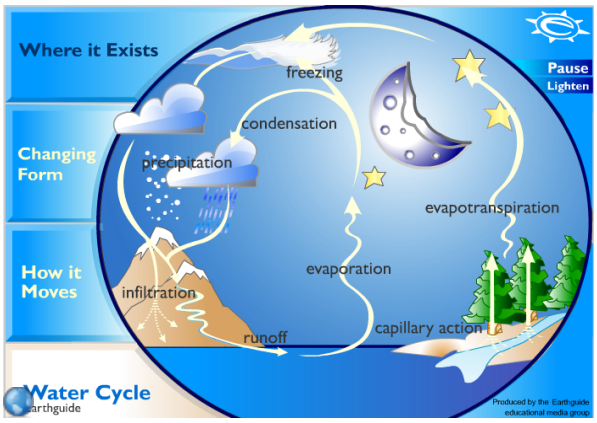
Water Cycle or Hydrologic Cycle



READ THE FOLLOWING ON THE WATER CYCLE.

TEXT - Water and Nitrogen Cycles.pdf

BE ABLE TO LABEL THE GIVEN DIAGRAM
DEFINE EACH OF THE FOLLOWING...

1. **transpiration** - loss of water through the pores in the leaves of plants.
2. **evaporation** - water vaporizes into the air.
3. **condensation** - water forms into a liquid form.
4. **precipitation** - collects in clouds and falls to the ground as rain/snow.
5. **surface runoff** - water that travels on the ground to a stream, pond or other body of water.
6. **percolation/infiltration** - water soaks into the ground.
7. **ground water** - water found within bedrock.
8. **capillarity** - water movement from the soil up to the roots of a plant.

Taken from 'Investigating Terrestial Ecosystems (Green Text) pages 43-44

The Water Cycle

The hydrogen and oxygen atoms in water are nutrients organisms need. These nutrients are recycled through ecosystems as follows.

Water vapour enters the atmosphere through **transpiration** from vegetation. (Transpiration is the loss of water through pores in the leaves of plants.) It also enters the atmosphere by evaporating from bodies of water and the soil (Fig. 3-7). In the cool upper atmosphere this vapour condenses, forming clouds. In time, enough water collects in the clouds to cause **precipitation**. When this happens, some of the water that falls on the ground runs along the surface of the ground to a stream, pond, or other body of water. This water is called **surface runoff**. But some of the water also soaks into the ground by a process called **percolation**. Some water percolates down to the bedrock. Then it becomes **ground water** and gradually runs back to lakes and other bodies of water.

Some of the water in the soil moves up to the roots of plants by **capillarity**. The roots absorb the water. This is how most plants get the hydrogen and oxygen they need. Animals can obtain water by eating plants or by eating other animals. Of course, they can also obtain it by drinking water directly from a body of water.

Finally, when plants and animals die, they decompose. During this process, the water in their tissues is released back into the environment.

