



# ***Nutrient Cycle and its Effects on Ecosystem***

**By**

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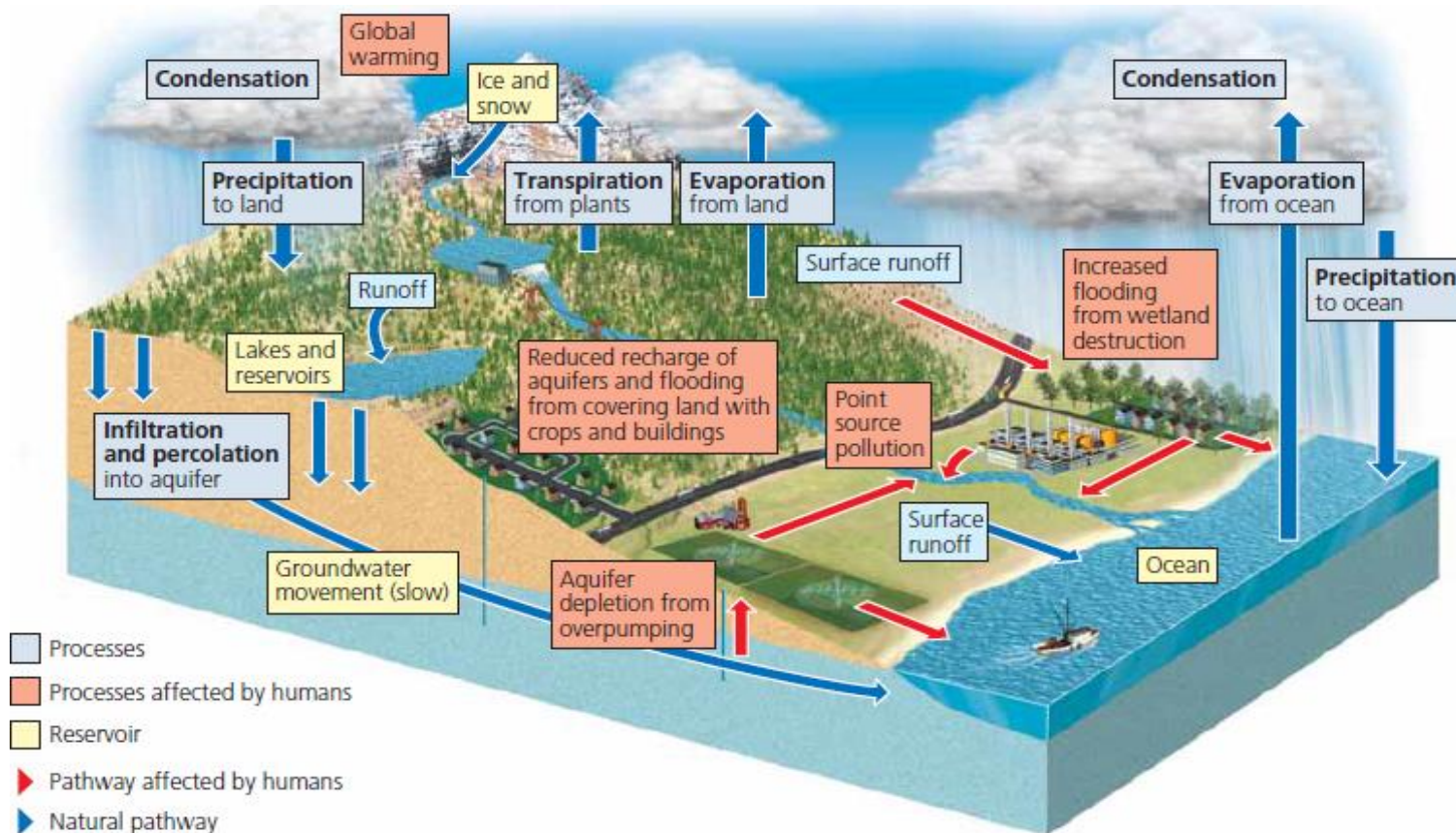
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# Nutrients Cycle within Ecosystem

- The elements and compounds that make up nutrients move continually through air, water, soil, rock and living organism in cycles called **biogeochemical cycles or nutrient cycles**.
- These cycles are driven directly or indirectly by solar energy and gravity, includes **water, carbon, nitrogen and phosphorus cycles**.
- Temporary storage sites such as atmosphere, oceans, water and underground deposits are called as reservoirs.

