



Interdependent Relationships in Ecosystems:

Animals, Plants and their Environment

Learn what the major communities in Wyoming are and their unique characteristics. In addition, learn how specific plants and animals are able to live and survive in each ecosystem.

Disciplinary Core Ideas: Next Generation Science Standards:

LS1.C: Organization for Matter and Energy Flow in Organisms

All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)

<http://www.nextgenscience.org/kls1-molecules-organisms-structures-processes>

ESS3.A: Natural Resources

Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

<http://www.nextgenscience.org/kess3-earth-human-activity>

Wyoming State Science Standards Connections:

SC4.1.1: Characteristics of Organisms:

Students describe observable characteristics of living things, including structures that serve specific functions and everyday behaviors.

SC4.1.3: Organisms and their

Environment: Students show connections between living things, their basic needs, and the environment.

Grade Level: Kindergarten

Number of Lessons: 2

Essential Question:

Why do organisms live where they do in Wyoming?

Objectives:

At the end of this unit, students will be able to:

- *Identify* and *differentiate* abiotic and biotic objects.
- *Organize* biotic elements to their habitat.
- *Illustrate* a biotic creature in its habitat.

Assessment opportunities:

At the end of this unit, you will be able to assess students through:

- Having them recognize and find abiotic versus biotic objects in a schoolyard bingo.
- Asking students to pair an organism to its habitat and give a reason for that pairing.
- Students creating an illustration of one local species in its habitat, or create a class mural.

Performance Expectations:

K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and places they live.

Interdependent Relationships in Ecosystems:

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Vocabulary

Abiotic

Biotic

Producer

Consumer

Riparian

Sagebrush community

Forest community

Alpine community

Niche

Adaptations

Habitat

Other resources and links:

<http://pbskids.org/eeeworld/index.html?load=eekostructure>

<http://www.exploringnature.org/db/detail.php?dbID=45&detID=3271>

<http://www.wyobio.org/>

http://www.friendsofthedunes.org/programs/education/teacher-resources/activities/supplemental/Animal_Charades_Game.pdf

Figure 1. (right) Conceptual diagram showing the trophic (herbivory, prey) levels of an ecosystem. Within this we see directional arrows of where that consumer is getting its energy. Not displayed here are omnivores, such as bears, who would span multiples levels of the trophic cascades.

Background Information

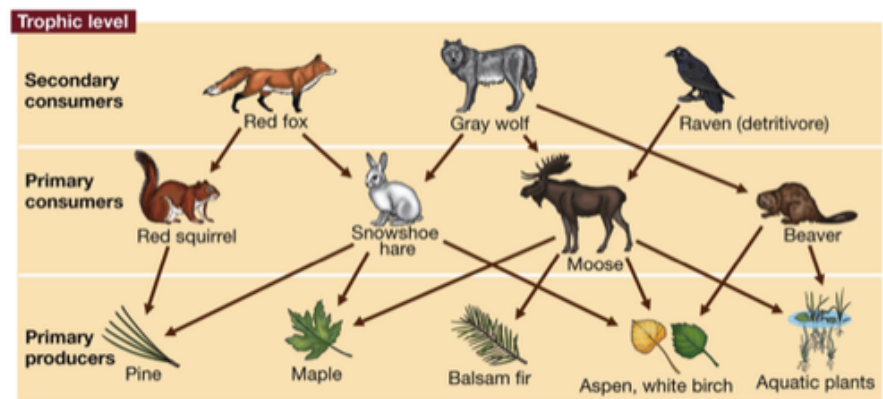
At the core of understanding ecosystems, is recognizing how energy flows from the sun to the different levels of biotic producers and consumers. Students must completely grasp the difference of living and non-living before they are able to understand how one species provides energy for another.

Abiotic forces, including temperature, sun, water availability, and elevation, determine where primary producers (plants and algae) are able to grow. These producers, in turn, help define specific communities. Communities are recognized as groups of organisms in a specific place and time that interact with each other. The habitat in which an organism lives can be defined by the environmental conditions, both biotic and abiotic, that exist there. Some species can tolerate a wide range of environmental conditions, but others cannot.

An example of this would be a sagebrush community, which is primarily defined by the dominance of sagebrush, but includes other plant species such as rabbitbrush, bunch grasses and much more, as well as associated animals. This community is known for its adaptations to low water availability, short growing season, strong winds, and is found in medium to high elevations.

