NOTES 11.2

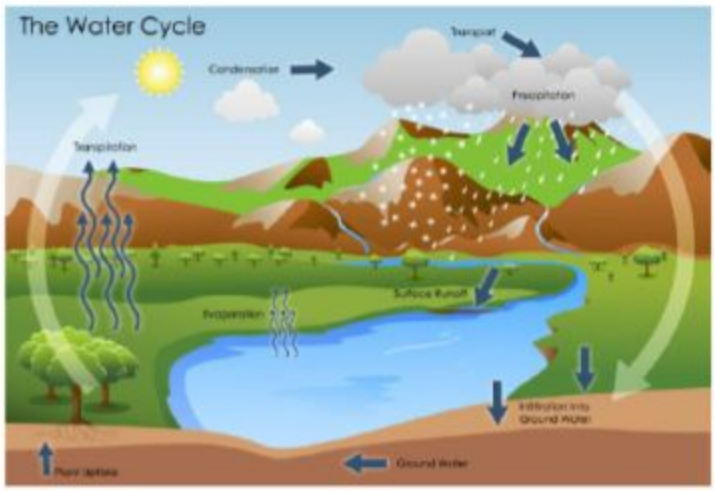
Chapter 11 – Matter & Energy in the Environment
Lesson 2 – Cycles of Matter

How does matter move in ecosystems?

The water that you used to wash your hands this morning might have once been part of an Antarctic glacier. How can this be?

Water moves continuously through ecosystems. The same is true of carbon, oxygen, nitrogen, and other types of matter.

4 cycles of matter –



1. **Water Cycle**

- Water covers 70% of Earth's surface & 97% of water is in oceans.
- Water continually cycles from Earth to its atmosphere and back again

The water cycle involves 3 processes - **evaporation, condensation & precipitation**

Q: What is evaporation?
A: the process during which liquid water changes into a gas called water vapor

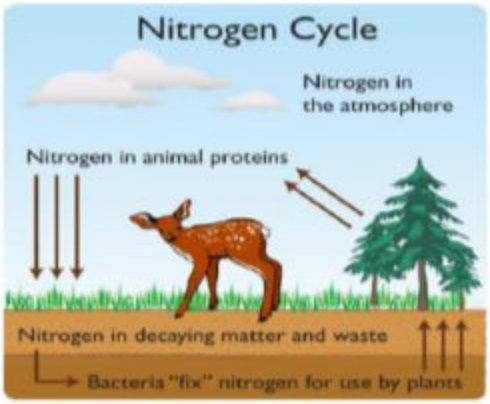
- Water vapor rises into the atmosphere.
- Water is released from living things – transpiration (plants) & cellular respiration (humans).

Q: What is condensation?
A: the process during which water vapor changes into liquid water

- Clouds are made of millions of tiny water droplets or crystals of ice that condense on particles of dust in the atmosphere.

Q: What is precipitation?
A: water that falls form clouds to Earth's surface

- Enters into bodies of water or soaks into soil
- Can be rain, snow, sleet, or hail



2. Nitrogen Cycle

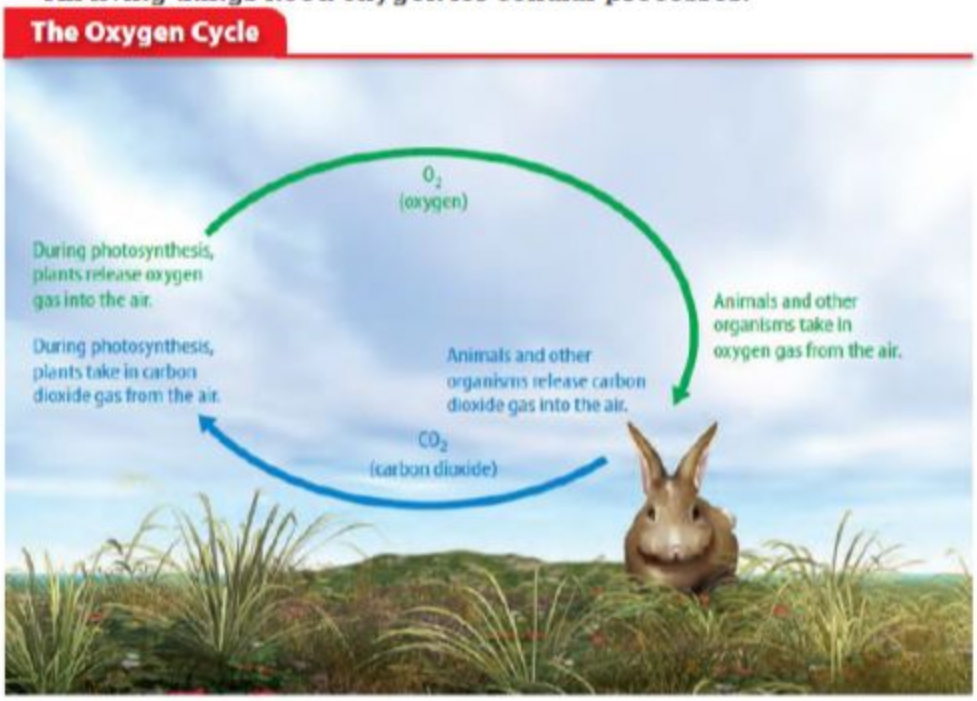
- The atmosphere is mostly nitrogen in a form that plants & animals cannot use.
- Nitrogen must be changed into a different form with the help of nitrogen fixing bacteria that live in soil & water through the process of **Nitrogen fixation**