# Water cycle

- Water cycle collects, purifies, and distributes the earth's fixed supply of water.



# Transpiration, Precipitation, Evaporation

- About 84 % water vapor in atmosphere comes from the ocean and rest from land.
- 90 % of water reaches the atmosphere evaporates from the surface of plants through a process called transpiration.
- Aquifers: water returning to earth's surface as precipitation by various paths. Some precipitation sinks through soil and permeable rock formations to underground layers of rock, sand and gravel called aquifers- stored as ground water.
- Some combines with  $\text{CO}_2$  during photosynthesis and produce high energy organic compounds-carbohydrates.
- In terrestrial ecosystems: most of precipitation becomes as surface runoff.

# Fresh water

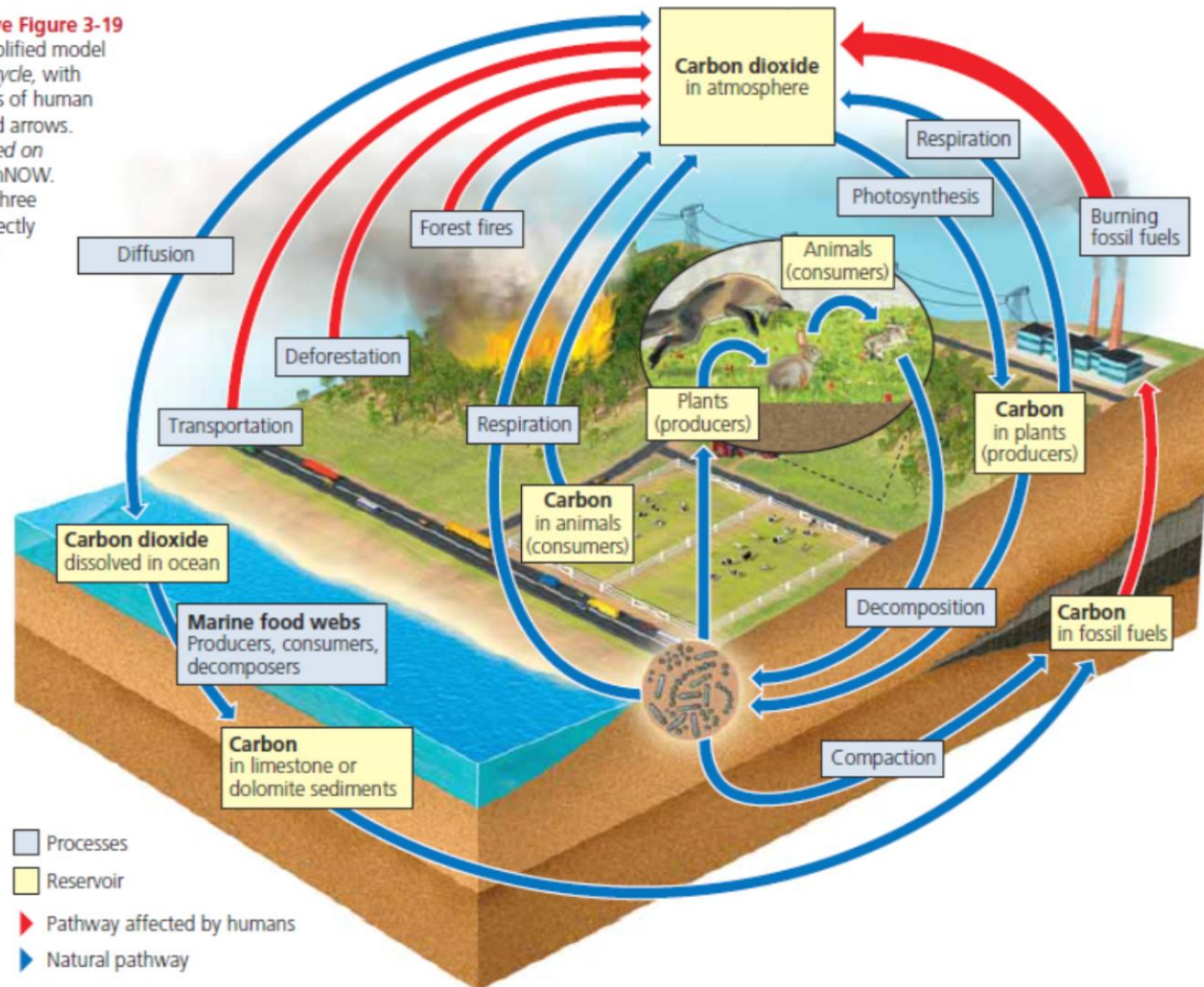
- **0.024 %** of earth's vast water supply is available as freshwater in accessible to groundwater deposits, lakes, rivers, and streams. Rest are salty, stored as ice.
- The water cycle by withdrawing large amounts of fresh water, clearing of agriculture land, soil erosion, pollution, ground water pollution and leads to climate change.

