

**McGraw-Hill Ryerson**

# **BC Science CONNECTIONS**



**BC Science Connections 9**

**Unit 4: Earth's spheres are interconnected**

## Topic 4.3: What interactions supply energy to Earth's biosphere?

- Producers transfer energy to consumers and decomposers.
- Interactions are needed to provide a constant flow of energy to sustain the biosphere.



## Concept 1: Producers transfer energy to consumers and decomposers.

- **Producers:** Living things that make their own food to get the energy they need
- **Consumers:** Living things that eat producers or other consumers to get the energy they need
- **Decomposers:** living things that break down dead organic material to get the energy they need

## Food Chains Chart the Flow of Energy from Producers to Consumers

**Food chain:** A model that describes how food energy is passed from one living thing to another

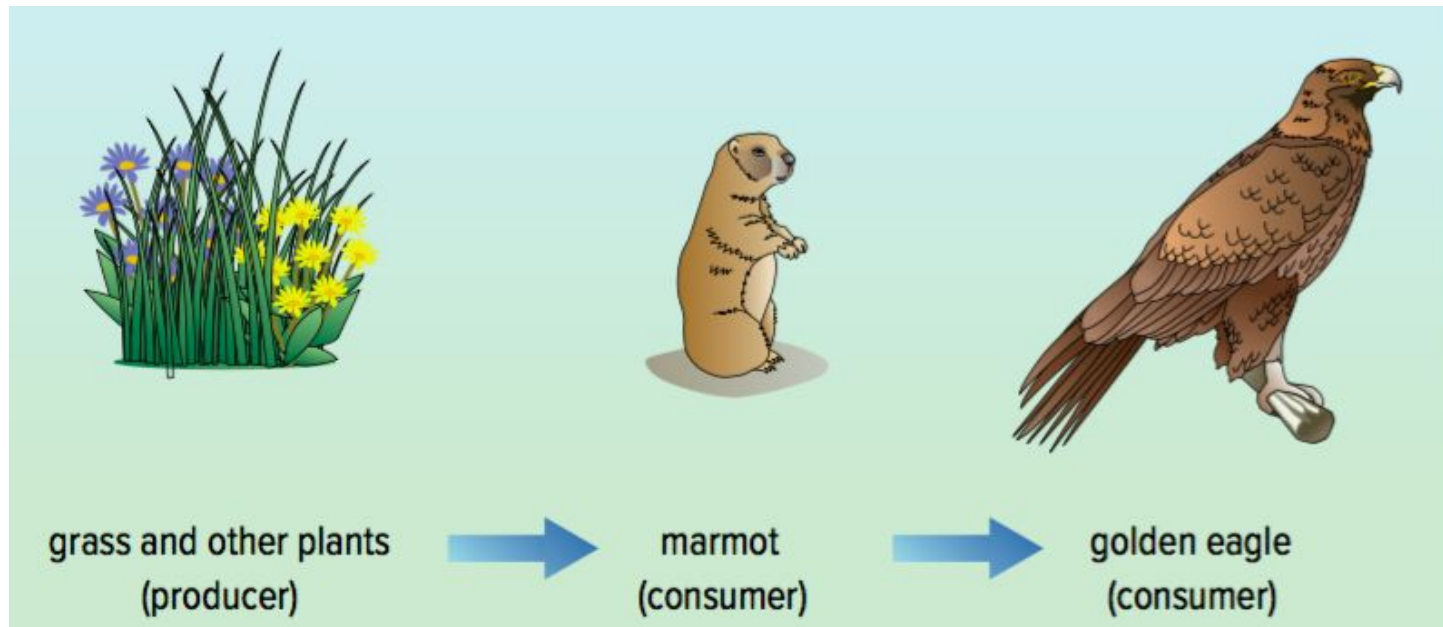


Figure 4.12: The terrestrial mountain ecosystem food chain has three links, with one producer and two consumers.

## Food Webs Show How Food Chains Are Connected

**Food web:** A model of feeding relationships shows a network of interacting and overlapping food chains

- A change in the number of one organism could affect several food chains in the food web
- All organisms in an ecosystem are connected and depend on each other for survival

