

Ecology: Review**Terms**

- Environment** – all of the living and non-living things that exist on Earth as well as their interactions with each other.
- Sustainability**- populations of plants, animals, and other living organisms can continue to interact, and to reproduce indefinitely. **Biodiversity** is preserved.
- Biodiversity**- The number of different types of organisms in an area
- Ecology** – The study of how organisms interact with each other as well as with their environment.
- Ecosystem**- a complex, self-regulating system in which living things interact with each other and with non-living things.
- Species** - a group of similar organisms in an ecosystem. Members of a species can reproduce with each other, and their offspring can reproduce.
- Population** - a group of members of the same species that live in the same area. The area that an organism lives is its habitat.
- Community** - made up of populations of different species that live and interact in an area.
- Niche** - All of the interactions of a species with its ecosystem form the species
- Biome** - a large geographical region that contains similar ecosystems
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The biodiversity on Earth is found in the biosphere, which includes the lithosphere, atmosphere, and hydrosphere. All of these spheres interact.

Biotic –

Abiotic –

Lithosphere -

Atmosphere –

Hydrosphere -

Cycles

- The Water cycle
- The Nitrogen cycle
- Carbon Cycle
 - o Photosynthesis
 - o Cellular Respiration

How Energy Moves in ecosystems

• Energy in ecosystems comes from the Sun. It is transformed into chemical energy by plants. As energy travels along **food chains**, the amount of usable energy decreases. Also know **Food Webs**

- Producers (autotrophs)
 - o
- Consumers (heterotrophs) –
 - Primary consumer -
 - Secondary consumer -
 - Tertiary consumer –
 - o Herbivore -
 - o Carnivore –

- Scavenger –
- Omnivore –
- Detritivore

Ecosystem Interactions

- **Symbiotic Relationships**
 - **Symbiosis** is a close interaction between two different species in which members of one species live in, on, or near members of another species.
 - **1. Commensalism** + / 0 relationship
 - One partner benefits without significantly affecting the other
 - **2. Mutualism** + / + relationship
 - Both organisms benefit
 - **3. Parasitism** + / - relationship
 - One organism, the parasite, harms the host
- **Predator – Prey Relationships**
 - When one organism **consumes** a second organism
- **Competitive Relationships**
 - Where organisms **compete** for an important resource such as food, shelter or possibly mates.
 - **1. Intraspecific** - Between members of the same species
 - **2. Interspecific** - Between 2 or more species

Biotic Potential

- The maximum number of offspring that a species could produce, if resources were unlimited.
- 4 Factors of biotic potential
 - Birth Potential - The maximum number of offspring per birth
 - Survival Capacity - The number of offspring that reach reproductive age.
 - Procreation - The number of times that a species reproduces a year.
 - Length of reproductive life - The age of sexual maturity and the number of years the individual can reproduce.
 - **Limiting Factor** - Environmental factor that prevents an increase in the number of organisms in a population or prevents them from moving into new habitats.
 - Abiotic Limiting Factors -
 - Biotic Limiting Factors -
 - **Carrying capacity**
 - The maximum number individuals that an organism can support without reducing its ability to support future generations of the same species.

Soil

- A loose covering on the ground containing a mixture of organic matter, minerals, and moisture..
 - **Topsoil** is the uppermost layer in soil. -
 - **Subsoil** is the layer below topsoil.-
 - **Bedrock** forms the bottom of the soil profile. -

Species at Risk

- As a population declines overtime the species may become **at risk**.
 - **Extirpated** - A species that no longer exists in Ontario but still occurs elsewhere
 - **Endangered** - A species that faces extinction or extirpated
 - **Threatened** - A species that is at risk of becoming endangered if limiting factors are not reversed
 - **Special Concern** - A species with characteristic that make it sensitive to human activities or natural events.

Ecology Questions

2. Describe an abiotic factor that could affect a population of squirrels.
3. How is a food chain related to a food web?
4. Snapping turtles eat frogs, frogs eat grasshoppers, and grasshoppers eat grass.
 - (a) Construct a food chain using the above organisms.
 - (b) Add a decomposer to your diagram.
 - (c) Add a source of energy for the producers to your diagram.
5. The nitrogen cycle relies on the actions of several distinct types of bacteria. List and describe the function of each.
6. Describe three types of symbiotic relationships, and give an example for each one.
7. Define the term “genetic diversity.”
8. List five major factors that affect biodiversity.

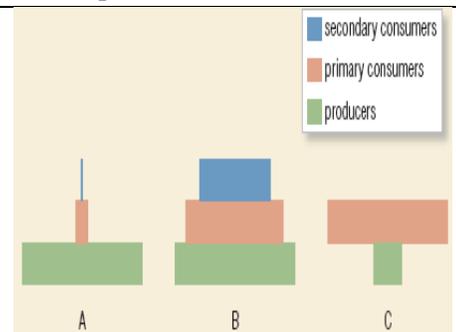
9. List the elements that make up soil.
10. Which type of soil would most gardeners prefer to have? Why?
11. What type of measurement can be used to determine the acidity of the soil?
12. What method can farmers use to restore nutrients in the soil of their fields?
13. Do “dissolved oxygen” and “biological oxygen demand” describe the same phenomenon? If not, how are the two terms different?
14. How are modern pesticides an improvement over earlier ones?