# Carbon Cycle

ThomsonNOW® Active Figure 3-19

**Natural capital:** simplified model of the global carbon cycle, with major harmful impacts of human activities shown by red arrows. See an animation based on this figure at ThomsonNOW.

**Question:** What are three ways in which you directly or indirectly affect the carbon cycle?





# Carbon Cycles- Biosphere

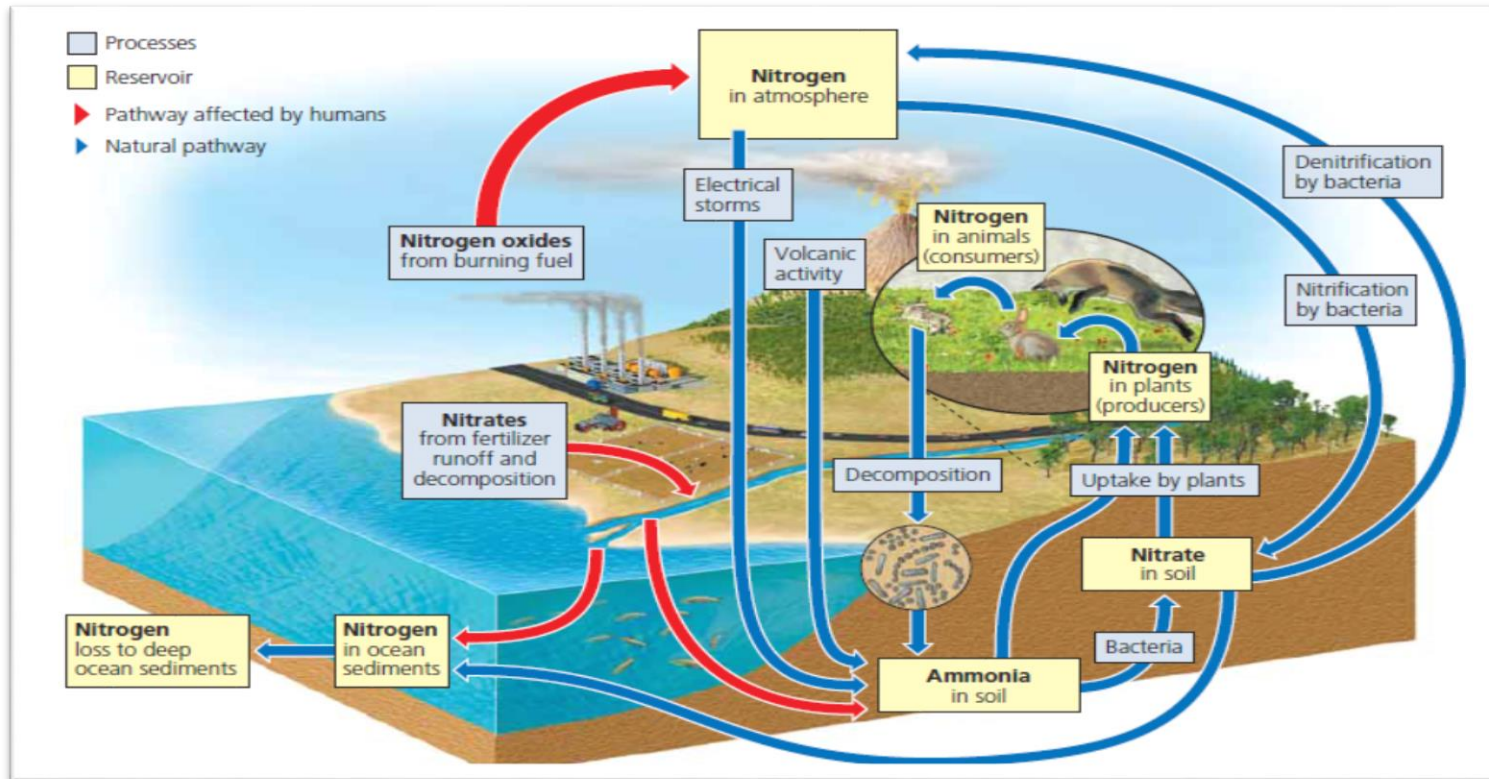
- Carbon- building block of carbohydrates, fat, protein, DNA, and other organic compounds- shown in fig.
- Carbon dioxide – which make up 0.038% of volume of the atmosphere and dissolved in water.
- Key component of nature's thermostat.
- If carbon- removes  $\text{CO}_2$  from atmosphere, the atmosphere is cool.
- If it generates  $\text{CO}_2$  the atmosphere will get warmer. – change in climate happens.
- Terrestrial producers remove  $\text{CO}_2$  from the atmosphere and aquatic removes in water. ( $\text{CO}_2$  to glucose sugar unit)
- Aerobic respiration : carried by producers, consumers and decomposers.

- Some carbon atoms take long term to recycle. Eg: fossil fuels- coal, oil and natural gas.
- This carbon is not released in atmosphere as CO<sub>2</sub> for recycling until these fuels are extracted and burned.
- Measures to alter CO<sub>2</sub>: afforestation, grasslands maintenance, - global warming is decreased and decrease in sea level.