Sagebrush is a primary producer for many primary consumers that call this community their home, like pronghorn, sage grouse, and sagebrush sheep moths. Energy captured by sagebrush and other producers is moved up through this trophic cascade, or food web, from primary consumer to secondary consumer, and eventually to top consumer. Energy is lost at each step, and must be constantly captured by the producers. Nitrogen and other nutrients contained in organisms are recycled through the community by decomposition. Carbon cycles back and forth through living organisms and the atmosphere.

This is just one example of the complexities and relationships seen in Wyoming ecosystems; see below for another example. This unit provides the framework for students to explore the communities and systems at play in their backyard and throughout the state.



Biol 102 Lecture 4-18. (n.d.). *flashcards*. Retrieved October 10, 2014, from <http://quizlet.com/11513457/biol-102-lecture-4-18-flash-cards/>

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Lesson 1: Living and Non living

What is living? What is non living? What makes something living? What do all living things have?

Objectives:

- Identify and differentiate abiotic and biotic objects.

Materials:

- Projector
- Chart paper
- Book
- Bingo sheets

Time Commitment:

30 minutes plus prep time depending on the length of the book and student attention.

Preparation:

- Have PowerPoint up and running.
- Set up chart paper and projector.
- Select a book from below.
- Print out Bingo sheets for each student.

Assessment:

- Recognize and find abiotic versus biotic objects through a schoolyard bingo.

Directions:

1. Using the PowerPoint provided, ask students to identify if the picture is of something living or nonliving.

2. Ask the students, "What do all living things have in common? – Accept all answers- and write those down on a chart paper.

3. Show a picture of an animal or plant that all students agree is living. Now compare it to the list. Ask the students if this agrees with the list of attributes generated by the class. If it doesn't, then cross out the attribute.

4. Continue with other pictures of living things. Include pictures of both plants and animals.

5. Once done, read a book that deals with living and nonliving, such as "**Living and Nonliving**" by Carol Lindeen; "**Is It Living or Nonliving?**" By Rebecca Rissman

6. Complete Abiotic/biotic bingo **outside** to find local examples of these different elements (bingo provided on website).

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Photo by Peter Gibbons "Quite corner in the Beartooths."

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Lesson 2: Organisms and their Environment

Where do organisms living in Wyoming? Why do they live there?

Objectives:

- Students will be able to *organize* biotic elements to their habitat.
- Students will be able to *illustrate* a biotic creature in its habitat.

Materials:

- Projector
- Internet
- Yarn
- Animal/plant cards
- Animal Charades or copies of habitat matching

Time Commitment:

30 minutes in classroom
30 minutes in field, can be extended or shortened

Preparation:

- Print pictures of four major habitats, plants and animals found in Wyoming – Sage, forest, riparian and alpine (provided on website).
- Have WyoBio up and running.
- Plan field trip
- Print out Animal charades cards (provided on website).

Assessment:

- Ask students to pair an organism to its habitat and give a reason for that pairing.
- Student illustration of one local species in its habitat, or create a class mural.

Directions:

1. Ask students (in pairs or small groups) to match animals and plants to their habitat.

*Use habitat and species cards provided.

2. Bring all students together and define four major habitats of Wyoming; sagebrush steppe, forest, riparian and alpine. Use WyoBio as a way to zoom into where these habitats are.

3. *Animal charades.* Using the pictures provided, have each student pick out one of the animals and act out how it moves in its environment.

Examples include:

Hop: Snowshoe hare
Run: Antelope
Slither: rattlesnake
Swim: Brook Trout
Fly: Red Tail Hawk
Walk: Bear

Once done, have each student draw or write where they think their animal lives, where they get their energy, and why they look or act like they do.

Example: If I am a bear, I live in the forest and get energy from the berries I eat. My fat and fur help me stay warm through the long winter.

4. *FIELD TRIP:* go to a local habitat and have students pick one animal, or plant to draw.

Have students draw and describe the habitat and community that that species lives in as well as where they think its energy comes from.

While out, take pictures of local plants or animals and upload them onto WyoBio when back in the classroom. If you are able, identify the species.



Photo by Lindsay Stoffars "Natural Beauty."

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