Humans Affecting Earth Cycles

Humans are affecting earth cycles for a few reasons.

1. Increased population: Human population has gone from 3 billion around 1960 to over 8 billion today. More people equal the need for more food, resources, etc.
2. More stuff: Every generation has more stuff that requires more energy and resources. Example in 1980 there were no home computers or cell phones. Today there are billions of them.
3. Increase waste: We are a throw away society. More waste creates more heat and greenhouse gases. When something broke there were people to fix them. Example in 1980 a TV repair man would repair a TV where as today we throw them away.

Energy Balance

- The sun’s energy coming into Earth is fairly constant.

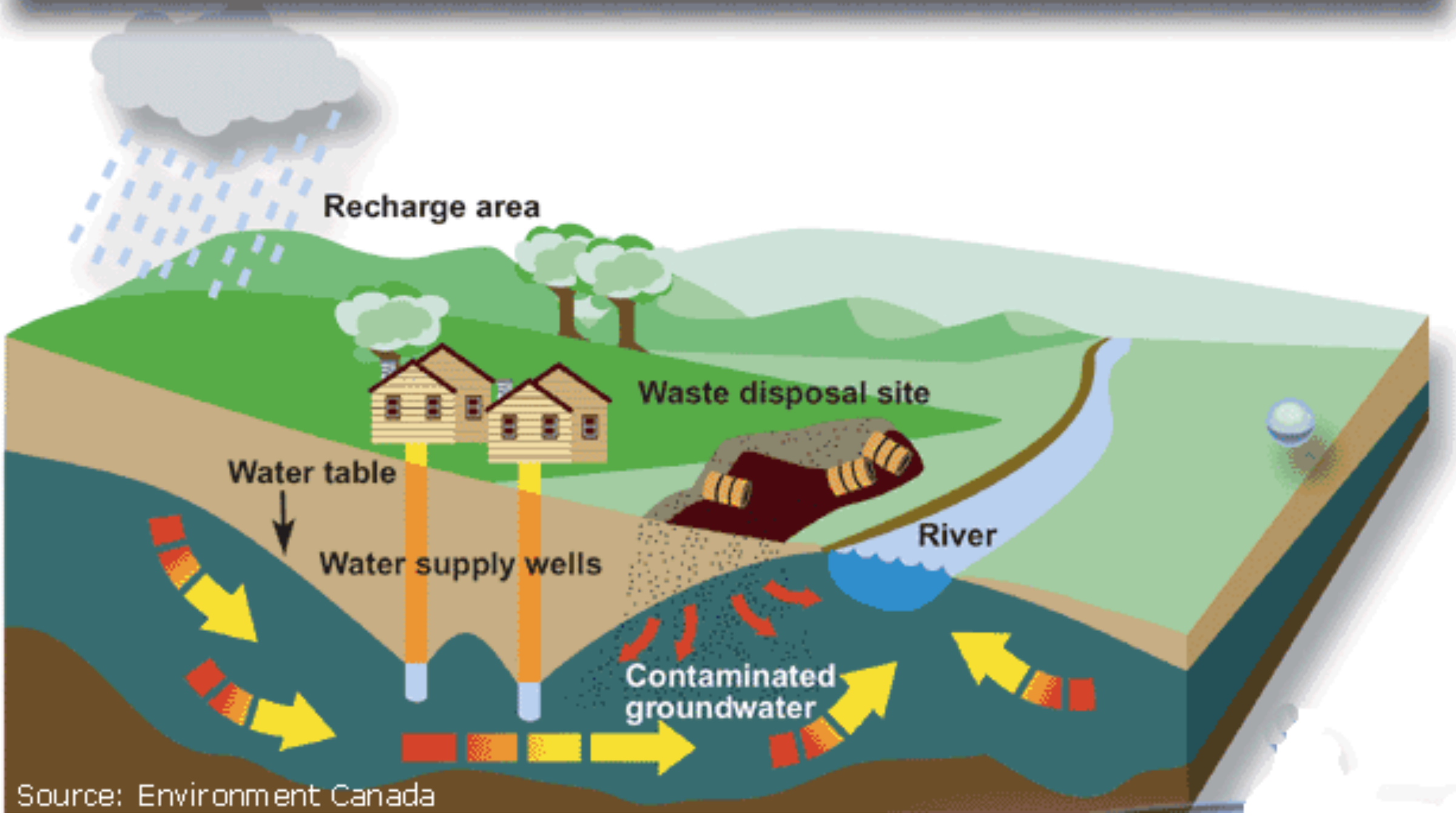
- If more is reflected than coming in the Earth cools and vise versa. Also, if more heat is produced by human activity the Earth will warm

- Humans are reducing the amount of heat reflected and creating more with earth activities. Example: less trees, more cities, more roads, etc. reduce reflection & burning fuels, increase population, more stuff, etc. increases heat produced.

