Science 9

Earth Science IV

Name:
Date:
Block:

1. **Water Cycle**
2. **Carbon Cycle**

_____ _____ occurs when matter moves from one place to another on Earth. Matter can cycle throughout the Earth both _____ and through _____ _____. In this unit, we will be discussing four major matter cycles: water, carbon, nitrogen, and phosphorus.

Water Cycle

Water is _____ on Earth's _____ in the form of ponds, lakes, rivers, oceans, snow, and ice. It can also be found _____ Earth's _____ in the form of ground water and in the _____ as water vapour.

All water continuously cycles through ecosystems through three main processes:

- _____: Heat from the Sun causes water at Earth's surface to evaporate changing liquid water into water vapour
- _____: As warm air rises, it cools and condenses into water droplets or ice crystals, forming clouds
- _____: Water falls back to Earth's surface when it rains, snows, sleets, or hails

Water is able to travel along Earth's surface as '_____'; it will move downhill back into the ocean due to _____.
Water that is underground is called _____
Water moves from the ground surface into the soil by a process called _____

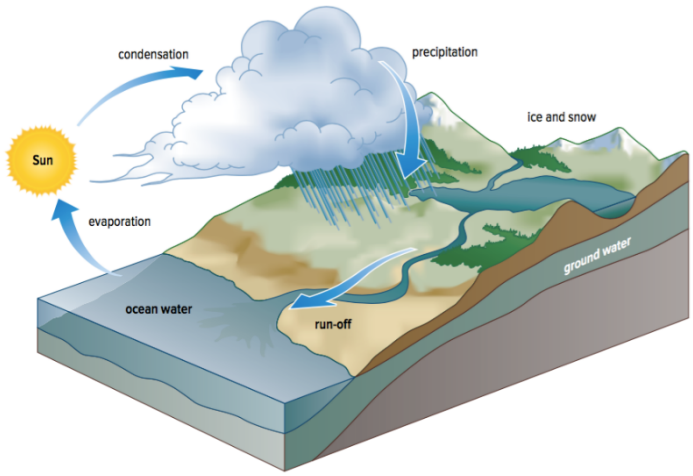


Figure 4.16: During the water cycle, water is exchanged among the hydrosphere, atmosphere, and geosphere.

Water can also travel through the _____ by a process called _____.
Transpiration occurs when water is _____ by the roots of a _____, carried through it, and eventually it will _____ through small pores in the _____.

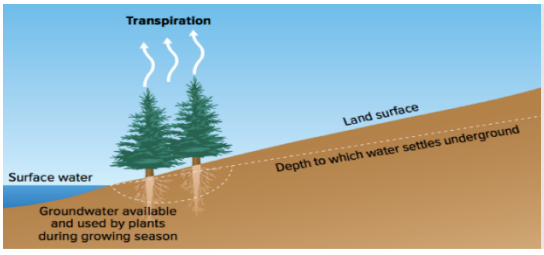


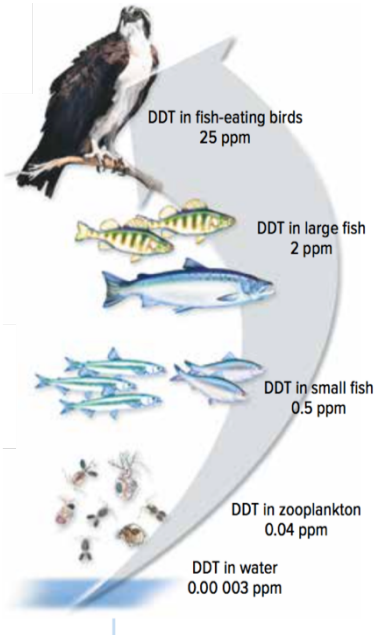
Figure 4.17: Studies show that about 10% of water vapour in the atmosphere is released by plants.

How have humans impacted the water cycle?

Water can be _____ when the water quality of both fresh and salt water have been _____. This can result in negative effects on organisms and can make water unsuitable for its desired uses.

There are two major types of pollution:

- _____ _____ pollution: a _____ identifiable _____ of pollution that pollutants come from
  - Examples: factories, power plants, sewage treatment plants, oil wells
- _____ _____ pollution: a source of pollution that is difficult to track where it comes from; these pollutants are released in a wide area
  - Examples: run-off from farms, construction sites, parking lots



When pollutants enter into the environment, it is difficult for it to break down. When micro-organisms (phytoplankton, bacteria) eat pollutants in the water (such as pesticides, plastics, etc.), it will _____ in its _____ and body _____. This can lead to **bioaccumulation** and **biomagnification**.