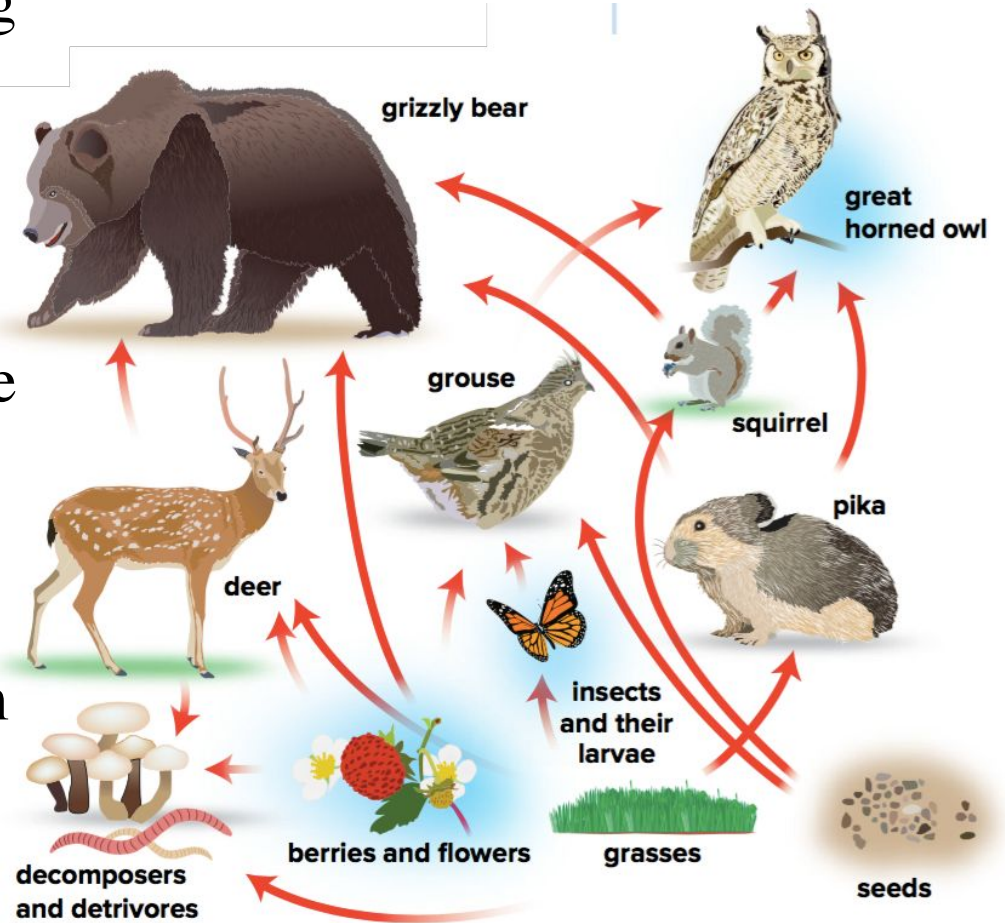


Figure 4.13: An food web that might be found in B.C.'s alpine regions

## Discussion Questions

1. Compare and contrast producers, consumers, and decomposers.
2. A food web is a more realistic model for feeding relationships in an ecosystem than a food chain. Explain why.

## Concept 2: Interactions are needed to provide a constant flow of energy to sustain the biosphere.

Why are there limits to the length of a food chain?

- Most of the energy transferred from one organism to another is lost to the environment as unusable heat
- Some energy has already been used to support life functions (growth, cellular respiration)
- Some energy is stored in wastes that are excreted
- Less and less energy is available to each organism in the food chain