Q: What is nitrogen fixation?
A: the process that changes atmosphere nitrogen into nitrogen compounds that are usable by living things

- Plants take this now usable nitrogen in from their roots in soil and water.
- Animals take in nitrogen when they eat plants.
- When organisms die & decompose, they return nitrogen to the environment.
- Nitrogen is also returned to the environment in animal waste products – manure – which provides nitrogen to plants for better growth.

3. Oxygen Cycle

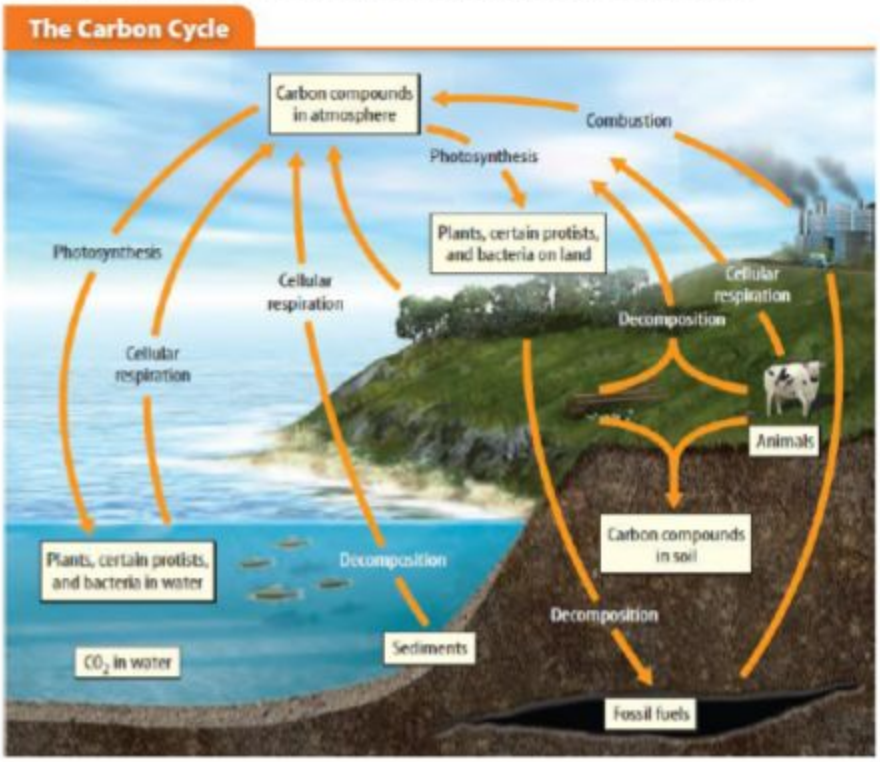
- All living things need oxygen for cellular processes.



4. Carbon Cycle

- All organisms contain carbon.
- Animals & humans obtain carbon from food.

- Plants get carbon from the atmosphere & water.
- Carbon can also enter the atmosphere from decaying remains of organisms in the form of carbon dioxide and in photosynthesis as a reactant.



- Carbon is found in fossil fuels.
- Carbon dioxide is one of the gases, in the atmosphere, that absorbs thermal energy from the Sun & keeps Earth warm – known as the **Greenhouse Effect**

Q: What is the Greenhouse Effect?
A: a process that occurs when gases in Earth's atmosphere trap the Sun's heat – which prevent Earth from getting too hot or too cold

- An increase in Greenhouse gases can harm ecosystems because more thermal energy is absorbed thus increasing temperatures.