Water Cycle

- Humans built dams which block the natural flow of water
- Irrigation removes ground water faster than input
- Deforestation increases runoff
- Climate change reduces water frozen in ice caps and increases sea level

Groundwater contamination from a waste disposal site



Rock Cycle

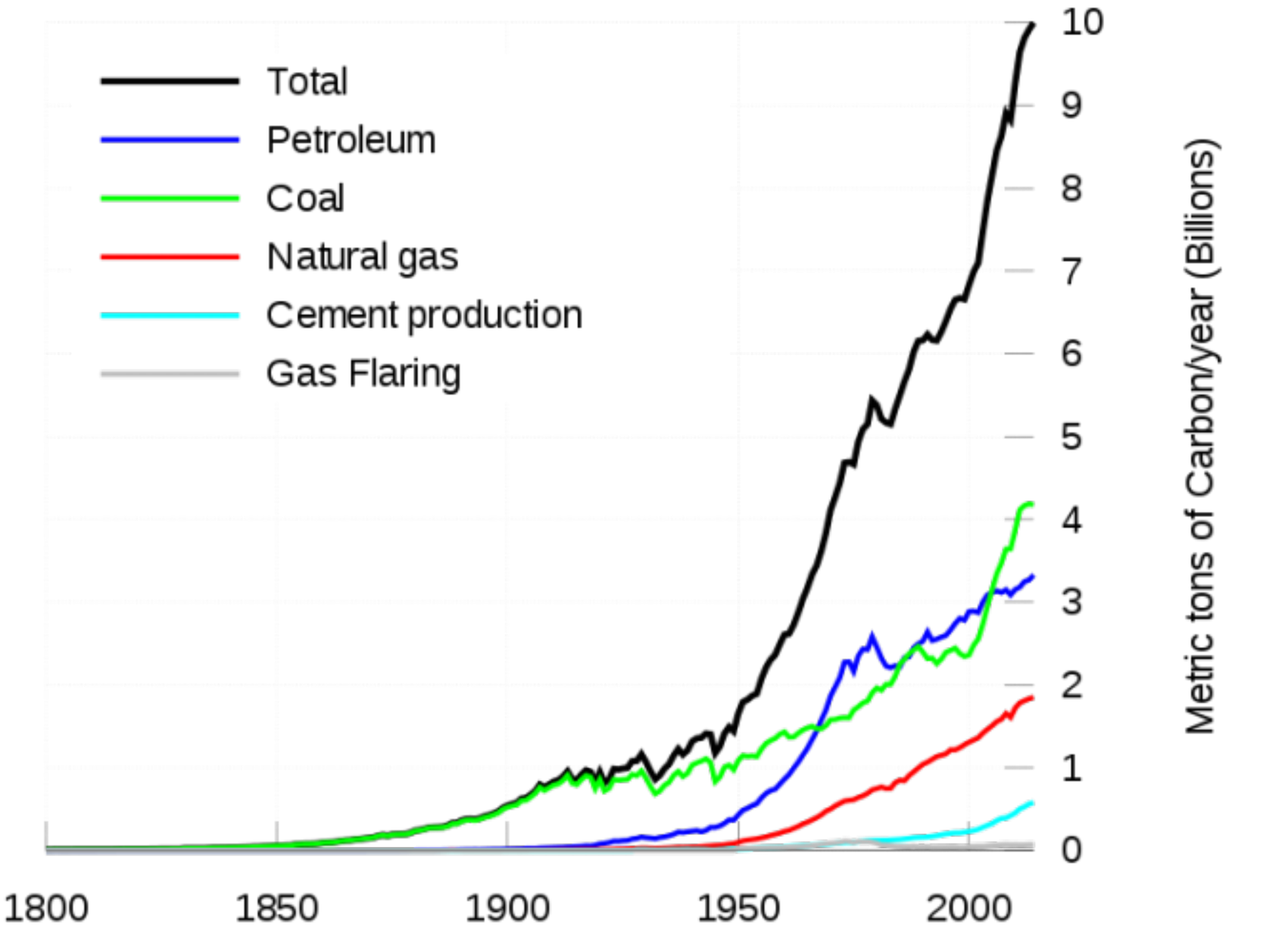
- Humans use rocks and minerals for a wide variety of purposes.
- These actions produce more sediments that can affect wildlife in streams and rivers.
- Mining also increases weathering which will increase erosion and or sedimentation.