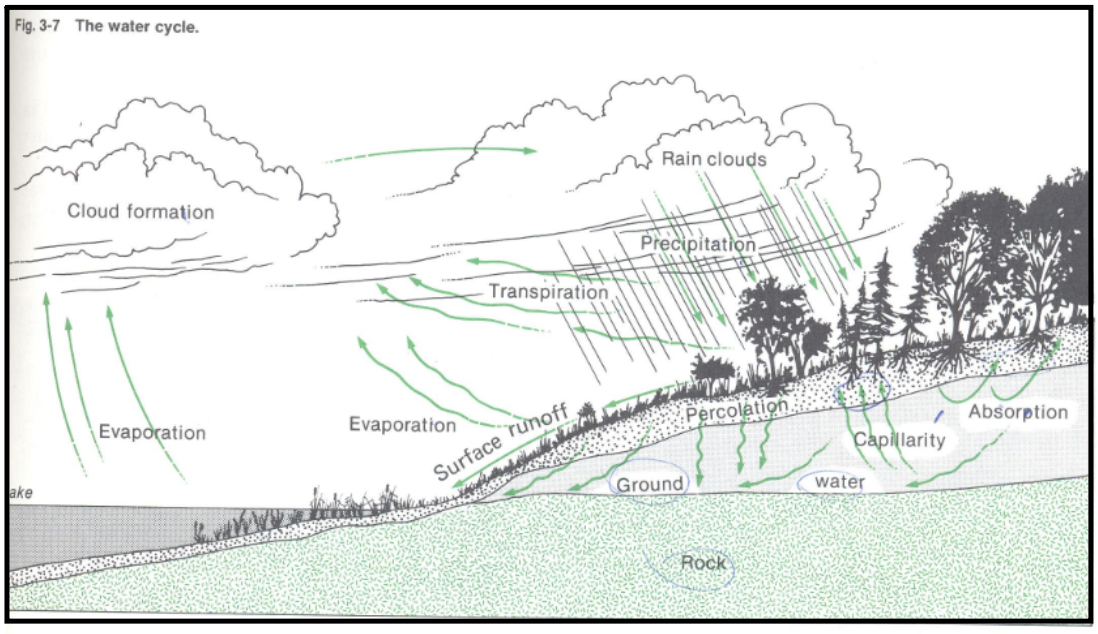
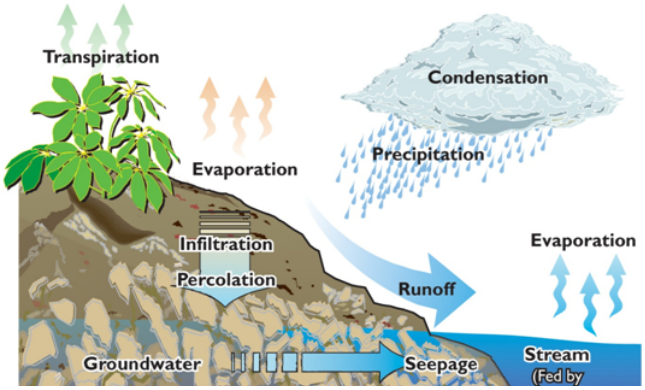


Fig. 3-7 The water cycle.

Water Cycle



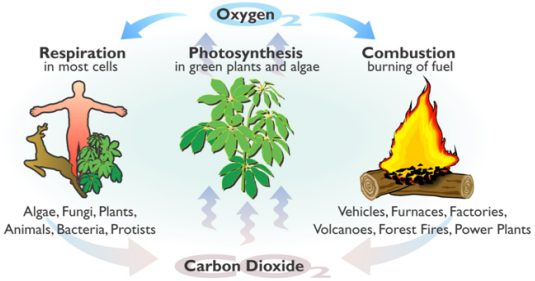
Did you know?

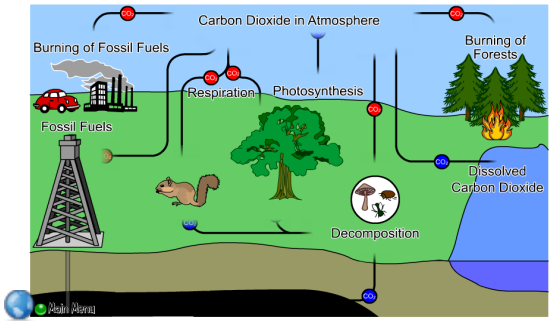
- A fixed amount of water recirculates around the Earth.
- Water moves in certain directions from place-to-place (reservoir-to-reservoir) by only certain processes and pathways.
- Some processes of transfer are rapid while others are much slower.
- A conceptual "reservoir" of water is not quite the same thing as a reservoir in which water is stored.
- When land-based glacial ice melts and runs off into the sea, sea level rises.
- When land-based glacial ice forms, sea level drops.
- When floating icebergs melt into the sea, sea level doesn't change.
- Glacial ice is made up of freshwater that had previously fallen as snow.
- Evaporation of seawater requires an input of energy; condensation of clouds releases energy.

