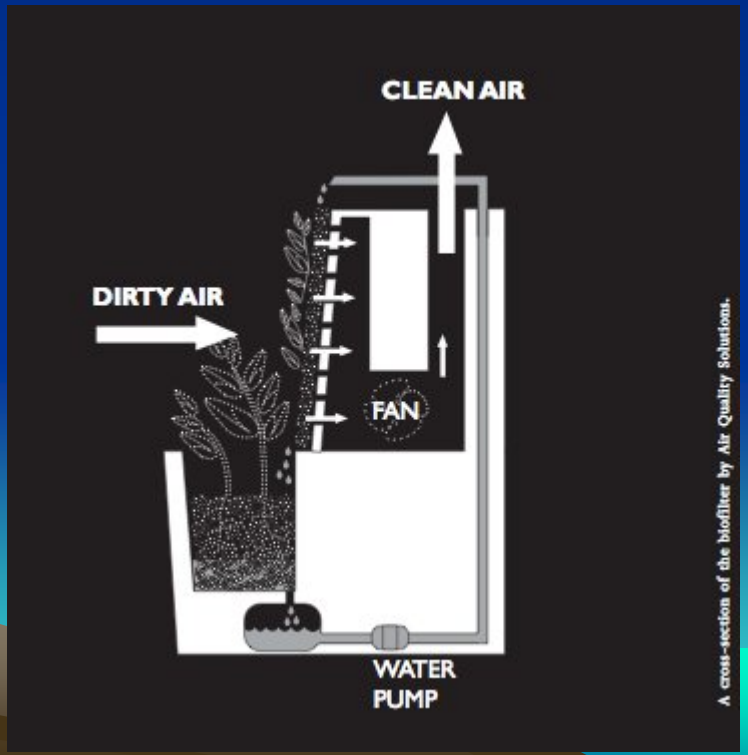
U. of Alberta Hospital

Stanford U Hospital

Biophilic Design

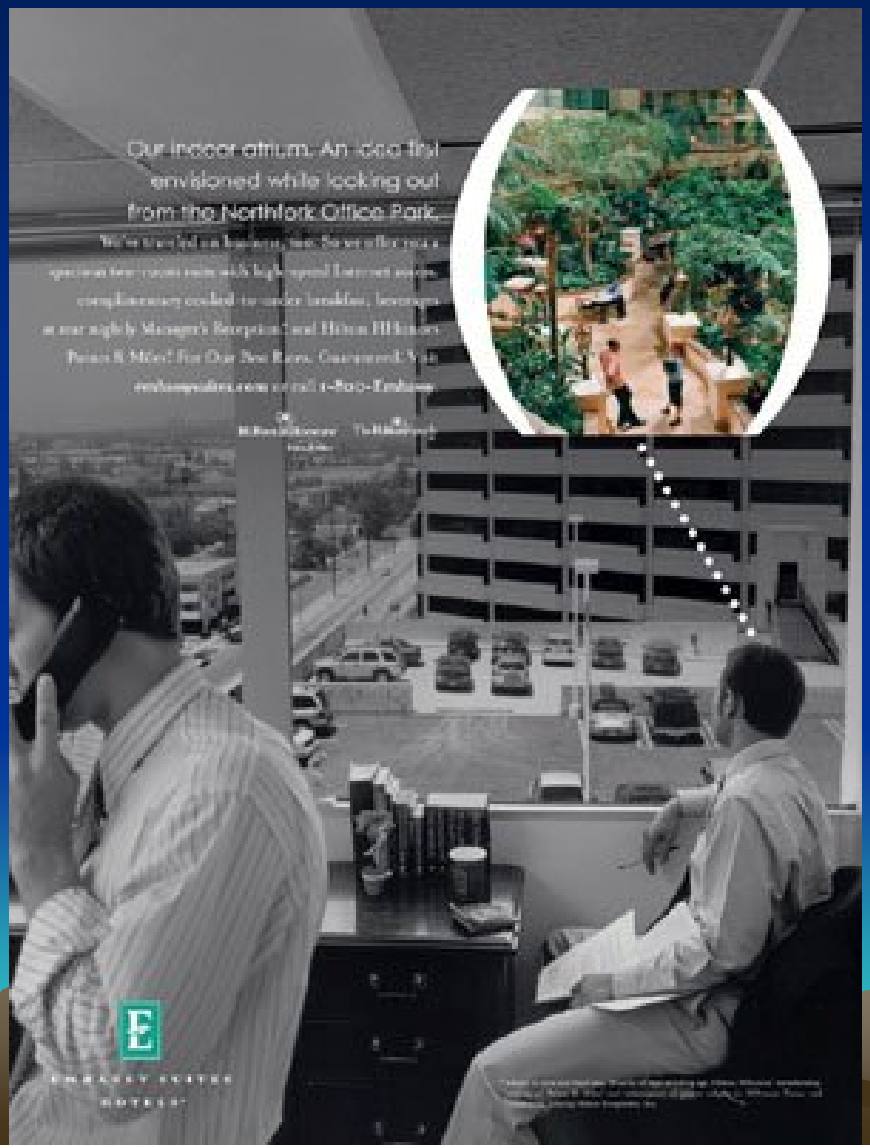


Biowall at the University of Guelph-Humber, Toronto



Biophilic Design

Biophilic Design



Embassy Suites ad

Biophilic Design

Biophilic Design

Disney's Animal Kingdom Lodge

Video

- Forensics and the Body Farm
  - What is back-timing?
  - What is the purpose of the body farm?
  - What are some different variables studied at the body farm lab?

Producers

- Most **producers** are photosynthetic and make carbohydrates by using energy from the sun.
- Some producers (those near hydrothermal vents) use chemosynthesis, taking energy from inorganic molecules

Producers

- **Biomass** – the organic material produced in an ecosystem
- **Measuring Productivity**
  - **Gross primary productivity** is the rate at which producers in an ecosystem capture the energy of sunlight by producing organic compounds.
  - The rate at which biomass accumulates is called **net primary productivity**.

Net Productivity

- Rain forests and estuaries produce about 25 times more biomass than deserts, and about 3 times more than lakes and grasslands
- Rain forests contribute almost 1/3 of the earth's biomass, even though rain forests only represent 5% of earth's surface