Human Impact on the Rock Cycle

- Rates of erosion have increased
  - Why?
- Mining has striped many of the resources that are nonrenewable
  - Quarrying of rocks and minerals to fight the ever growing need for resources
  - Why?

Carbon Cycle

- Deforestation: The loss of trees slows the taking in of CO2 for photosynthesis
- Burning Fossil Fuels: Takes CO2 out of the crust and puts it in the atmosphere
- Making Cement: Limestone is burned releasing CO2
- Increased Population: 8 billion people producing more CO2
- Agriculture: When the soil is cultivated it releases CO2


Total
Petroleum
Coal
Natural gas
Cement production
Gas Flaring
10
9
8
7
6
5
4
3
2
1
0
Metric tons of Carbon/year (Billions)
1800
1850
1900
1950
2000

Global carbon dioxide budget
gigatonnes of carbon per year (2004-2013)

Carbon cycle

Greenhouse gases

Atmospheric growth (Sources-Sinks)
4.3 ± 0.1

Deforestation

0.9 ± 0.5

Agricultural activities

Burning of fossil fuels

8.9 ± 0.4

Photosynthesis

Land sink
2.9 ± 0.8

Ocean acidification

Ocean sink
2.6 ± 0.8

Geological reserves

Nitrogen Cycle

- The production of fertilizers adds more nitrogen to the soil, water, and atmosphere. This is one reason manatees are starving. Algae is covering their food supply (aquatic grasses).
- Burning of fossil fuels increases nitrogen in the air.
- Intense farming of legumes (ex: soybeans) adds more nitrogen to the soil.

How Humans Affect the Nitrogen cycle?