15. Place the following categories in order from the least serious to most serious: extirpated, special concern, extinct, endangered, and threatened.
16. How can soil erosion be reduced?
17. What is one measure the federal government takes to prevent invasive species from being accidentally introduced into Canada?
18. Name an international treaty that protects biodiversity in Canada and around the world.

More Questions:

19. Explain why it is more accurate to define the biosphere as a global ecosystem rather than a global community.
20. Hypothesize what would happen to an ecosystem that had all of its decomposers removed.

21. Bacteria are bad for your health and are responsible for many diseases that hurt humans, animals, and plants. All efforts should be taken to completely eradicate bacteria on the planet.
 - (a) Evaluate the validity of this statement. Support your answer.
 - (b) If necessary, modify the statement to make it more accurate.
22. Study the following energy pyramids.
 - (a) Which pyramid best represents a sustainable ecosystem?
 - (b) Explain why each of the other two pyramids is unsustainable.
 - (c) Suppose data were collected from the ecosystem represented by B in 10 years’ time. Draw an energy pyramid that might describe energy flow in the ecosystem at that time. Explain why you drew it the way you did



5. Name four elements that are found in most organisms.
6. Give an example of an abiotic reservoir
7. (a) What do nitrifying bacteria do?
(b) What do denitrifying bacteria do?
8. What is the difference between a habitat and a niche?

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Ecology Review - Answers

2. Students' answers may vary but could include water availability, temperature, space for home, or inclement weather.
3. A food chain shows the flow of energy through a single feeding path in an ecosystem. A food web is made up of many interconnected food chains.
4. (a) grass => grasshoppers => frogs => snapping turtles
(b) grass => grasshoppers => frogs => snapping turtles bacteria
(c) Sun => grass => grasshoppers => frogs => snapping turtles
5. Bacteria involved in the nitrogen cycle include: nitrogen-fixing bacteria that convert atmospheric nitrogen gas into ammonia; nitrifying bacteria that convert ammonia into nitrates; denitrifying bacteria that convert nitrates back into nitrogen gas; decomposing bacteria that break down the tissues of dead or decaying organisms and release nitrogen compounds into the ecosystem.
6. Three types of symbiosis include: commensalism, where one organism benefits from another's actions and the second organism neither benefits nor is harmed, such as a bird building a nest on a tree; mutualism, where both organisms benefit from interacting with one another, such as leaf-cutter ants and fungus; parasitism, where one organism benefits at the expense of another, such as ticks living on mammals.

7. Genetic diversity is a specific type of biodiversity that focusses on the differences among individuals of the same species.
8. Five major factors that affect biodiversity include habitat change, overexploitation, pollution, invasive species, and climate change.
9. Elements that make up the soil include litter, topsoil, humus, organic matter, rock particles, subsoil, and bedrock.
10. Most gardeners would prefer loam soil. It has lots of humus, which provides nutrients for plant growth; air pockets to allow water to drain but still support plant growth; air pockets that hold air for important bacteria to grow and assist with cycling of nutrients.
11. pH measures the acidity of substances including soil.
12. Students' answers may vary but could include crop rotation, use of manure, or addition of fertilizers.
13. No. Dissolved oxygen measures the amount of oxygen present in water. Biological oxygen demand measures the rate at which oxygen is used up by the micro-organisms in a given body of water.
14. Modern pesticides are designed to last one growing season and then break down into less harmful substances.

15. Special concern, threatened, endangered, extirpated, and extinct.
16. Practising soil conservation and reducing farming practices that remove or damage the topsoil can reduce soil erosion.
17. Students' answer may vary but could include by-laws that prevent the movement of materials that may carry invasive species, or laws against bringing foreign food, produce, and animals into the country.
18. The Convention on Biological Diversity
19. A community describes several interacting populations. The biosphere is defined as the area on the planet where all life exists. Since this involves all the biotic components interacting with abiotic factors, ecosystem would be a better description than community.
20. Energy and nutrients would be trapped in the tissues of all the organisms that ever existed in the ecosystem. There would likely be a shortage of nutrients and energy available for the environment.
21. (a) This statement is too wide-sweeping. Bacteria play critical roles in all the nutrient cycles and, without them, life on the planet would not be possible.
(b) Students' answers may vary but could include the following: Certain bacteria are bad for your health and are responsible for many diseases that hurt humans, animals, and plants. However, not all bacteria are harmful.
22. (a) Pyramid A best represents a sustainable ecosystem.
(b) Pyramid B does not follow the 10 percent rule as you move up the feeding levels. Not enough energy is available to support the top two feeding levels. Pyramid C does not make sense, as the bottom level has to have the most energy.
(c) Assuming that scenario B survives past the next couple of generations, it would likely look like Pyramid A in 10 years' time. The second level would outstrip the energy in the bottom level and eventually most of these animals would die out.
However, the producers would likely recover and a sustainable number of consumers would follow.

5. Carbon, hydrogen, oxygen, and nitrogen are elements found in most organisms.
6. Students' answers may vary but could include oceans and forests.
7. (a) Nitrifying bacteria convert ammonia into nitrates, which plants absorb through their roots and use to grow.
(b) Denitrifying bacteria convert nitrates back into nitrogen gas, which returns to the atmosphere.
8. A habitat is where organisms live, but a niche represents all the interactions of a given species within its ecosystem.