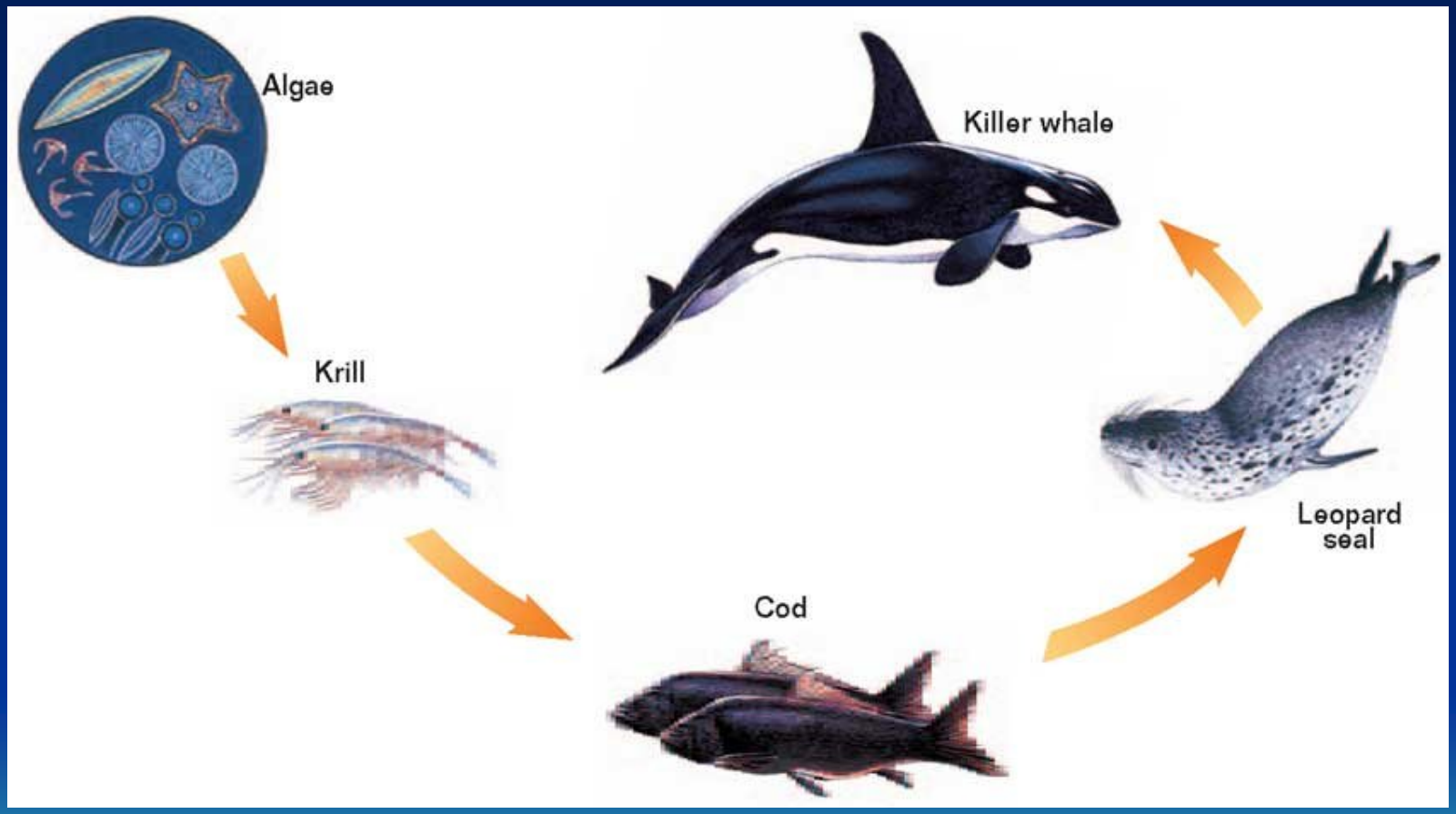
Consumers

- **Consumers** obtain energy by eating other organisms and include herbivores, omnivores, carnivores, detritivores, and decomposers.