Carbon Cycle

Carbon is needed by all living things and cycles through ecosystems.

Carbon-Oxygen Cycle



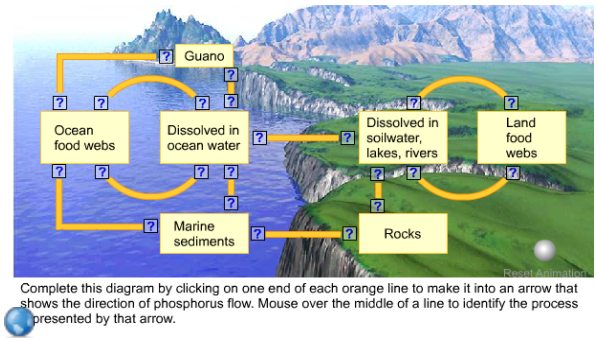


- Some organic matter does not decompose easily. Instead, it builds up in the earth's crust. Oil and coal were formed from the build-up of plant matter millions of years ago.

- At one time the carbon cycle was almost a perfect cycle. Carbon was returned to the atmosphere as quickly as it was removed. The increased burning of fossil fuels is adding carbon to the atmosphere faster than producers can remove it.

Phosphorus Cycle

Many important molecules within cells contain phosphorous atoms. For example, ATP (adenosine triphosphate) is found in every living cell and plays a key role in energy storage and supply.

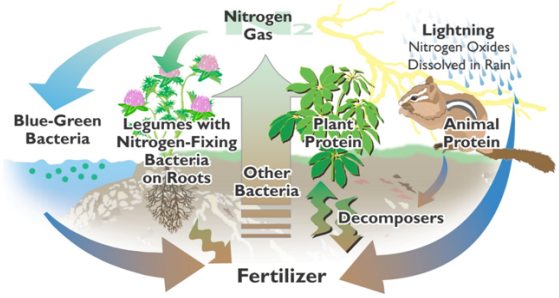


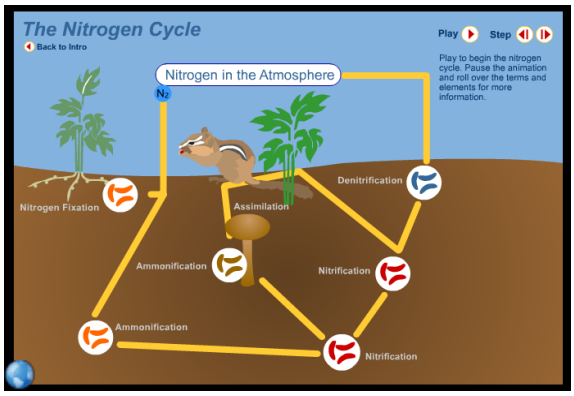
Phosphorus normally occurs in water and soil in inorganic compounds. Phosphates (PO_4) are a common form. These compounds are absorbed by plants and used to make organic compounds such as ATP. When animals eat plants, phosphorus is passed on to them. When dead plants, dead animals, and fecal matter decay, organic forms of phosphorus are released into the water or soil. Bacteria decompose these organic forms into inorganic forms. Then, the cycle begins again.

Nitrogen Cycle

Nitrogen is an element essential to life. It is found in proteins, DNA (deoxyribonucleic acid), and in chlorophyll molecules.

