https://fc.deltasd.bc.ca/~mannandale/sc10/hw/EP_carbon_cycle.swf - carbon cycle interactive

The Carbon Cycle – Additional Notes

Carbon atoms are a fundamental unit in all living things. It is also part of oceans, air, rocks and soils. Carbon moves between different stores or reservoirs. Carbon can be stored in many locations. Some carbon reservoirs (sinks) hold carbon for long periods of time while other reservoirs offer only short time storage.

Carbon moves from the atmosphere to plants.

In the atmosphere, carbon is attached to oxygen in a gas called carbon dioxide (CO_2). With the help of the Sun, through the process of photosynthesis, carbon dioxide is pulled from the air to make plant food (glucose – $C_6H_{12}O_6$) from carbon. Plants convert the food into biomass and use the energy contained in the food to grow, repair and other life processes. Plants, algae, some plankton and cyanobacteria perform photosynthesis. Organisms that produce their own food from the sun are called producers.

$$6CO_2 + 6H_20 + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2$$

Carbon moves from plants to animals.

Through food chains, the carbon and energy that is in plants moves to the animals that eat them. Animals that eat other animals get the carbon from their food too. Animals that eat plants or other animals are called consumers.

Carbon moves from plants and animals to the ground.

When plants and animals die, their bodies, wood and leaves decay bringing the carbon into the ground. Some becomes buried miles underground and will become fossil fuels. Detrivores/decomposers help break down dead plants and animals. In this process some carbon is released back to the atmosphere or becomes part of the soil.

Carbon moves from living things to the atmosphere.

Each time you exhale, you are releasing carbon dioxide gas (CO_2) into the atmosphere.
Animals and plants get rid of carbon dioxide gas through a process called respiration.

$$C_6H_{12}O_6 + O_2 \rightarrow 6CO_2 + 6H_20 + \text{energy}$$

The energy released through respiration is used for growth, repair and other life processes.

Carbon moves from fossil fuels to the atmosphere when fuels are burned.

When humans burn fossil fuels to power factories, power plants, cars and trucks, most of the carbon quickly enters the atmosphere as carbon dioxide gas. Each year, five and a half billion tons of carbon is released by burning fossil fuels. That's the weight of 100 million adult African elephants! Of the huge amount of carbon that is released from fuels, 3.3 billion tons enters the atmosphere and most of the rest becomes dissolved in seawater.

Carbon moves from the atmosphere to the oceans.

The oceans, and other bodies of water, soak up some carbon from the atmosphere. Oceans act as a huge reservoir for carbon. Carbon is either dissolved in the ocean water, being utilized by organisms in

the ocean or depositing as sediment on the ocean floor. Temperature of the ocean determines the amount of carbon that can dissolve. Warmer, more saline water contains less carbon than colder less saline water.

Carbon moves from underground to the air.
Volcanoes and forest fires release CO_2 gas to the air.

Carbon dioxide is a greenhouse gas and traps heat in the atmosphere. Without it and other greenhouse gases, Earth would be a frozen world.

Humans have burned so much fuel that there is about 30% more carbon dioxide in the air today than there was about 160 years ago before the start of the Industrial Revolution. Carbon is being removed from long-term storage more quickly than it naturally would as we mine coal and drill for oil and gas.

Humans are also influencing carbon levels in the atmosphere by clearing land for agriculture and urban development. These actions reduce plants that can absorb and use CO_2.

Carbon moves through our planet over longer time scales as well. For example, over years weathering of rocks on land can add carbon to surface water which eventually runs off to the ocean. Over long time, carbon is removed from seawater when the shells and bones of marine animals and plankton collect on the sea floor. These shells and bones are made of limestone ($CaCO_3$), which contains carbon. When they are deposited on the sea floor, carbon is stored for a very long time in the sediments.

The amount of limestone deposited in the ocean depends somewhat on the amount of warm, tropical, shallow oceans on the planet because this is where prolific limestone-producing organisms such as corals live.

After reading the information on the carbon cycle and filling in the details on the cycle diagram, complete the following questions:

Use the words in the text box for the blanks!

coal	oil	natural gas	burning of fossil fuels	forest fires	volcanoes	CO_2
photosynthesis	respiration	ocean	glucose	greenhouse	fossil fuels	

1. Plants remove CO_2 from the atmosphere in the process of _____ to make _____ and oxygen.
2. Animals use oxygen in the process of _____ to return CO_2 to the atmosphere.
3. The _____ is the main regulator of CO_2 in the atmosphere because CO_2 dissolves easily in it.
4. As leaves decompose, carbon in them may be released as _____ into the atmosphere or trapped in the soil to eventually become _____.