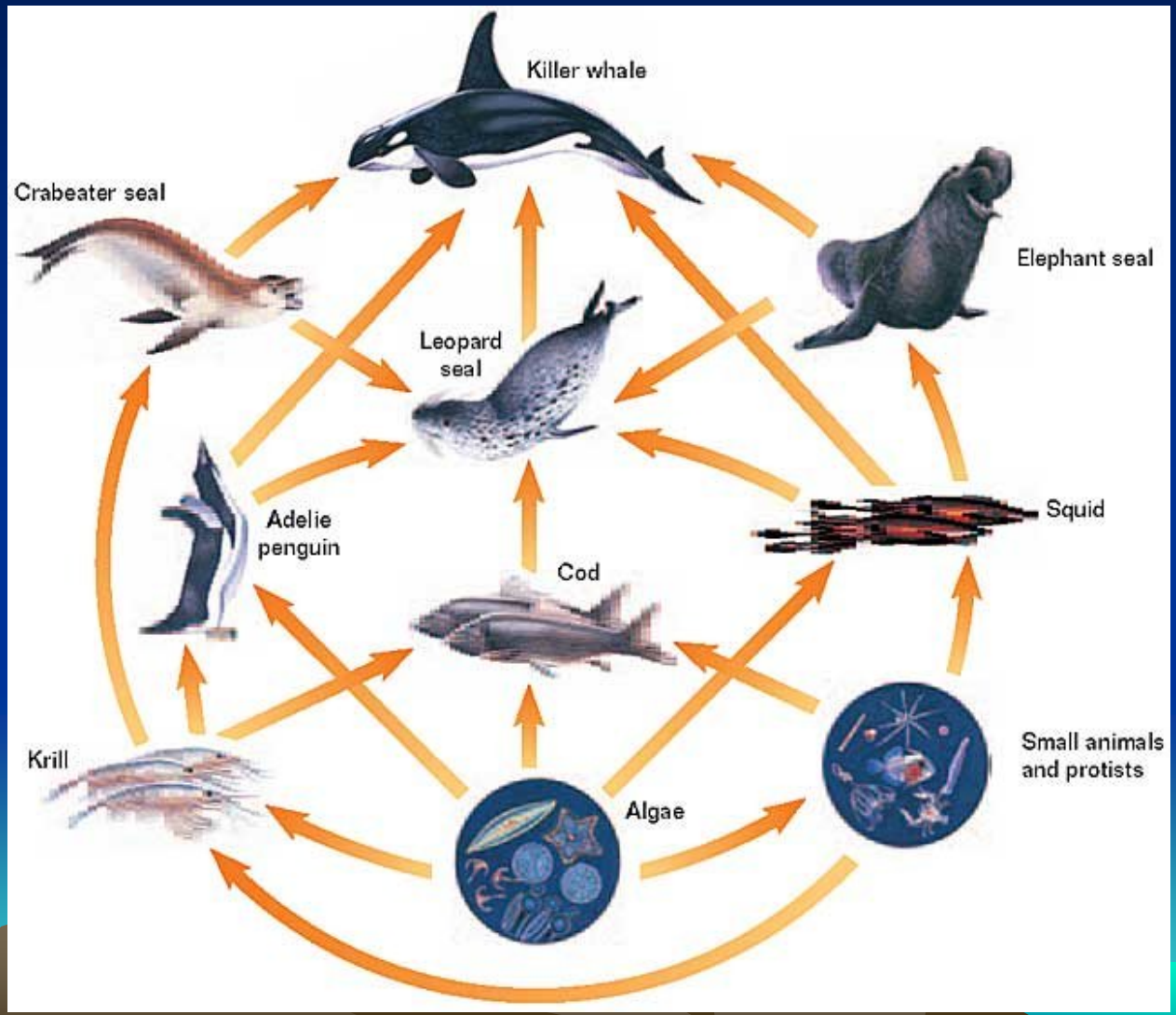
Energy Flow

- **Food Chains and Food Webs**
  - A single pathway of energy transfer is a **food chain.**
  - A network showing all paths of energy transfer is a **food web**.