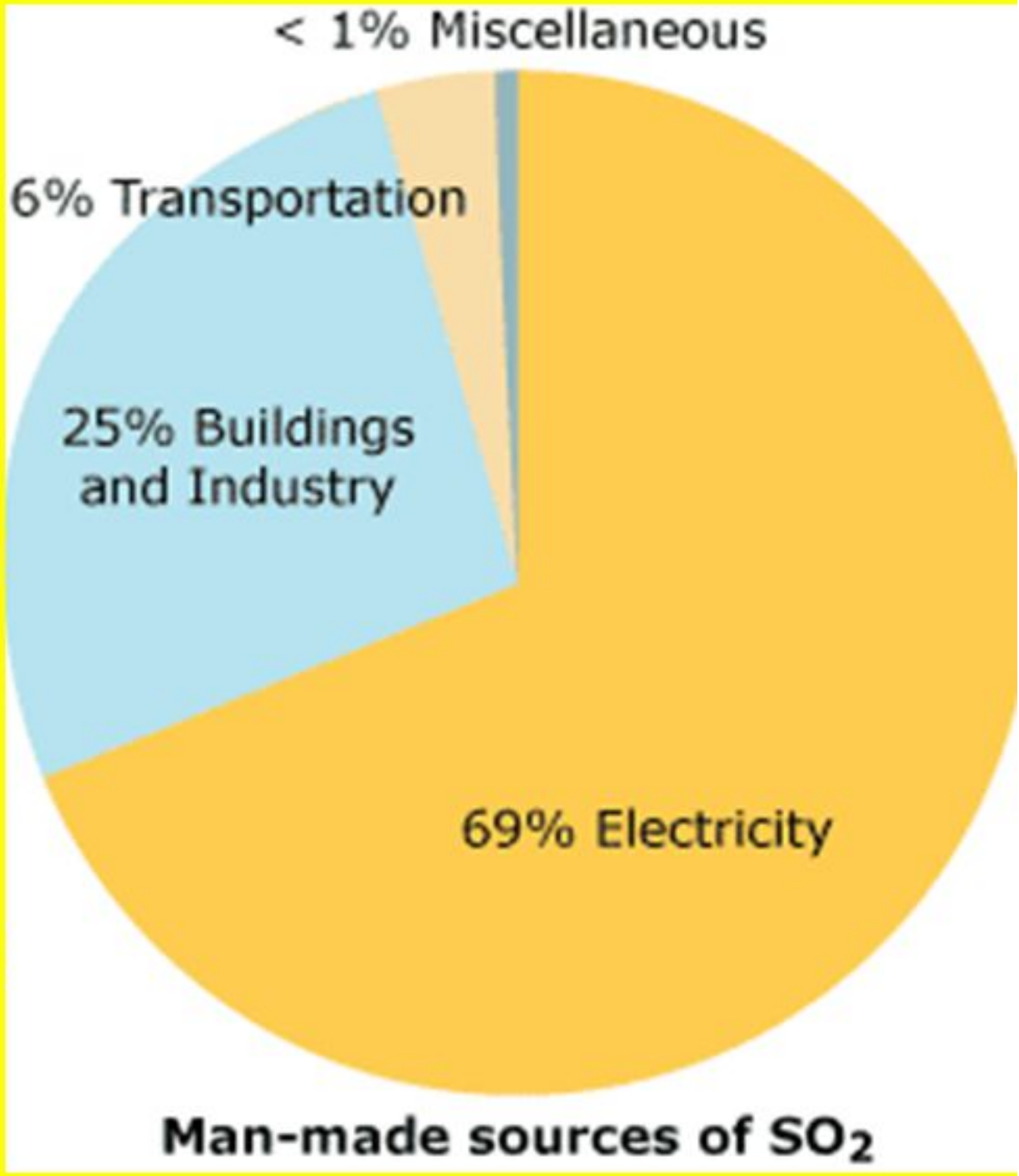
- Humans have doubled the natural rate of nitrogen entering the land-based nitrogen cycle, through the use of chemical fertilizers and fossil fuels.
- The increase in nitrogen has increased water and atmospheric pollution, acidification of lakes, streams, and soils, and has contributed to greenhouse gases.
- Some plants adapted to soil low in nitrogen have been negatively affected or replaced by nitrogen-loving plants. This has affected the animals that consume those plants
- Read the article Human alteration of the Global Nitrogen cycle: Causes and Consequences. The article can be found online, or in the journal Ecological Applications (Volume 7, August 1997)

Sulfur Cycle

- Most sulfur is emitted into the atmosphere by the burning of fossil fuels in the form of sulfur dioxide.
- The production of electricity from burning coal produces most of the SO2.
- More sulfur is added to the environment than is cycled back in and that increases the acidity of our rain.

Human Effects on the Sulfur Cycle

- **1/3 of all sulfur released is due to human activity**
  - **Add sulfur dioxide to atmosphere by:**
    - **Burning coal and oil**
      - **Produces sulfuric acid**
    - **Refining sulfur-containing petroleum**
    - **Mining & converting sulfur-containing metallic ores into free metals**
      - **copper, lead, & zinc**