- _____: the process where pollutants collect in the cells and tissues of organisms
- _____: the increase in concentration of pollutants in tissues of organisms that are at higher levels in a food chain or food web

Practice Questions:

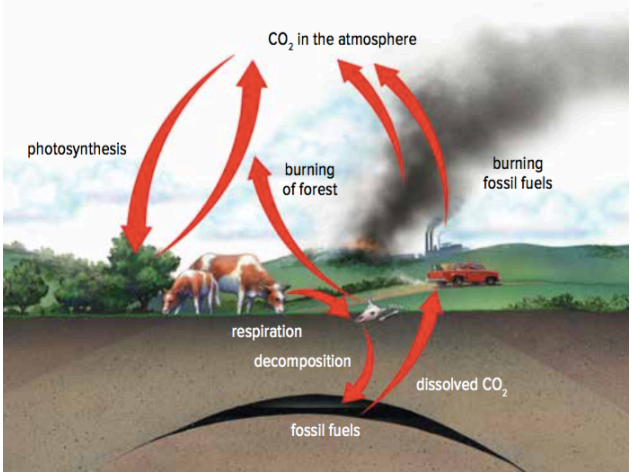
1. Explain why the sun and gravity are considered the driving forces of the water cycle.

2. Would biomagnification be possible without bioaccumulation occurring? Explain

Carbon Cycle

Carbon is cycles through both abiotic and biotic factors. In the carbon cycle, carbon predominantly exists in the form of _____ _____ gas (_____).

- Carbon dioxide gas moves from the atmosphere into the biosphere through _____ and _____ _____
- Carbon dioxide also moves back to the atmosphere when organisms _____ and _____
- Carbon enters the _____ when the remains of organisms are _____ under _____ layers



Carbon can also be _____ in order to be used for later.

- Some carbon is stored in the woody _____ of living _____
- Some carbon is stored in the _____ remains of _____ buried deep in the ground
    - Over time, this stored carbon transforms into carbon-rich _____ _____ (coal, oil, natural gas)

How have humans impacted the carbon cycle?

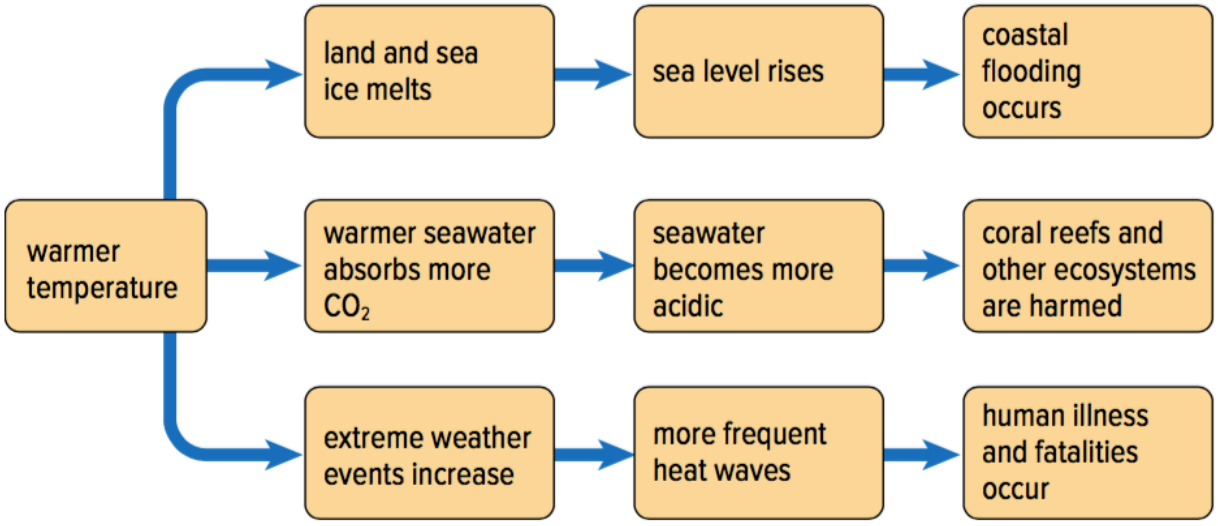
The amount of carbon dioxide used by _____ and given off by _____ _____ is nearly the _____ (carbon dioxide is balanced). Over time, human activities (such as burning fossil fuels, burning trees) have impacted the carbon cycle by releasing excess carbon into the atmosphere. This excess carbon has led to _____ _____ and global _____ _____ as carbon dioxide is a greenhouse gas that traps heat in the atmosphere.

- **Global warming**: An _____ in the average _____ of Earth's surface
- **Global climate change**: A long-term _____ in Earth's _____

The effects of Excess Carbon

Earth's surface temperature: Increased by between _____ and _____ in the past 100 years

- This "small" change can affect conditions in all of Earth's spheres



The effects of a rising sea level:

- Some _____ have gone _____
- Salt water gets into the drinking water supply
- _____ _____ and destruction of wetlands

The effects of the changing ocean chemistry:

- _____ becomes more _____ because it absorbs more carbon dioxide from the air
- An acidic and warming ocean can _____ _____ _____ and _____ themselves (acidity dissolves the organisms' shells)