Food Chains and Food Webs

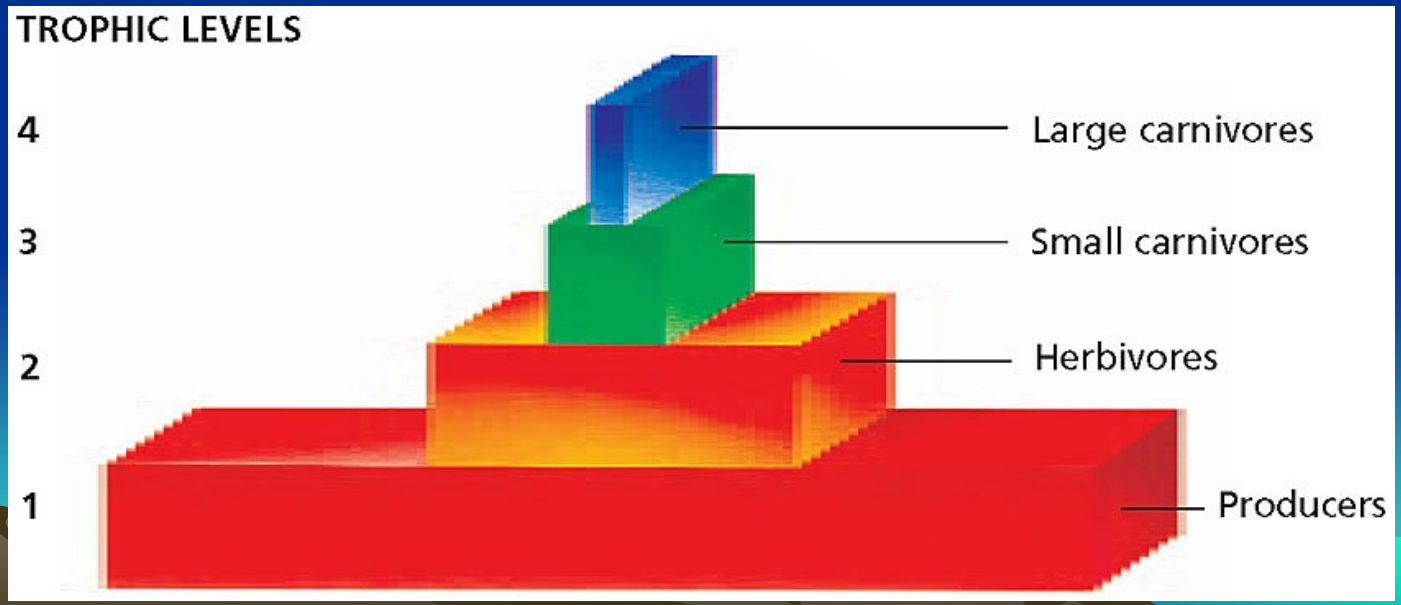


Food Web in an Antarctic Ecosystem

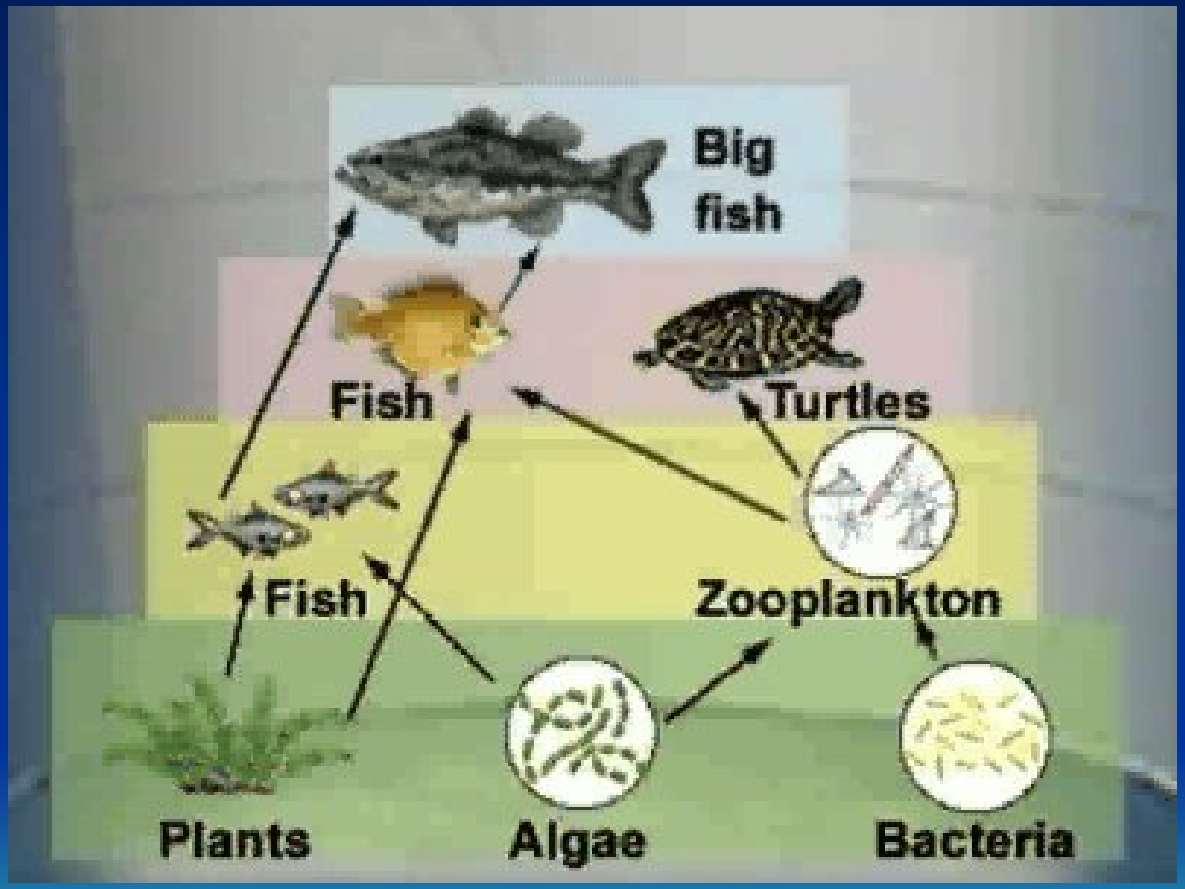


Energy Flow

- **Energy Transfer**
  - Ecosystems contain only a few trophic levels because there is a low rate of energy transfer (about 10%) between each level. Most energy is not transferred because it is lost as heat.