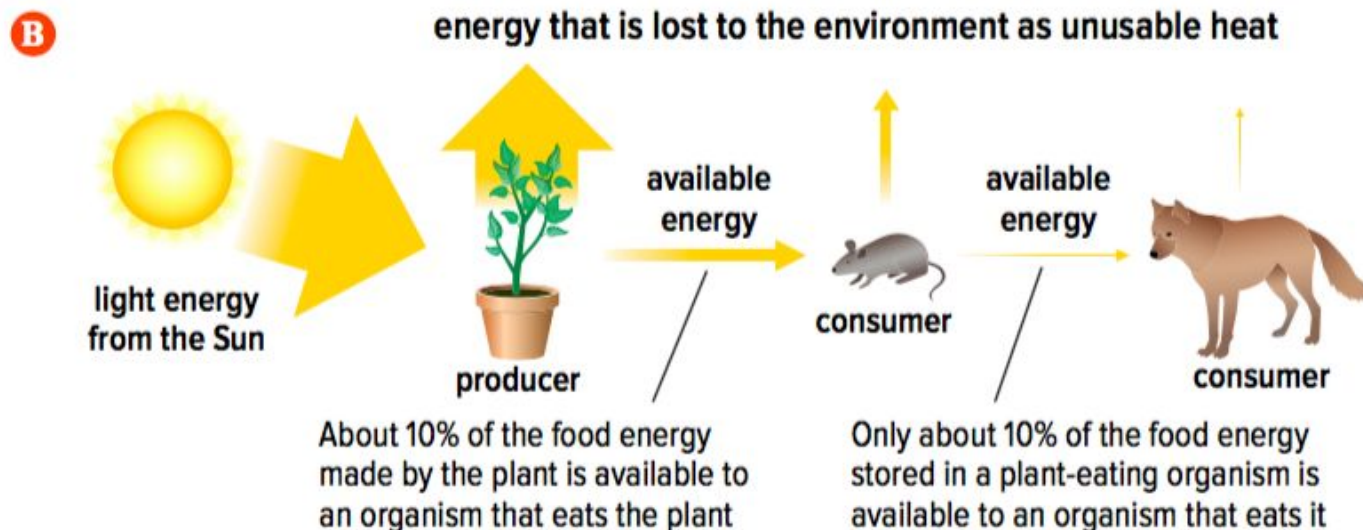
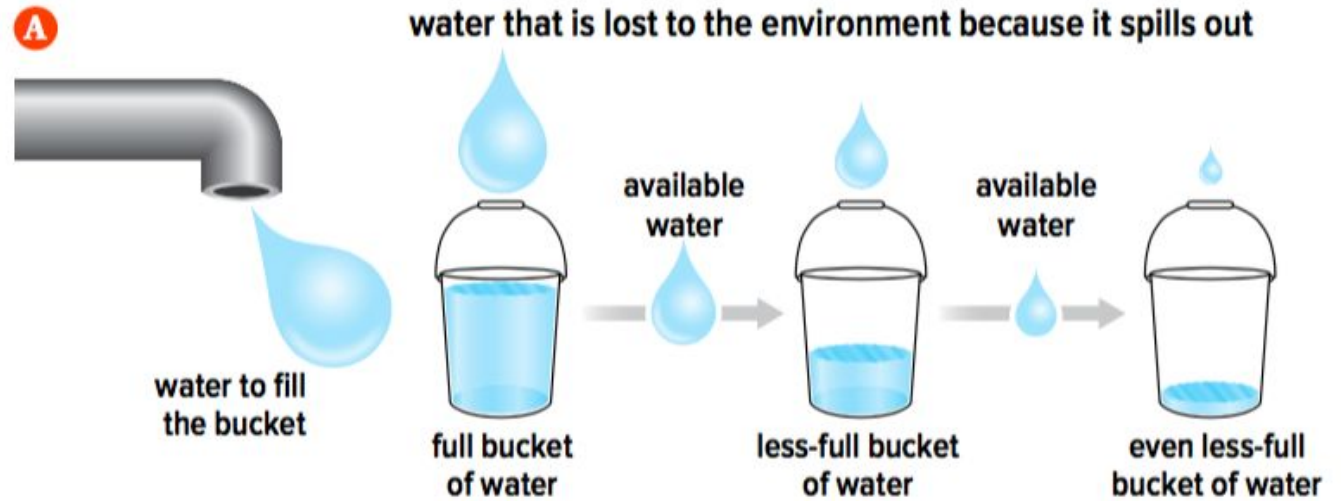
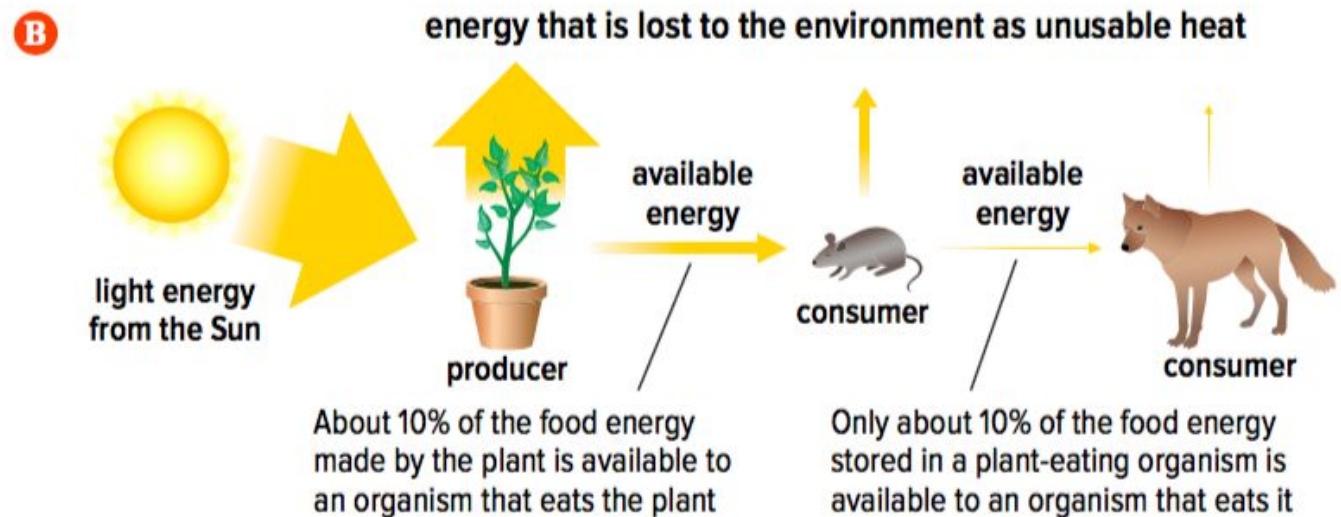