5. Today these deposits are burned as fossil fuels, which include _____, _____, and _____.
6. More CO_2 is released in the atmosphere today than in the past because of _____ _____.
7. Another natural source for CO_2 is _____ and _____.
8. Too much CO_2 in the atmosphere may be responsible for increasing the _____effect.

9. Name all the places that carbon can be found:

10. In which carbon sink is carbon stored the longest?

11. List 3 groups of producers:

12. What role do producers play in the carbon cycle?

13. What processes other than photosynthesis and respiration are important in the carbon cycle?

14. Where do herbivores get their carbon from?

15. What are two major ways that humans affect the carbon cycle?
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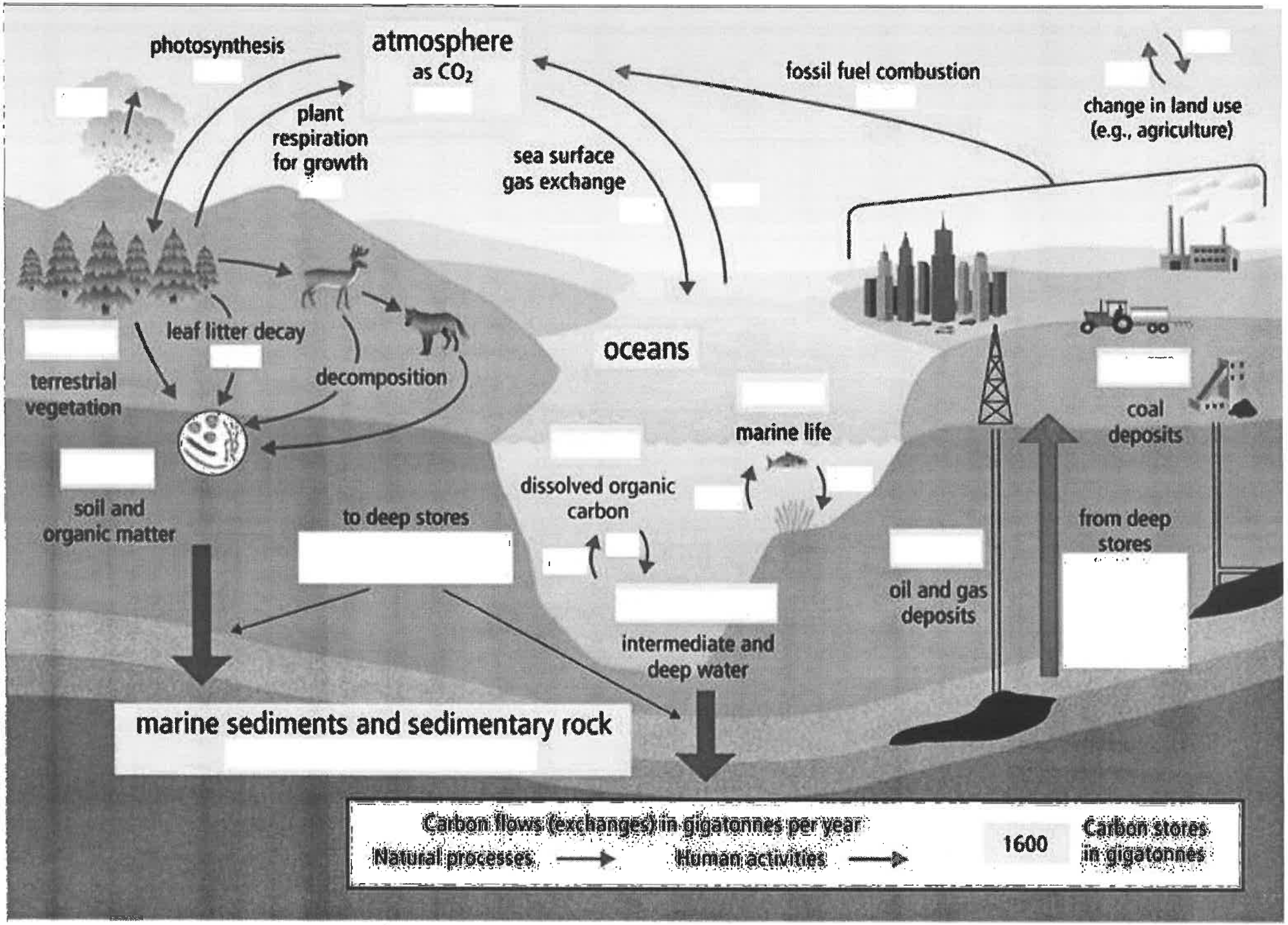
16. How do these actions contribute to global warming?

17. List three ways we could reduce the extra carbon that is getting into the atmosphere.



The carbon cycle

Data current as of 2008