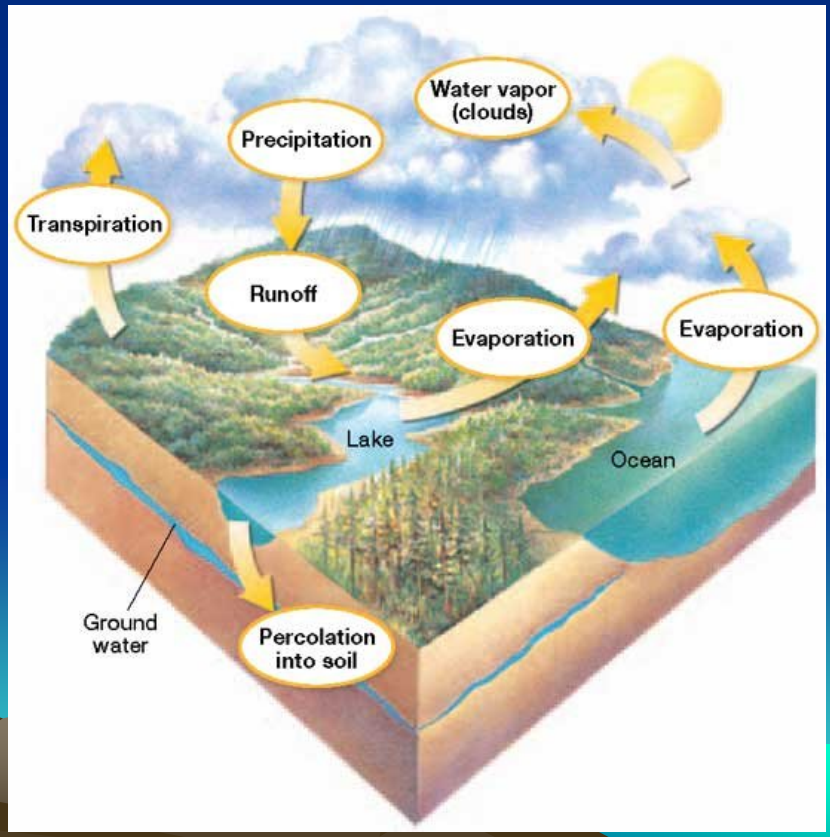


Energy Pyramid



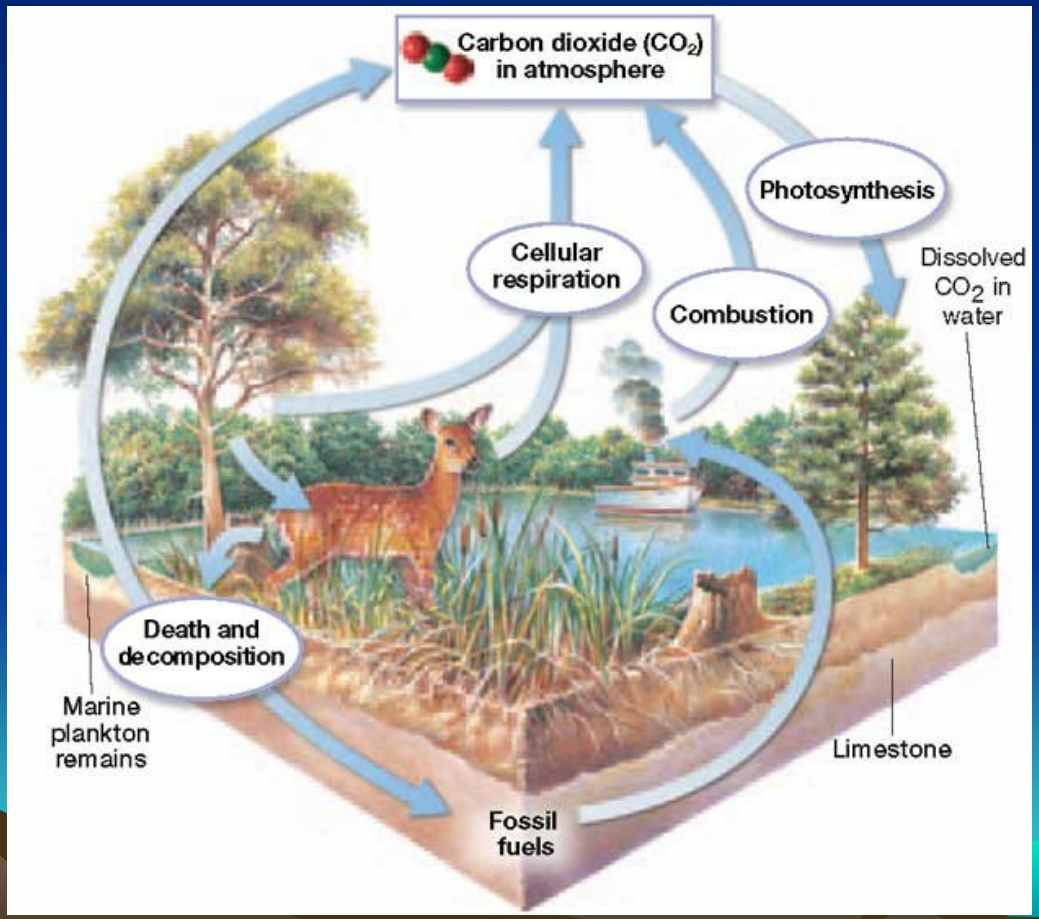
The Water Cycle

- Key processes in the **water cycle** are evaporation, transpiration, and precipitation.



