

Unit 2: Interactions in the Environment

Chapter 4: Healthy Ecosystems

4.1: What is an Ecosystem

Vocabulary

biotic element: any living thing found in the environment (e.g. plants, animals)

abiotic element: any non-living part of the environment (e.g. sun, water)

organism: a living thing

micro-organism: a living thing that can only be viewed with a microscope

species: a group of similar organisms that can mate and reproduce more of the same type of organism

population: a group of organisms of the same species in a given area

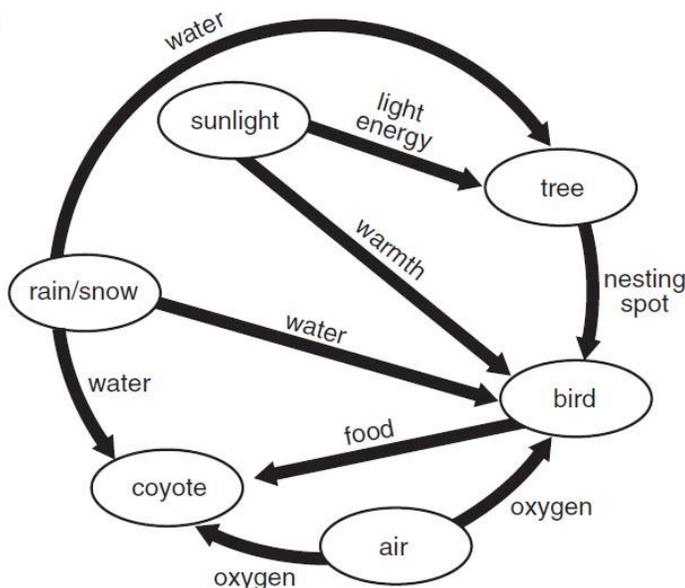
community: a group of populations of different species in a given area

ecosystem: the network of interactions that link the living and non-living parts of an environment

ecology: the study of relationships between organisms, and between organisms and their environment

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1.



1. The **abiotic** elements include **sunlight, air, and water, including rain and snow**. The sunlight provides light for the plants and warmth for animals. Air provides oxygen for animals. Rain and snow provide water for plants and animals.

Biotic elements include the **plants (trees) and animals (birds and coyotes)**. The plants provide shelter and food for some animals. Some animals, such as birds, provide food for other animals, such as coyotes.

2. A **species** is a group of living things that look similar and can mate and produce similar offspring.

A **population** is all the individuals of the same species that live in the same area.

A **community** is made up of all the populations that live in the same area.

For example, the individual plants of the milkweed species are pollinated and produce other milkweed plants. All the milkweed plants at Point Pelee are a population. All the populations of living things, including milkweed plants, at Point Pelee make up the community there.

3. Humans can change the environment in ways that include

a) adding trash and other waste products that are not naturally in that environment;

b) killing some of the living things (such as plants when humans step on them);

c) causing some of the living things to die or leave (such as animals, if humans pollute the water along the shoreline).

4. An **ecosystem** is a system of **interactions between biotic and abiotic** parts of an environment. That system can be large or small.

In a rotting log, abiotic elements such as water, temperature, and light are interacting with fungi, insects, micro-organisms (living things) and the rotting log itself (which began as a biotic living tree and is being decomposed into abiotic nutrients).

5. Point Pelee is an example of a large ecosystem that contains many smaller ecosystems. For example, animals in the savannah ecosystem drink water from the marsh ecosystem, which gets some water that runs off from the savannah and swamp forest ecosystems when it rains.

4.2: The Needs of Living Things

Living things need: - energy (directly or indirectly from sun)
- oxygen or carbon dioxide from air
- water
- nutrients
- liveable temperatures

Vocabulary

habitat: the environment where an organism lives

nutrient: a substance that an organism needs to grow and maintain its body

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1. (a) Living things need **energy** (obtained directly or indirectly from sunlight), gases in the air, **water**, **nutrients**, and **liveable temperatures**.

(b) Organisms need water, oxygen or carbon dioxide from the air, and nutrients from food to grow, to maintain their bodies, and to carry out their life processes. These activities also require energy. Without a liveable temperature range, organisms will either freeze to death or overheat.

2. Sunlight is needed by plants because they are able to use light energy to make their own food. Animals need to eat plants or to eat animals that have eaten plants, so the Sun's energy is passed along to animals when they eat. Animals and plants also need the Sun to keep Earth at a liveable temperature.

