

biotic living parts of an environment

abiotic non-living parts of an environment

Biotic and Abiotic Parts of the Environment

All the living things in the environment are its **biotic** (living) parts. Within the Western science framework, some parts of the environment are considered to be not alive. All the non-living things are the **abiotic** parts of the environment. All the biotic and abiotic parts of the environment are connected through the ways in which they interact with one another. **Figure 4.3** summarizes how biotic and abiotic parts of the environment can interact. Note that a population is a group of individuals of the same species living in the same geographical area at the same time. Populations of different species are part of a community in a particular habitat (environmental setting).

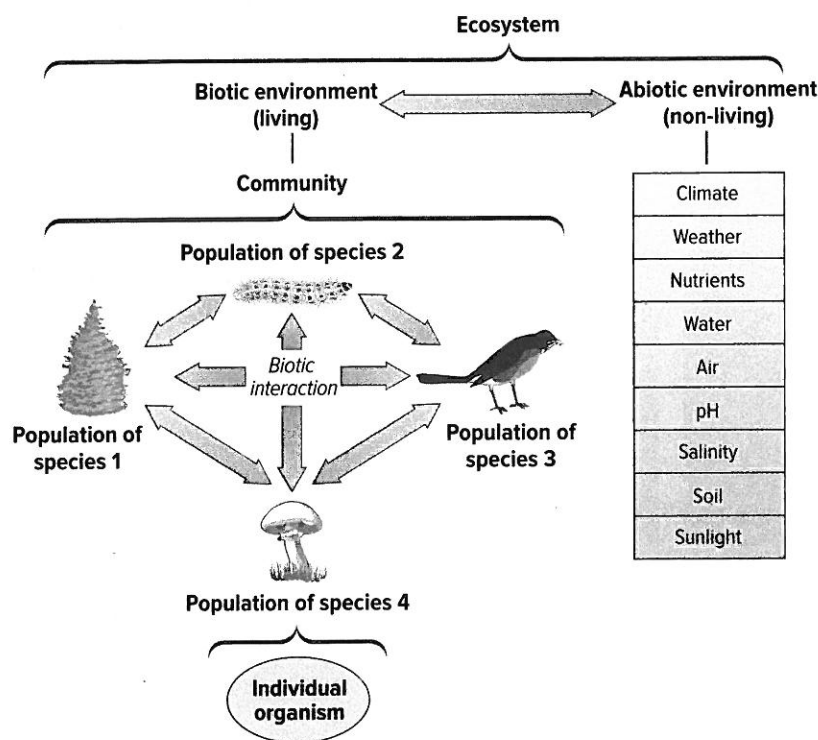


Figure 4.3 The interaction of biotic and abiotic parts of the environment is one example that shows how we are all connected. **How do the biotic components in the illustration interact with the abiotic components?**

- *biosphere*: all of the areas on and under the geosphere, in the atmosphere, and in the hydrosphere that are inhabited by and support life

Earth's spheres are interconnected. For example, the atmosphere interacts with the hydrosphere, resulting in weather. The hydrosphere interacts with the geosphere when floods wash away soil. The biosphere interacts with the geosphere when plant roots break apart rocks. **Figure 4.4** shows examples of each of Earth's spheres and how they interact with each other. You will learn more about how matter cycles through Earth's spheres in Topic 4.3.

Earth's Spheres

Natural processes move matter in continuous cycles from the biotic and abiotic parts of the environment and back again. At any time, matter occupies one of Earth's four spheres (systems):

- *atmosphere*: the gaseous part of Earth, which is concentrated within about 10 km of the surface but also extends hundreds of kilometres higher
- *geosphere* (or lithosphere): the solid, mainly rocky part of Earth
- *hydrosphere*: all of the water (liquid, as well as solid and gaseous) that exists on and within the geosphere

Figure 4.4 Earth's four spheres interact with and affect each other in many different ways. Understanding that Earth's spheres are interconnected is an important part of maintaining a sustainable Earth.



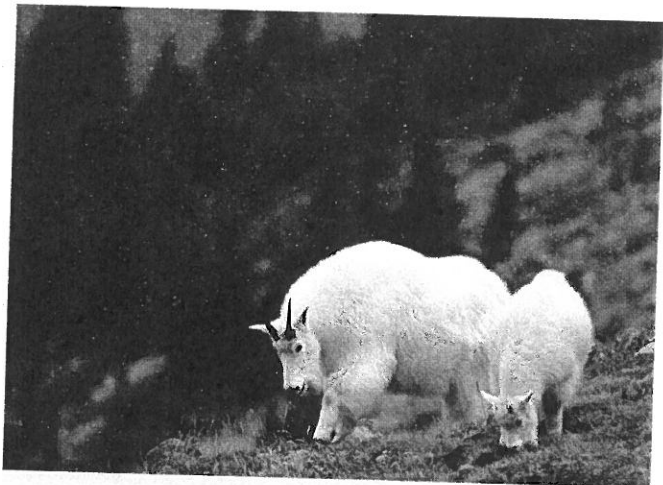
Ice storms are just one way the atmosphere interacts with Earth's other spheres. In January 2015, an ice storm hit Hope, B.C., bringing down trees and resulting in power outages and closed schools. **Which of Earth's spheres were affected by the ice storm?**