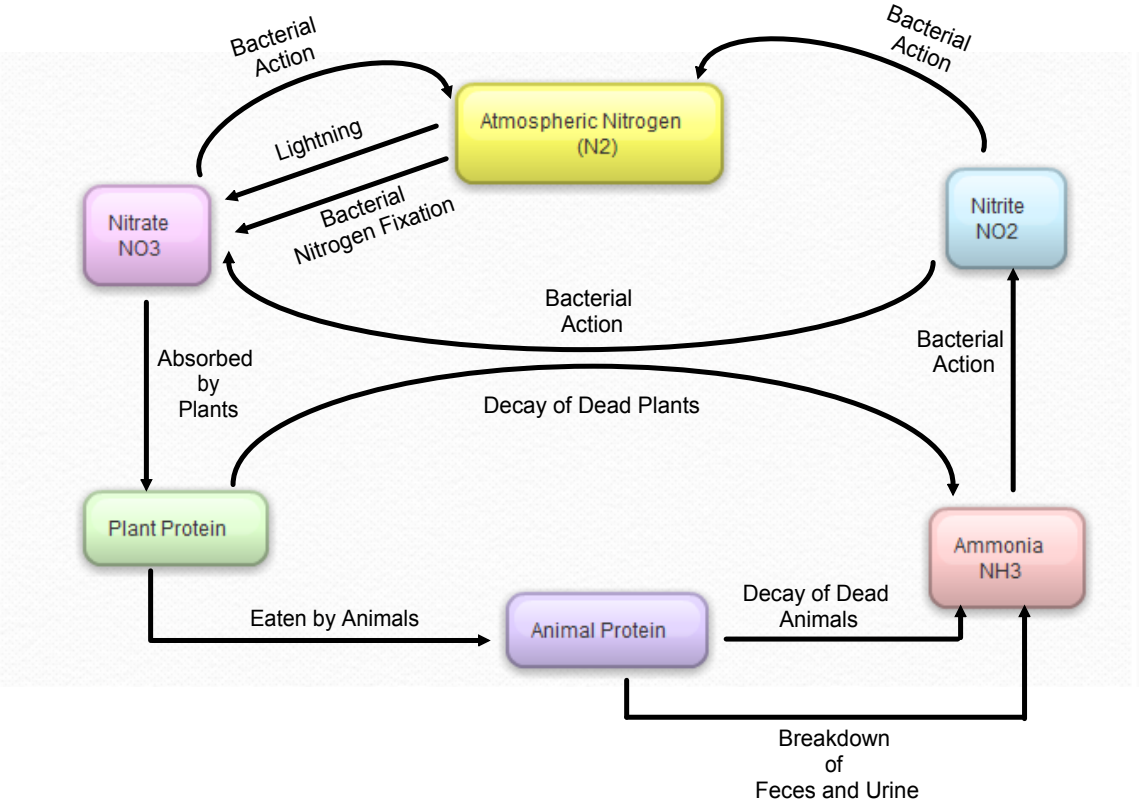
Nitrogen Cycle





SOLUTION...

https://bubbl.us/



*nitrogen fixation - the changing of nitrogen to nitrates

Environmental Problems Disrupting Natural Cycles by Humans

1. radioactive contamination
2. pollution of the ocean
3. depletion of fish stocks
4. use of fossil fuels
5. draining of underground aquifers
6. clearing of forests
7. use of fertilizers and pesticides