3. Plants need water (along with carbon dioxide and sunlight) to grow and to make food. Water plants also get the carbon dioxide they require from the water. Animals need water to digest food and to form bodily fluids, such as blood. Water animals, such as fish, also get their oxygen from water.

4. Plants help humans survive by producing oxygen, which we need to breathe, and by providing us with food.

4.4: Interactions Among Living Things

Vocabulary

competition: - happens when more than one organism tries to get the same resources in the same habitat

- limited resources = limited number of organisms

predator: an organism that hunts other living things for food

prey: an animal that is hunted by a predator

mutualism: an interaction between individuals of different species that benefits both individuals

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1. Competition is an interaction between organisms that use the same resources available in an area. Competition can occur within a population (that is, between members of the same species) and between populations of different species.

2. Competition limits the number of organisms that can live in a habitat because some resources are limited. When there is not enough of a resource for all the organisms in an area, the organisms that lose the competition for that resource either die or move somewhere else in search of that resource.

3. (a) A predator is an animal that hunts and kills another animal for food. Examples include cats, which hunt mice.

(b) A prey animal is an animal that is hunted and eaten. Examples include rabbits, which are hunted by foxes.

4. (a) From 1985 to almost 1990, the wolf population decreased and the moose population increased. However, in the last year or so the trends reversed: the moose population declined and the wolf population increased.

(b) When the moose population was low, there was not enough food available for all the wolves, so some died or left the area. Then, with fewer predators, moose populations began to increase again. Once there were fewer wolves and more moose, fewer wolves died because competition for food was not as intense. The wolf population began to increase, which led to more moose being killed by wolves. Consequently, the moose population started to decrease.

4.5 How do Humans fit into Ecosystems?

Humans who move into an ecosystem will often make the native animals and plants die off or move out, because they:

- change the landscape, destroying animals' homes
- remove or kill native plants and insects that are food for other animals
- pollute land/water
- use pesticides and herbicides

1. Most humans do not live “in the wild,” so they build homes, roads, office buildings, stores, and restaurants. They also use land to farm on. In all of these uses, the land is changed to suit the needs of the people.

Usually native plants are removed and the nearby soil and water are polluted, so native animals must move elsewhere to meet their needs.

2. The benefit of using fertilizers is that they make more food grow by adding nutrients to the soil. Larger supplies of food can improve nutrition and decrease prices. The drawback is that excess nutrients in the fertilizers can run off the cropland. This can pollute neighbouring lands and water bodies.

3. The benefit of using pesticides is that they stop insects and other pests from eating crops. The drawback is that the toxic chemicals in the pesticides can pollute the land and the water they run off into. They also kill insects that are food for other animals, so those animals need to go elsewhere to meet their food needs. Also, over time pest species can build up a tolerance to a pesticide, requiring the use of even more pesticide to achieve the same results.

4. Metals that are mined, such as iron, aluminium, and nickel, are advantageous because they are used to make machines and useful technologies, such as cars, appliances, batteries, and braces. The disadvantages of mining include emitting pollutants, such as sulphur dioxide, arsenic, cadmium, and mercury, into the air and releasing them into the soil and water.

Chapter 4 Review

WHAT DO YOU REMEMBER?

1. (a) **Biotic** means living. Biotic elements of the environment are living things or things produced by living things. **Abiotic** means not living and not produced by living things. Abiotic elements of the environment are non-living things and conditions.

(b) An **individual** is one living thing. A **population** is the sum of all the individuals of the same species in an area.

(c) A **predator** is an animal that hunts and kills its food. The **prey** is the animal hunted by the predator.

2. Sample answer: One biotic–abiotic interaction is the giving off of oxygen into the air by plants as they photosynthesize. Another example is the taking of oxygen from water by fish as they breathe.

3. (a) An **ecosystem** is a system of interactions among and between the biotic (living) and abiotic (nonliving) elements of an environment.

(b) Sample answer: A **habitat** is the place in an environment where an organism lives. For example, when a frog lives in and around a pond, the pond area is the frog's habitat. The pond ecosystem is the system of interactions between and among the frog, water, pond plants and algae, other animals in the pond, air, sunlight, temperature range over the year, and other biotic and abiotic elements in the area.

WHAT DO YOU UNDERSTAND?

5. Sample answer: A park near my home has the following biotic elements: geese, fish, cattails, algae, grass, small birds, insects, squirrels, and sometimes dogs and people. Its abiotic elements include sunshine, air, water in a pond, soil, a typical temperature range, rocks, and usually wind. It may be an ecosystem because all the elements interact, so the organisms can meet their needs.