

# Ecosystem Recycling

## The Water Cycle

Movement of water between various reservoirs

- Water is crucial to life
- Cells contain 70-90% water
- Water provides aqueous environment where most of life's chemical reactions occur

Three important processes:

1. **evaporation** – a change from liquid to gas (vapor)
  - i. loss of water from oceans and other bodies of water
  - ii. loss of water from the soil
2. **transpiration** – release of moisture through pores
  - i. release of water through the stomata (small pores) in plants (major)
  - ii. release of water by animals when they breathe, sweat, or exercise (minor)
3. **precipitation** – loss of water from the atmosphere
  - i. rain, snow, sleet, hail, fog

## The Carbon Cycle

The combination of photosynthesis and cellular respiration form the basis of the carbon cycle

- during photosynthesis, plants use carbon dioxide to make carbohydrates
- Animals use oxygen to break down carbohydrates during cellular respiration
- Decomposers release carbon dioxide into the atmosphere

## The Nitrogen Cycle

The complex pathway that nitrogen follows within an ecosystem

- All organisms need nitrogen to make proteins and nucleic acids
- Nitrogen gas,  $N_2$ , makes up about 78% of the atmosphere
- Most living things can use nitrogen only in the form of ammonia,  $NH_3$ 
  - Process of converting  $N_2$  to  $NH_3$  is called **nitrogen fixation**
  - **Nitrogen-fixing bacteria** convert nitrogen gas into ammonia,  $NH_3$
  - Nitrogen-fixing bacteria live in the soil and roots of some kinds of plants (mutualistic relationship)
- Bodies of dead organisms contain nitrogen
- Urine and feces contain nitrogen
- Decomposers break down the corpses and wastes of organisms and release the nitrogen they contain as ammonia
  - This process is called **ammonification**
  - Through ammonification, nitrogen is reintroduced into the ecosystem
- Bacteria in the soil take up  $NH_3$  and oxidize it into nitrites and nitrates – this process is called **nitrification**
- Nitrogen is returned to the atmosphere through **denitrification**
  - Occurs when anaerobic bacteria break down nitrates
- Plants can absorb nitrates and ammonia from the soil
- Animals obtain it by eating plants and other organisms
  - Digest the proteins and nucleic acids