

4th Grade Life Science Unit

Ecosystems of Alaska

Teacher Background Information – for teacher content knowledge only, NOT student learning goals

An ecosystem is a biological community of interacting organisms and their physical environment.

Every species is linked, directly or indirectly, with a multitude of others in an ecosystem. Plants provide food, shelter, and nesting sites for other organisms. For their part, many plants depend upon animals for help in reproduction (bees pollinate flowers, for instance) and for certain nutrients (such as minerals in animal waste products). Some species have become so adapted to each other that neither could survive without the other. There are also other relationships between organisms. Parasites get nourishment from their host organisms, sometimes with bad consequences for the hosts. Scavengers and decomposers feed only on dead animals and plants. Some organisms have mutually beneficial relationships. The interaction of living organisms does not take place on a passive environmental stage. Ecosystems are influenced by non-living factors such as climate, water type and availability and mineral types. The world contains a wide diversity of physical conditions that create a wide variety of environments: freshwater and oceanic, forest, tundra, mountain, and many others. In all these environments, organisms use vital earth resources, each seeking its share in specific ways that are limited by other organisms. In every part of the habitable environment, different organisms vie for food, space, light, heat, water, air, and shelter. The linked and fluctuating interactions of life forms and environment compose a total ecosystem; understanding any one part of it well requires knowledge of how that part interacts with the others.

Big Idea

Ecosystems are made up of interactions of organisms with their living and non-living environment.

Essential Question

What makes up an ecosystem?
What types of ecosystems do we have in Alaska?

AAAS Benchmarks/National and Science Education Standards

- For any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.
- Insects and various other organisms depend on dead plant and animal materials for food. 5D /E2
- Organisms interact with one another in various ways besides providing food. 5D/E3a
- Changes in organisms' habitat are sometimes beneficial to it, and sometimes harmful. 5D/E4
- Most microorganisms do not cause disease, and many are beneficial.
- Over the whole earth, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.

Student Difficulties and Misconceptions

Students often believe that:

- Stronger organisms have more energy.
- There are more herbivores because they have more offspring.
- A species high on the food web is a predator to everything below it.
- Energy accumulates in an ecosystem so that the top predator has all the energy from the organisms below it.
- Carnivores can exist in a plant free world if their prey produce enough.

Instructional Implications

- Students' study of interactions among organisms should start with relationships they can directly observe. By viewing nature films, observing local wildlife, and/or participating in simulations they should see a great diversity of life in different habitats.
- Students should become acquainted with many examples of ecosystems, starting with those near at hand.
- Students can begin to look for ways in which organisms in one habitat differ from those in another and consider how some of those differences are helpful to survival. The focus should be on the consequences of different features of organisms for their survival and reproduction.
- Understanding and appreciating the diversity of life does not come from knowing bits of information or classification categories about many different species; rather it comes from their ability to see in organisms the patterns of similarity and difference that permeate the living world.
- Questions should encourage students to consider where organic substances come from, where they go, and to be puzzled when they cannot account for the origin or fate of a particular organic matter.

Local Connections

Observations and interactions within the natural world of the child
Visits to DIPAC, Wetlands, inter-tidal zones, forests, muskegs, arctic alpine
Discovery S.E. naturalists

Materials/Resources

STC Ecosystems
Seeds & Roots: Aquatic Ecosystems
ADF&G Alaska Wildlife curriculum, wildlife ecology cards
School trails curriculum (GV, AB, Gast)
[The Case of the Mummified Pigs](#)
"A Sense Of Wonder" Ch. 20 from [More Picture Perfect Science Lessons K-4](#)

Alaska GLE's

The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by:

[4] SA3.1 identifying the local limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive. (L)

The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by

[4] SC1.1 showing the relationship between physical characteristics of Alaskan organisms and the environment in which they live.

[4] SC1.2 describing fossil evidence (e.g., casts, track ways, imprints, etc.) of extinct organisms

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by

[4] SC2.1 choosing appropriate tools (i.e., hand lens, microscopes, ruler, balance) to examine the basic structural components (e.g., stems, leaves, fish scales, wings) of living things

[4] SC2.2 describing the basic characteristics and requirements of living things

The student demonstrates an understanding that all organisms are linked to each other and their physical environment through the transfer and transformation of matter and energy by

[4] SC3.1 identifying examples of living and non-living things and the relationship between them (e.g., living things need water, herbivores need plants.

[4] SC3.2 identifying a simple food chain, diagramming how energy flows through it, and describing the effects of removing one link

ASSESSMENTS

[Uncovering Student Ideas in Science](#)
Volume 2; Probe 19: Habitat Change
Volume 2; Probe 18: Rotting Apple

Related Scientist or Career Path

Rachel Carson