

55

Ecosystems and Restoration Ecology

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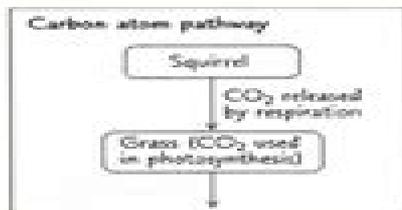
All living systems require a constant input of energy and an exchange of matter with the environment (BIG IDEA 2). In an ecosystem, energy flows but matter is recycled (BIG IDEA 4). Ecosystems maintain dynamic homeostasis by regulating the transfer of energy and matter (BIG IDEA 2).

KEY CONCEPTS

- 55.1** Physical laws govern energy flow and chemical cycling in ecosystems p. 1239
- 55.2** Energy and other limiting factors control primary production in ecosystems p. 1241
- 55.3** Energy transfer between trophic levels is typically only 10% efficient p. 1245
- 55.4** Biological and geochemical processes cycle nutrients and water in ecosystems p. 1248
- 55.5** Restoration ecologists return degraded ecosystems to a more natural state p. 1253

Study Tip

Make a flowchart: To connect the processes shown in Figures 55.4 and 55.14 to actual events in an ecosystem, make a flowchart like the one begun here. It should show how a carbon atom exhaled as CO_2 by a squirrel could eventually enter another squirrel after passing through decomposers, a small bird, grass, a hawk, an oak tree, and a grasshopper (not in that order).



Go to Mastering Biology

- For Students** (in eText and Study Area)
- Get Ready for Chapter 55
 - Figure 55.4 Walkthrough: Overview of Energy and Nutrient Dynamics
 - BioFix® Animation: The Carbon Cycle
- For Instructors to Assign** (in Item Library)
- Scientific Thinking: Restoring Native Oysters in the Chesapeake Bay
 - Interpreting Data: Net Primary Production

Ready-to-Go Teaching Module

(in Instructor Resources)

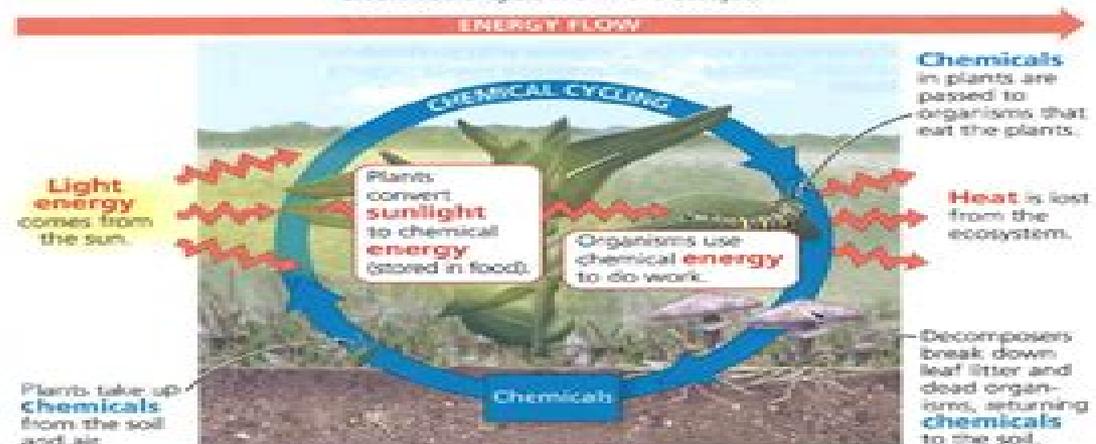
- Trophic Relationships (Concept 55.3)



Figure 55.1 This arctic fox (*Vulpes lagopus*) will obtain chemical nutrients and energy when it eats the seabird it has killed. Before its death, the seabird ate fish from the sea and excreted waste that provided key nutrients for the plants on this Alaskan island. These interactions illustrate a few of the many ways that chemicals and energy move through ecosystems.

What are the dynamics of energy and chemical nutrients in an ecosystem?

There is a one-way flow of **energy** through an ecosystem, whereas **chemicals** cycle within the ecosystem.



Bio Guide 55 Ecosystems

BM King



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