What Are Biogeochemical Cycles?

Worksheet

A biogeochemical cycle moves a chemical element between organisms and the environment (soil, water, atmosphere) through biological, geological, and chemical processes. Without these cycles, ecosystems would not sustain life.

Questions

1. What is the primary source of carbon in the carbon cycle?

A) soil
B) fossil fuels
C) atmospheric CO
D) ocean water

2. How do nitrogen-fixing bacteria help ecosystems?

A) they produce oxygen
B) they convert N gas into usable nitrates
C) they decompose plants
D) they increase soil pH

3. Why is phosphorus less abundant in the atmosphere than carbon or nitrogen?

A) plants don't need it
B) it doesn't have a gas phase
C) it's not part of any cycle
D) only aquatic organisms use it

4. Which human activity most disrupts the nitrogen cycle?

A) recycling
B) building roads
C) industrial fertilizer use and fossil fuel burning
D) planting forests

5. Describe the carbon cycle in an ocean ecosystem.

6. How does the nitrogen cycle help plants grow?

7. What happens if the phosphorus cycle is disrupted (e.g., all topsoil washes away)?

8. Define: What is a biogeochemical cycle?

9. Define: Name the four major biogeochemical cycles.

10. Define: Why do we need the nitrogen cycle?

Answer Key

1. C) atmospheric CO - Atmospheric CO is the main reservoir; photosynthesis pulls it into living systems. Fossils and soil store carbon but don't initiate cycles.

2. B) they convert N gas into usable nitrates - Nitrogen-fixing bacteria are the only organisms that convert atmospheric N into NO, which plants can absorb.

3. B) it doesn't have a gas phase - Phosphorus has no gas phase under normal conditions. It cycles primarily through soil and water, not air.

4. C) industrial fertilizer use and fossil fuel burning - Fertilizers and combustion release excess nitrogen compounds, disrupting natural nitrogen balance and causing eutrophication.

5. CO dissolves in seawater. Phytoplankton absorb CO for photosynthesis, storing carbon. Fish eat phytoplankton and animals respire CO back to water. Dead organisms sink; bacteria decompose them, releasing CO.

6. Nitrogen gas (N) in air cannot be used directly by plants. Bacteria in soil and root nodules convert N to nitrates (NO). Plants absorb nitrates to make proteins and DNA. Animals eat plants; decomposers return nitrogen to soil.

7. Phosphorus is not very mobile in nature; it mostly stays in soil and rocks. Without soil, plants cannot absorb phosphorus limited plant growth. Lower plant production less food for herbivores ecosystem collapse.

8. The cyclic movement of a chemical element between living organisms and the non-living environment (soil, water, air).

9. Carbon cycle, nitrogen cycle, water cycle, and phosphorus cycle.

10. Nitrogen is essential for proteins and DNA. Bacteria convert atmospheric N into usable nitrates for plants.