

## Biodiversity

**Subject Area:** Plant Science

**Unit Title:** Biodiversity

**Grade Level:** 4th & 5th

**Objectives:** To create an understanding of what biodiversity is and how it can be threatened.

**Colorado Content Standards to be covered:**

### SCIENCE

**Standard III - Life Science:** Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

**Anticipatory Set:** Ask the students to fill in the first column of the included Vocabulary Knowledge Rating Chart indicating how well they know each vocabulary word before the lesson (first column).

### Input:

Biodiversity is short for biological diversity. Biodiversity includes all the organisms living and interacting in all the ecosystems on earth. The biosphere is the area of water, land and atmosphere able to sustain life. The basic ecological unit in a biosphere is the ecosystem. An ecosystem may be as small as a rotting log. It can be as large as an ocean. Each ecosystem consists of a community of plants and animals. They are in an environment that supplies them with the materials needed for life. It is very complex. There is much to learn about all the connections among organisms within an ecosystem.

The incredible biodiversity that we see today is the result of millions of years of geologic change. Our unique and diverse ecosystems have evolved slowly through time. Along with the evolution of ecosystems, comes the variation within species, which can be measured at the genetic level. Each carries its own unique genes which have allowed it to adapt to changing environments through time. The web of life on our planet is maintained by our diverse ecosystems and the organisms found within them. Each animal and plant is connected to the living and physical elements (such as soils) in its ecosystem. Saving or protecting biodiversity means that our unique ecosystems will continue to purify our water, clean the air we breathe, produce oxygen, recycle nutrients and regulate climate. Can you imagine how difficult it will be to maintain the world as we know it if we lose biological diversity?

Biodiversity is important. This is because it takes many ecosystems throughout the world to maintain the web of life. However, biodiversity is disappearing. Biodiversity disappears when plants and animals become extinct. When we lose a plant or animal species, we lose its gene pool. We may also be losing a valuable medicine or a better crop— we just don't know. When a plant is extinct, we no longer have the opportunity to use and appreciate its unique qualities.

Some things that threaten biodiversity are:

- rapidly growing human populations that increase the demand for natural resources
- over-exploitation of species
- pollution
- habitat fragmentation
- desertification
- spread of non-native (exotic) species
- climate change

Managing for biodiversity means managing lands for native plants and animals in a way that will keep them part of the ecosystem forever. Many of the plants we see when we visit parks, open spaces, forests and other public lands are native plants. Colorado’s native plants are those that have evolved here over time. They were in Colorado before any of our ancestors settled here. We say that these plant species are endemic to Colorado. Some plants are found in a wide range of places. Some are found only in Colorado (narrow endemics). Not all of the plants we see in Colorado are native. Some are non-native or exotic plants. They evolved in other places. People accidentally or intentionally brought or are bringing them to America. Some of these exotic plants become noxious weeds.

Native plants are important because they support the animals that live in Colorado and are resources for ecological restoration.

What are some uses of native plants?

Food and shelter:

- people eat strawberries and choke cherries
- livestock and wildlife eat grasses
- people build homes and furniture from trees
- medicine: did you know that originally aspirin came from willows?

Other products: baseball bats from ash trees

Tourism: Crested Butte and Breckenridge Wildlife festivals

**Checking for Understanding:** At the end of this section choose one of the following for a quick check: ask the students to partner share and think, pair and share, do a quick 3 word write up as an exit slip, do a quick sketch or give each other a quick thumbs up or down to check for understanding. Determine the level of mastery for each student and provide individual remediation as needed.

**Discussion:**

**Biodiversity & Ecology**

Discuss with your students the terms biodiversity (the diversity of plant and animal life in a particular habitat or in the world as a whole); and ecosystem (an ecological community together with its environment, functioning as a unit.)

**Activity 1:** Have your students list the living and non-living things found in the ecosystem we will call the “classroom.” Draw arrows showing the connection between the things in this ecosystem. You may want to expand this ecosystem to be the “school” ecosystem or the “community” ecosystem.

Eliminate something from the classroom ecosystem like the chalkboard. What impact does that have on other things in the classroom?

**Activity 2:** Expand on the list of things that threaten biodiversity (page 1). See below.

*Rapidly growing human populations* that increase demand for natural resources. An example of this is happening in Colorado. More and more people are moving into this beautiful state. People need homes, roads to go to work, shopping centers, etc. Consequently, 90,000 acres of land in Colorado are converted from agricultural use to some other use each year. Land that once grew crops that helped clean the air and provide food and fuel are gone.

*Over-exploitation* - the commercial market develops a demand for a resource, the local human populace

mobilizes to extract and sell the resource; sometimes the resource is extracted so thoroughly that it becomes rare or even extinct. An example of a resource that has been over exploited is whales hunted to the point of extinction.

*Pollution:* reduces the quality of the environment and makes life more difficult or even impossible for some species, including humans, to survive; an example is water pollution.

*Habitat fragmentation* is the breaking up of habitat. For example, when land is subdivided and houses are built in an area, this habitat is broken up. Many biologists consider fragmentation of natural habitats one of the greatest threats to biodiversity.

*Desertification* is the drying up of an area because the water is taken away. An example of this is when cities buy water from farmers. Without water, the farm land will dry up and desertification occurs. Habitat that once supported ducks and other animals and plants is gone.

*The spread of non-native species* can represent an enormous problem for the health of native plants and animals. Some non-natives can overtake areas because none of their natural controls (predators, competitors, parasites) are present. With nothing to keep the populations in check, the non-natives can spread and take over large areas. An example of this is Purple Loosestrife. This plant out-competes natives in wetland and riparian areas. It crowds out other plants, reducing food and shelter for wildlife.

*Climate change:* an example of this is the climatic change that caused the extinction of the dinosaurs.

**Closure:** Review and clarify the key points of the lesson including the new vocabulary words. Have the students return to the Vocabulary Knowledge Rating Chart and rate their understanding of each vocabulary word after the lesson. Then have them write down the definition and provide at least one example or use the word in a sentence.

## Vocabulary Knowledge Rating Chart

### Before the Lesson:

In the first column, indicate how well you know each vocabulary word by using “1” to represent “I know what it means,” “2” “I sort of know what it means,” or “3” for “I don’t know what it means.”

### After the Lesson:

In the second column, indicate how well you know each vocabulary word after the lesson, by using “1” I know what it means, “2” I sort of know what it means, or “3” I don’t know what it means. Next write down the definition and give at least one example or use the word in a sentence.

Vocabulary Word	Before Lesson	After Lesson	Definition	Example/Sentence
<b>biodiversity</b>				
<b>biosphere</b>				
<b>extinct</b>				
<b>endemic</b>				
<b>non-native plant (or exotic)</b>				
<b>noxious weeds</b>				

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Vocabulary Word	Before Lesson	After Lesson	Definition	Example/Sentence
<b>biodiversity</b>			the diversity of plant and animal life in a particular habitat includes all the organisms living and interacting in all the ecosystems on earth.	answers will vary
<b>biosphere</b>			The area of water, land and atmosphere able to sustain life.	
<b>extinct</b>			When plants or animals disappear or die off.	
<b>endemic</b>			Plants evolved in an area over time.	
<b>non-native plant (or exotic)</b>			Plants that people accidentally or intentionally brought or are bringing to America.	
<b>noxious weed</b>			A plant growing where it is not wanted, and can injure public health, agriculture, recreation, wildlife or property.	