The Carbon Cycle

- Photosynthesis and cellular respiration are the two main steps in the **carbon cycle.**

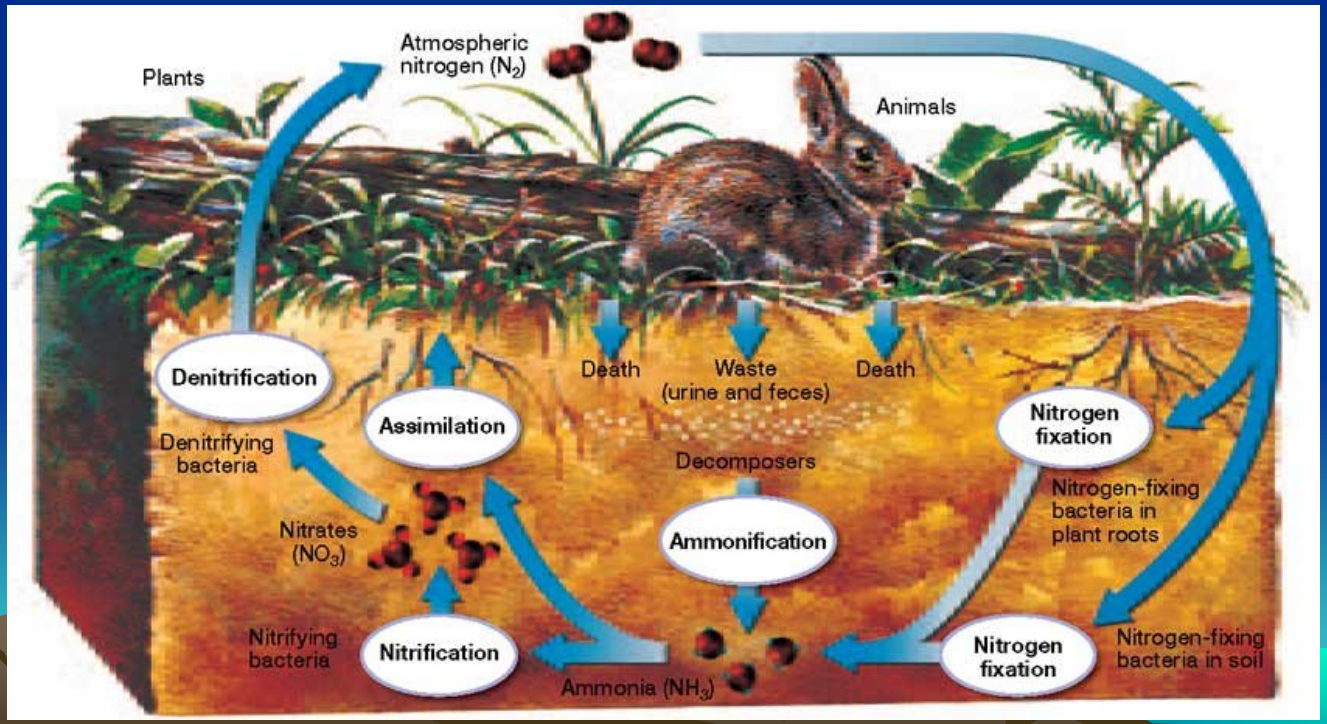


The Carbon Cycle

- Humans are having a significant impact on the carbon cycle.
  - Burning fossil fuels and clearing vegetation causes an increase in carbon levels beyond what is cycled, resulting in a buildup of carbon in the environment
  - **Carbon footprint** – the extra carbon created by an individual or society

Nitrogen Cycle

- **Nitrogen-fixing bacteria** are important in the **nitrogen cycle** because they change nitrogen gas into a usable form of nitrogen for plants. To **fix** means to make the element useable.



Phosphorus Cycle

- In the **phosphorus cycle,** phosphorus moves from phosphate deposited in rock, to the soil, to living organisms, and finally to the ocean.

Video

- What's killing the corals?
  - How is coral bleaching similar to the relationship between a landlord and a renter?
  - Why would global warming be deadly to coral when coral only live in warm waters?