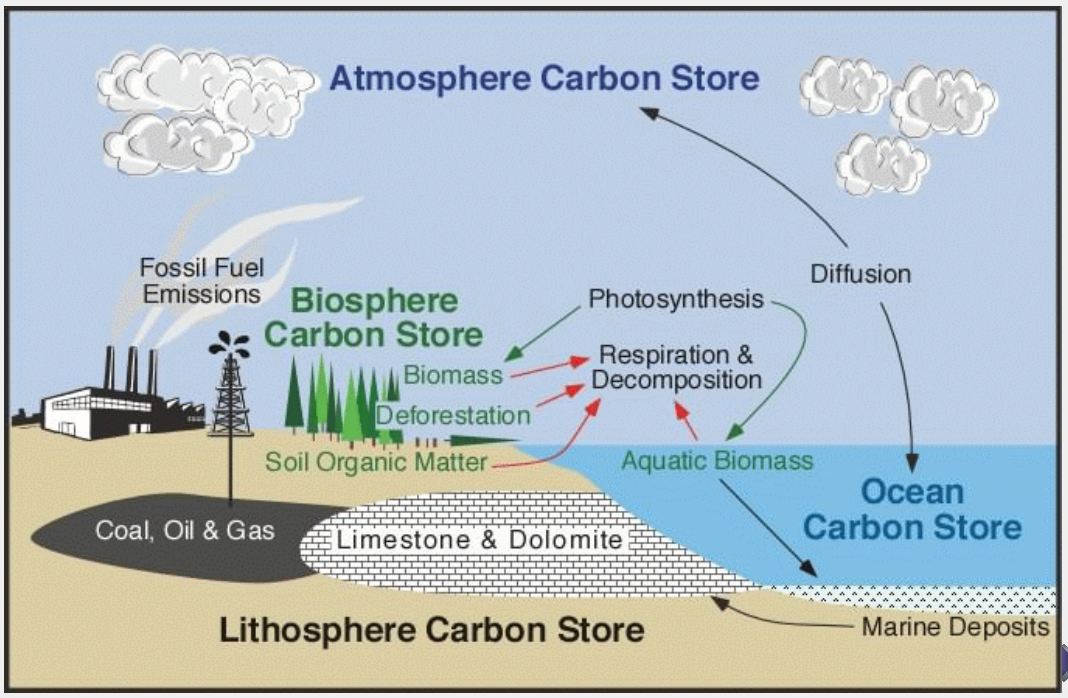
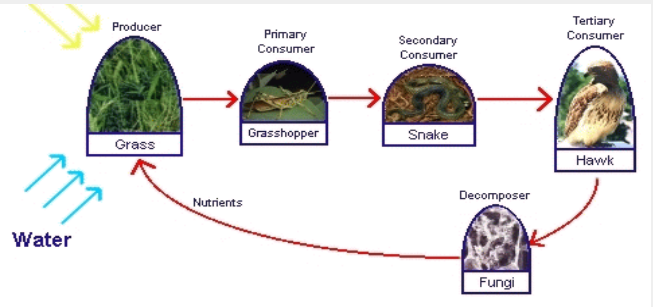
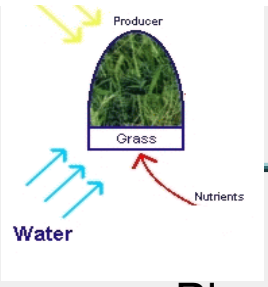
The Carbon Cycle Extended



'Organic' Carbon Based Life

- The primary building block of all molecules in any living thing is carbon
- The molecules that we get from the food we eat including proteins, carbohydrates, fats and nucleic acids are all long chains of carbon molecules
- These molecules are used to build cells and tissues in your body Eg. Muscle-protein
- Therefore the food chain is fundamentally a carbon cycle.





Photosynthesis

Where do plants get their carbon?

- Plants create carbon molecules by a process called Photosynthesis using Carbon Dioxide CO_2 from the atmosphere

$$CO_2 + H_2O + \text{energy} \rightarrow C_6H_{12}O_6 + O_2$$

carbon dioxide | water | sun | glucose | oxygen

The sugar/glucose is stored by the plant or turned into other molecules the plant needs

Cellular Respiration

- Heterotrophs ubtain their energy by metabolizing food
- This process is called cellular respiration
- Respiration occurs in the mitochondria of every living cell

$$C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + \text{energy}$$

Glucose | oxygen | carbon dioxide | water | (heat)

Decomposition

- The same basic equation can be used to describe decomposition

Organic Matter + O_2 -> CO_2 + H_2O + energy

oxygen; carbon dioxide; water; (heat)

- In decomposition *methane* CH_4 as well as CO_2 is released into the atmosphere

Combustion

The same basic equation can be used to describe combustion

Fuel

Organic Matter + O_2 -> CO_2 + H_2O + energy

oxygen; carbon dioxide; water; (heat)

John McColgan / U.S. Forest Service

Human / Anthropologic Alterations to the Carbon Cycle

Land Use Changes

- Deforestation: decreases photosynthetic capacity
  - Loss/gain of carbon stored in biomass/vegetation
  - Agricultural crops fix less carbon than forests
  - Deforestation in tropical areas leads to desertification
- Draining wetlands
  - 85% of wetlands have been lost in S. Ontario
  - Loss/gain of carbon stored in biomass/peat
  - Increases the rate of decomposition of stored carbon