Figure 4.14: A) Most of the water in the bucket that is transferred from one player to another in a bucket-toss relay game is lost to the environment. Less and less water is in the bucket for each player in the relay.



B) Most of the energy that is transferred from one organism to another in a food chain is lost to the environment as unusable heat. Less and less energy is available to each organism in the food chain.

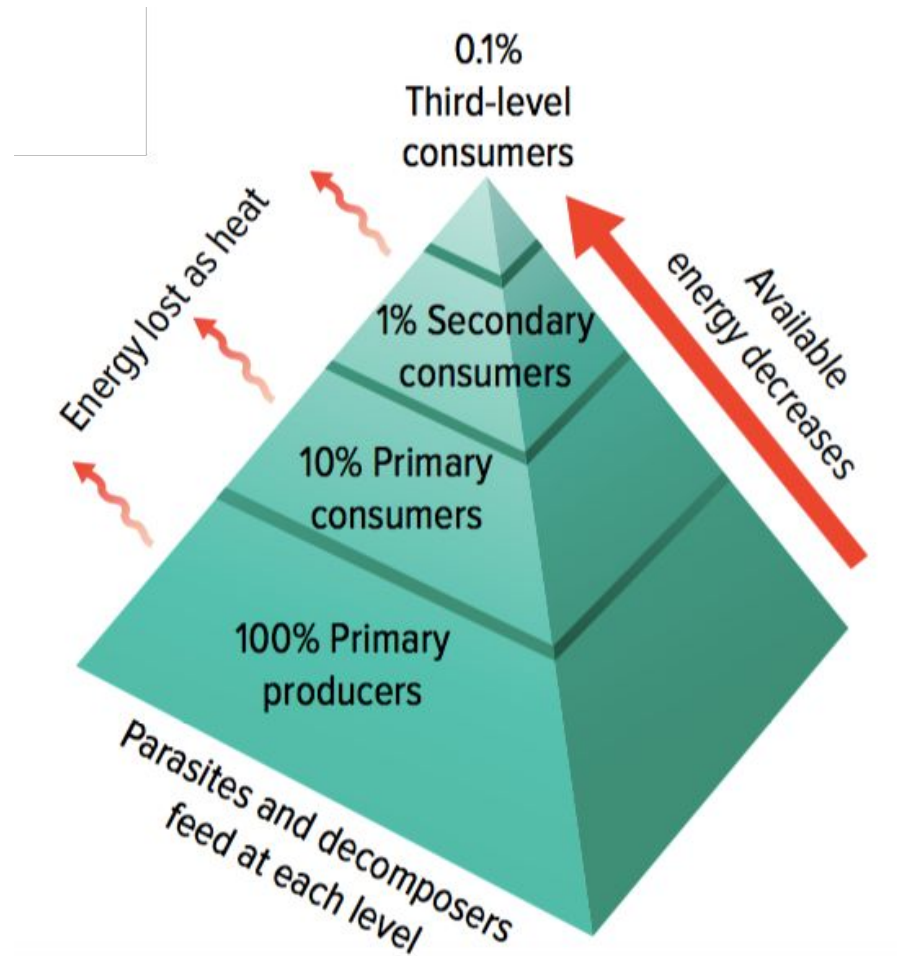




## Energy Pyramid

**Energy pyramid:** A model that shows the amount of energy available in each level of a food chain

Figure 4.15: In a pyramid of energy, each level represents the amount of energy that is available to that trophic level. With each step up, there is an energy loss of 90%.



## Discussion Questions

1. When a mouse eats a plant, only about 10% of the plant's energy is transferred to the mouse. What happens to the rest of the energy?
2. In **Figure 4.14**, the analogy of a bucket-toss relay game is used to explain the transfer of energy through a food chain. Create your own analogy to explain this transfer of energy.

## Topic 4.3 Summary: What interactions supply energy to Earth's biosphere?

- Producers transfer energy to consumers and decomposers.
- Interactions are needed to provide a constant flow of energy to sustain the biosphere.