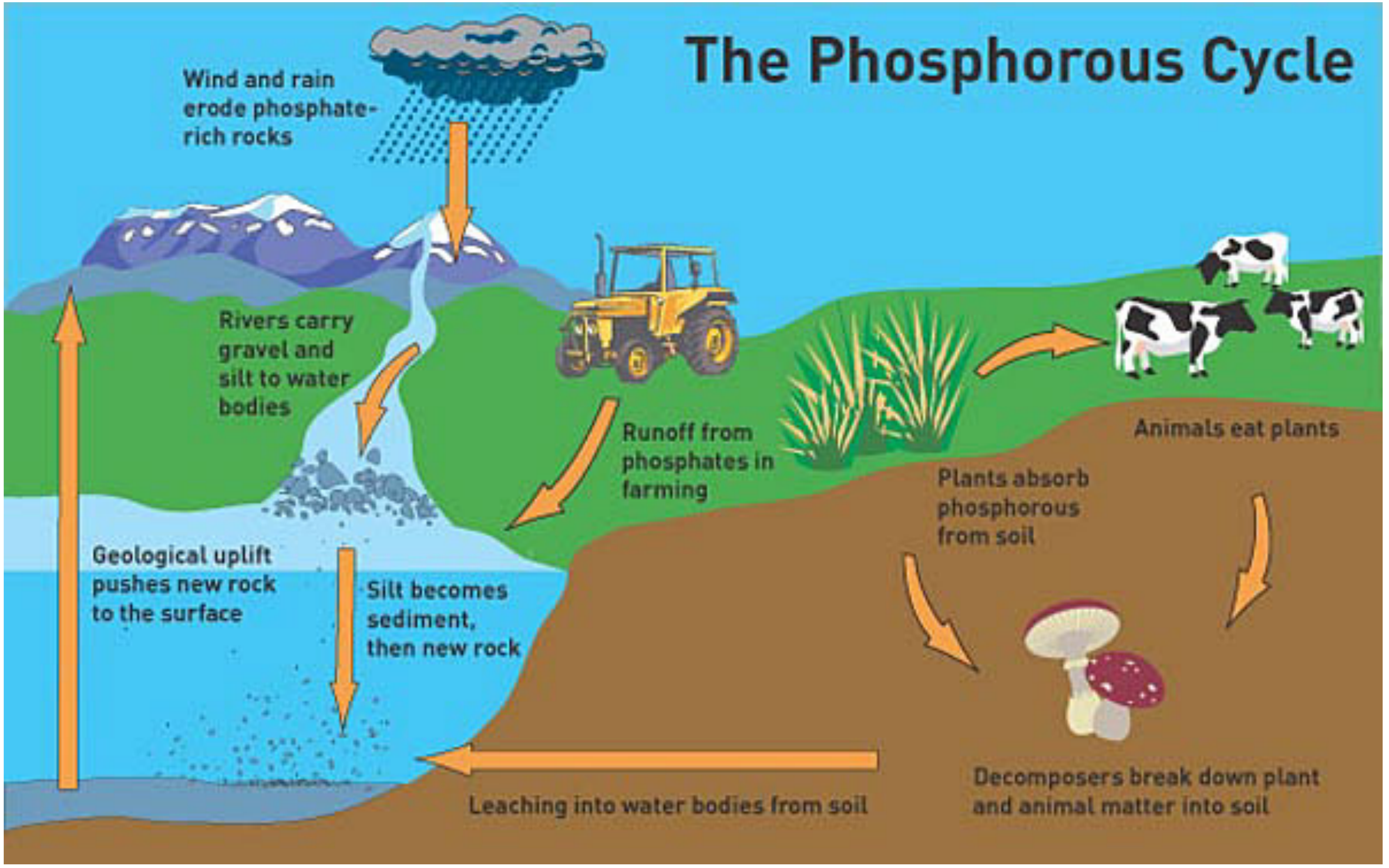


Man-made sources of SO_2

Phosphorous Cycle

- I forgot to add this cycle in the last powerpoint.
- Phosphorous is produced when rocks weather and erosion carried it to the sea or taken up by plants to be put in the food web and then to sediments. Sediments turn to rock that is weathered to complete the cycle.
- Humans increase the phosphorous by mining phosphate rocks for fertilizer and add it to the soil. This makes its way to the waterways where microorganisms use the nutrient and Oxygen and impact aquatic life negatively.

The Phosphorous Cycle



Exam # 1 Review

- Earth's energy balance
  - Where does ALL Earth's energy come from
  - Explain the location and process of one of Earth's Protection Zones
  - Name 2 characteristics of Solar Energy
  - What is the Global Radiation Balance
  - List 3 ways Earth's energy is reflected to space
  - What are the 2 most common gases in the atmosphere
  - Explain 2 ways Earth's heat energy is transferred
  - Explain the difference between Sensible & Latent heat

- Rock Cycle
  - Draw and label the Rock Cycle
- Water Cycle
  - List 5 ways water moves through its cycle
  - Where is most of Earth’s water thought to be
- Carbon, Nitrogen, Sulfur, Phosphorous Cycles
  - Name 3 cycles on Earth other than water and rock
  - Name 4 human activities that disrupt one or more Earth cycles

- Climate Cycles
  - What is the difference between weather & climate
  - Name one indicator that shows the climate is warming
  - Besides humans, what natural event is responsible for warming the climate
- Humans Affecting Earth's Cycles
  - Name 4 human activities that disrupt one or more Earth cycles