Landslides occur when soil and rock from the geosphere are pulled downward by gravity. **How do you think the biosphere may have been affected by this landslide?**



The hydrosphere includes solid and liquid water, as well as water vapour in the atmosphere. Bear Glacier ends in Strohn Lake near Stewart, B.C. **How does the cloudy sky in this photo represent an interaction between the hydrosphere and the atmosphere?**



Mountain goats and the grass they eat are part of the biosphere. **How do you think these mountain goats interact with or are impacted by Earth's other spheres?**

Before you leave this page . . .

1. How are First Peoples and Western science ideas of interconnectedness different and similar?
2. Which of Earth's spheres are involved when liquid water expands as it freezes and causes small cracks to form in rocks?

CONCEPT 2

Sustainability ensures balanced systems now and for the future.

Natural ecosystems are sustainable—they are able to continue to exist indefinitely, recycling their materials, as long as they have a continued and constant source of energy. Natural ecosystems are always changing, so what is sustainable for some organisms at some times might not be sustainable for them at other times. However, the system itself is always sustainable.

Ecosystems also provide services that all living things, including humans, depend on. *Ecosystem services* are the benefits that organisms receive from the environment and its resources. Refer to Table 4.1. Keep in mind that these services are inseparably linked together on a global scale. Each one is as important as any other, and none is expendable or replaceable. If we do not take care of Earth and Earth's spheres or the cycles and subsystems within them, systems become unbalanced, break down, and become unsustainable.

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Table 4.1 Examples of Ecosystem Services

Ecosystem Service	Example
Atmospheric gas supply	Regulation of carbon dioxide and oxygen
Climate regulation	Regulation of greenhouse gases
Cultural benefits	Aesthetic, spiritual, and educational value
Disturbance regulation	Storm protection, flood control, drought recovery, and other aspects of environmental response to disturbances
Food production	Crops, livestock, fish
Habitat (living space)	Habitat for migratory species and for locally harvested species, overwintering grounds, nurseries
Nutrient recycling	Carbon, nitrogen, and other nutrient cycles
Raw materials (natural resources)	Fossil fuels, timber, minerals
Soil erosion control	Retention of topsoil
Water supply	Supplying of water by reservoirs, watersheds, and wells

 **Before you leave this page . . .**

1. Pick one example of an ecosystem service from Table 4.1. Identify which of Earth's spheres it affects, explain how, and explain how humans benefit from the service.

Scientifically literate citizens are aware of bias in sources of information.

Activity

Can You Spot Bias?

Read at least two articles and watch one news report on the same science topic. Can you determine if the articles or news report are biased? If so, how do you know? After you read this page, re-examine the articles and news report to see whether your answer has changed and why.



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You are exposed to information of many different kinds from many different sources each day. Being able to recognize and evaluate bias in information is a vital part of being scientifically literate. Bias is a judgment that is based on a person's knowledge, understanding, and beliefs. For example, someone who is against processing Alberta's northern shale oil resources might call them "tar sands." A person in favour might call them "oil sands." The first term suggests a sense of an environmental problem. The second term suggests a sense of an economic opportunity. Either term indicates a bias. Now compare **Figure 4.5** and **Figure 4.6**. Notice how the choice of photo can indicate a bias as well. It is valuable to recognize bias and understand what it might communicate about ideas, issues, or both.

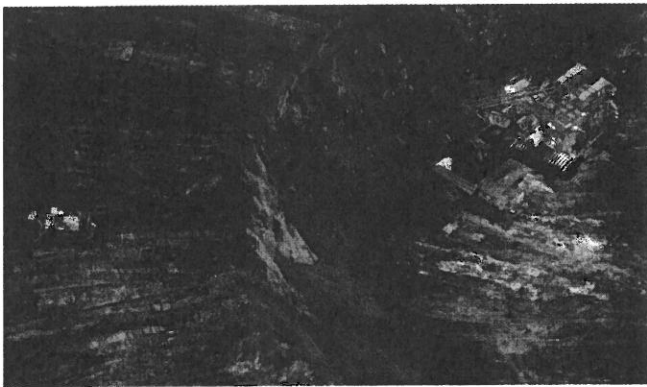


Figure 4.5 Open-pit mining at Fort McMurray. What do you think and feel when you look at this photo?



Figure 4.6 Open-pit mining at Fort McMurray. What do you think and feel when you look at this photo?



Before you leave this page . . .

1. Define bias. Why it is important to be able to recognize bias when gathering information about a topic or issue?
2. Give an example of a time when you were able to identify bias when reading about or discussing a topic or an issue.