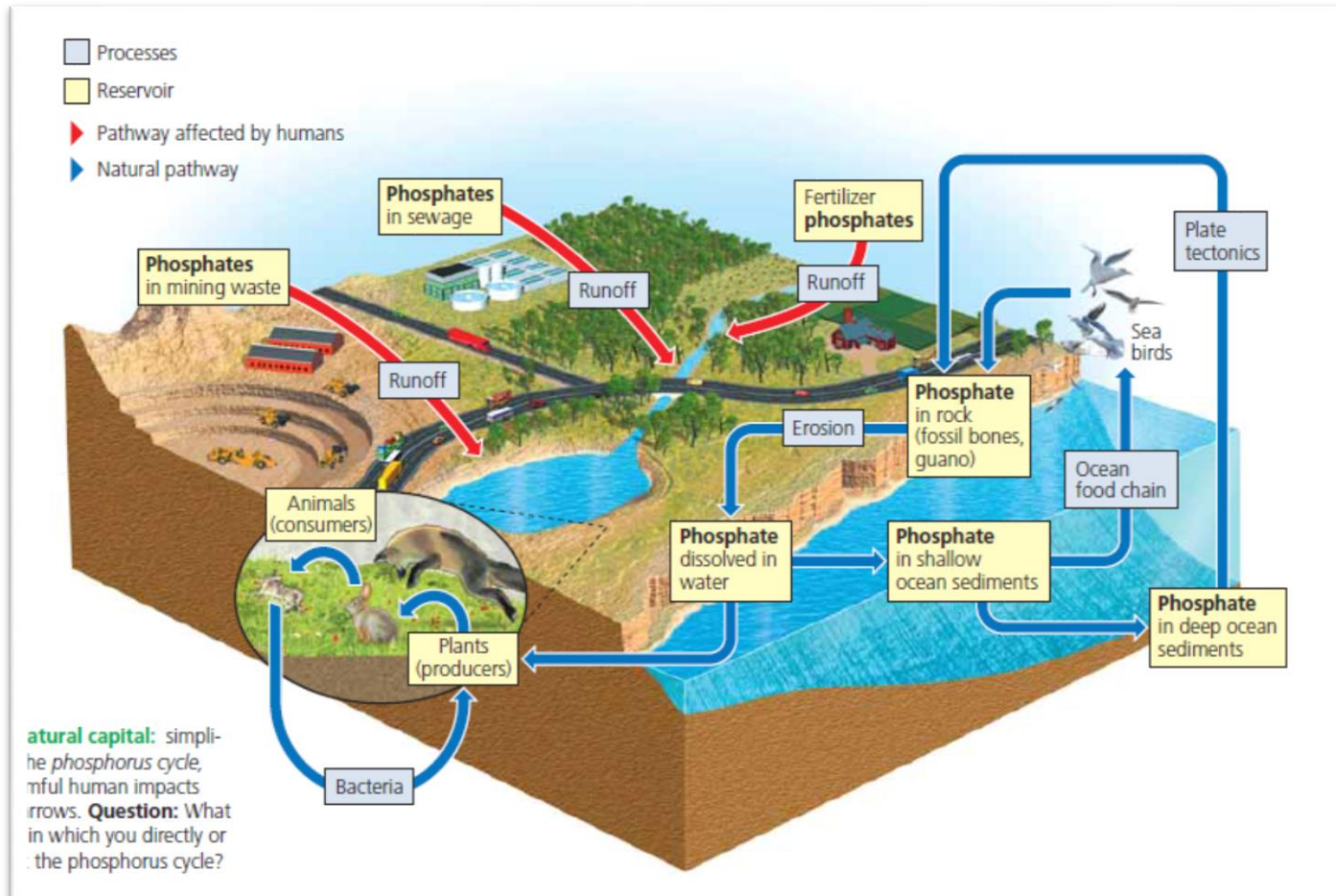
# Nitrogen cycle

- The major reservoir for nitrogen is the atmosphere.
- Unreactive  $N_2$  gas makes up 78% of atm. Volume.
- Component of proteins, DNA, vitamins, etc.
- It cannot be absorbed. Can be used directly as nutrient by multicellular plants or animals.



- Two natural process convert or fix nitrogen into compounds useful as nutrients for plants and animals.
  - One is electrical discharge, - in atmosphere.
  - Other is nitrogen fixing bacteria –nitrogen cycle.
- nitrogen fixation: special bacteria in soil and blue green algae in aquatic environment combine Nitrogen with hydrogen to take ammonia.
- Bacteria takes up nitrogen to produce nutrients and excrete in soil or water.
- Some ammonia is converted to ammonium ions that can be used by plants.

# Phosphorus cycle



- The major reservoirs for phosphorus is phosphate salts containing phosphate ions in rock/ ocean sediments.
- It is slow compared to other cycle.
- The dissolved phosphate ions are absorbed by roots of plants and other producers.
- Major component vertebrate bones and teeth.
- It is applied as fertilizer.
- This leads to eutrophication- phosphorus rich run-off from land produce high amount of algae, which can upset chemical cycling and other lake ecosystem.

**Thank you**