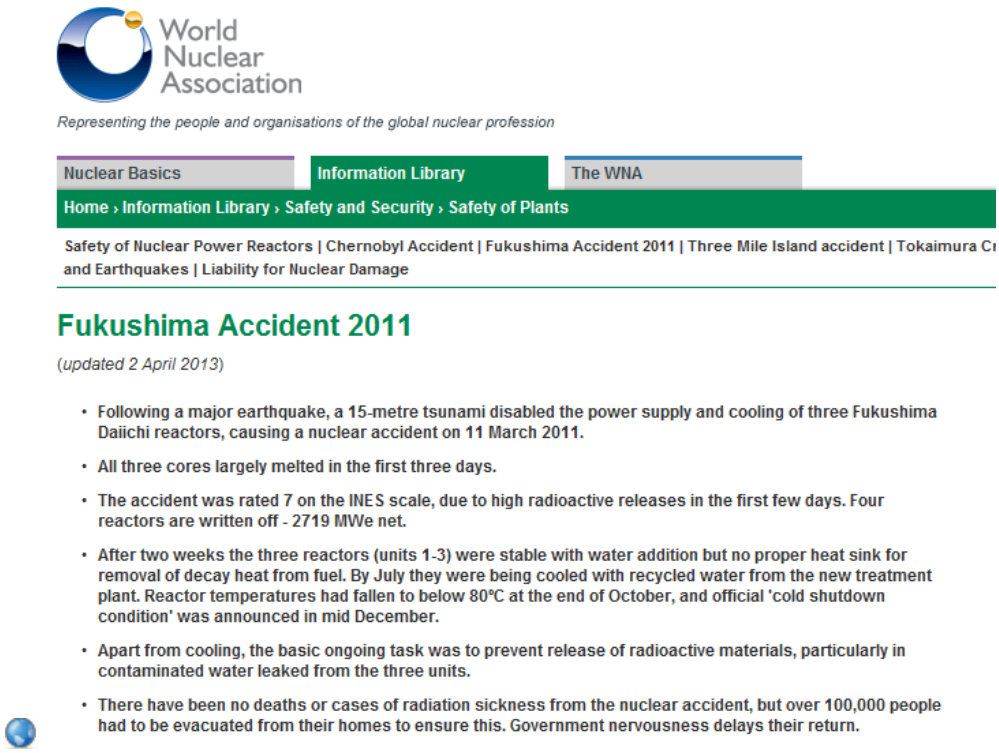
* we will look further into #1 since we in NB rely on nuclear energy from...

Point Lepreau in Saint John

WHERE???

When Nuclear Energy Goes Wrong...

1) Fukushima, Japan (March 2011)



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Safety of Nuclear Power Reactors | Chernobyl Accident | Fukushima Accident 2011 | Three Mile Island accident | Tokaimura Cr and Earthquakes | Liability for Nuclear Damage

Fukushima Accident 2011

(*updated 2 April 2013*)

- Following a major earthquake, a 15-metre tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing a nuclear accident on 11 March 2011.
- All three cores largely melted in the first three days.
- The accident was rated 7 on the INES scale, due to high radioactive releases in the first few days. Four reactors are written off - 2719 MWe net.
- After two weeks the three reactors (units 1-3) were stable with water addition but no proper heat sink for removal of decay heat from fuel. By July they were being cooled with recycled water from the new treatment plant. Reactor temperatures had fallen to below 80°C at the end of October, and official 'cold shutdown condition' was announced in mid December.
- Apart from cooling, the basic ongoing task was to prevent release of radioactive materials, particularly in contaminated water leaked from the three units.
- There have been no deaths or cases of radiation sickness from the nuclear accident, but over 100,000 people had to be evacuated from their homes to ensure this. Government nervousness delays their return.

LAB at home...Eco-Points???

Upsetting the Nutrient Balance in an Ecosystem

Green Text - Page 47

Problem: How will lawn fertilizer affect the balance in an ecosystem?

Materials:
2 - beakers with a 1 L capacity
2L - pond water
6 - strands of *Cabomba*, *Elodea* or other aquatic plant (10-20 cm long)
6 - pond snails

Procedure:
1. Fill both jars with pond water.
2. Add half of the aquatic plants to each jar.
3. Add three pond snails to each jar.
4. Label one jar "Control" and the other "Experimental".
5. Add a ***very small pinch*** of lawn fertilizer to the "Experimental" jar.
6. Place the jars side by side in a bright location.
7. Observe the jars every day for 2-3 weeks. Make notes on any changes in the appearance of the aquatic plants and snails.

The Future of Biodiversity

'Species at Risk'

Saving Species One at a Time

- Captive-breeding programs
  - Hope of reintroducing such species back into the wild
  - Ex. condors
  - Preserving genetic material
  - Germ plasm is any form of genetic material
  - Used for future use in research and species-recovery efforts
  - Zoos, aquariums, parks and gardens
  - Typically, a last resort for a species' survival
  - More study needed

Attachments

TEXT - Water and Nitrogen Cycles.pdf