Interactions of living and nonliving things

An ecosystem consists of all the biotic factors(living things) and abiotic factors (nonliving things, such as water, climate, rocks etc.) in a specific area. In all ecosystems, the living things interact with each other and with the abiotic factors. Photosynthetic organisms such as green plants and some bacteria, are able to use non-living things like carbon dioxide, water and energy from the Sun to make their own food . These organisms form the base of ecosystems because they provide energy in the form of food for all living things, and this energy flows through the ecosystem as it moves along the food chain. As we have already seen 90% of the energy that a living thing consumes as food is used for movement and warmth, as only 10% is used for growth and is available for the next living thing to consume. Because so much energy is lost ecosystems need a constant influx of energy from sunlight.

In addition to energy, chemical elements such as carbon nitrogen and phosphorus also move between the biotic and abiotic factors in an ecosystem. These elements are found in the nutrients that are present in living things and in humans the organic matter that has yet to be decomposed and that forms the upper layer of soil. There is more humus in the soil of temperature forests than in the soil of tropical rainforest because the cycling of elements occurs much more quickly in tropical rainforests so most nutrients accumulate in the plants there instead of in the soil .

These elements return to the environment either through respiration or as the decomposed remains of living things.

During respiration, which occurs in all living things, carbon dioxide is released into the atmosphere and becomes available to photosynthetic organisms. When living things die, decomposer organisms such as bacteria and fungi break down their remains. Bacteria are single-celled organisms whereas fungi can be single cell or multicellular and include mushrooms and molds. Both these types of organisms break down the complex compounds in organic matter into simpler substances, which are absorbed by the roots of plants and used to synthesize proteins, fats and other nutrients. These nutrients are stored in seeds, fruits and other plant parts and enter the food chain again when a primary consumer eats the plant.

key Concepts:

- ❖ All the energy in ecosystems originally comes from the sun
- ❖ Plants transform energy from the Sun into chemical energy in the form of glucose.
- ❖ Food chains show the flow of energy between living things in an ecosystem.
- ❖ Food chains also show the movement of matter in an ecosystem as living things consume each other.
- ❖ Matter is returned to the environment when dead animals decompose.

1. Which of the following best describes an ecosystem?

A) A community of only living organisms
B) A community of living organisms interacting with abiotic factors
C) A group of living organisms sharing the same physical space
D) A set of abiotic factors that support plant life

2. What is the primary role of photosynthetic organisms in an ecosystem?

A) To produce food for all living things
B) To break down organic matter into simpler compounds
C) To consume nutrients from soil and water
D) To regulate the flow of energy between trophic levels

3. What percentage of the energy consumed by an organism is available to the next trophic level in a food chain?

A) 50%
B) 25%
C) 10%
D) 90%

4. What is the primary reason ecosystems require a constant influx of energy from the Sun?

A) Sunlight breaks down organic matter into nutrients.
B) Energy is lost as heat through metabolic processes, reducing available energy.
C) The Sun is needed to replenish carbon dioxide levels in the atmosphere.
D) Solar energy is stored in the soil to sustain plant growth.

5. Which of the following best explains why tropical rainforests accumulate more nutrients in plants rather than in soil?

A) The soil in tropical rainforests is more fertile than in temperate forests.
B) Nutrient cycling occurs more quickly in tropical rainforests than in temperate forests.
C) Tropical rainforest plants do not require as many nutrients as those in temperate forests.
D) Soil in tropical rainforests is deeper, allowing for greater accumulation of nutrients.

6. Which organisms are primarily responsible for decomposing dead organic material in an ecosystem?

A) Photosynthetic organisms
B) Primary consumers
C) Decomposers such as bacteria and fungi
D) Secondary consumers

7. Which of the following is NOT a chemical element that cycles between biotic and abiotic factors in an ecosystem?

A) Carbon
B) Nitrogen
C) Oxygen
D) Chlorophyll

8. How do decomposers like bacteria and fungi contribute to the nutrient cycle in ecosystems?

A) They produce glucose for plants through photosynthesis.
B) They break down dead organisms and release nutrients into the soil.
C) They consume nutrients directly from living organisms.
D) They convert sunlight into chemical energy for plants.

9. What is the primary difference between the flow of energy and the flow of matter in an ecosystem?

A) Energy is recycled, while matter flows in one direction.
B) Energy flows in one direction, while matter is recycled within the system.
C) Energy is never lost, but matter is always lost from the ecosystem.
D) Both energy and matter flow in one direction only.

10. Which of the following is a direct consequence of the process of respiration in living organisms?

A) Oxygen is produced for photosynthetic organisms.
B) Carbon dioxide is released into the atmosphere.
C) Energy from sunlight is converted into chemical energy.
D) Nutrients are returned to the soil through decomposition.