



Lesson No. 4

Lessons in Biodiversity: the Writings of Aldo Leopold

(Thinking Like a Mountain & Escudilla)

Target Audiences – Environmental Science, Biology, Ecology, and Language Arts students.

Objectives:

This lesson is designed to a) supplement discussion and understanding of the concept of biodiversity, b) introduce students to the conservation philosophy of Aldo Leopold, c) foster understanding of the role of keystone species within ecosystems, and d) provide students with exposure to the field of natural history writing.

Background:

The lessons included here are based upon two of Leopold's most well-known essays. Both *Thinking Like a Mountain* and *Escudilla* touch upon the role of large predators in maintaining robust ecosystems. Additionally, these stories help us to understand the more intangible qualities that large predators bequeath an ecosystem. The latter take us into consideration of the philosophy and ethics underlying wildlife conservation. The lessons may be used in science classes to reinforce discussions of the importance of keystone species within ecosystems and how they maintain the ecological health of such systems.

Language Arts classes (see Actions 6 & 7) might use the writings featured in the lessons as a framework for discussion of natural history writing (aka nature writing). Nature writing is considered by many to be the richest form of post-World War II American nonfiction and has been populated by some of literature's most well-known authors including Henry David Thoreau, Charles Darwin, Rachel Carson, Edward Abbey, John James Audubon, and Alexander von Humbolt.

Alternatively, the essays suggested could serve as a portal for a lesson(s) during which students research and present information about Aldo Leopold himself. Leopold was a pioneering conservationist, as well as the father of the profession of wildlife management, and certainly belongs in the pantheon of great American environmentalists along with people such as John Muir, Theodore Roosevelt, Rosalie Edge, Olaus Murie, and Robert Marshall. He should be more well-known.

Actions:

1. As a group (or individually) read *Thinking Like a Mountain*. (For more advanced students, consider reading and discussing *Escudilla* as well. It deals more directly with the ethics of wildlife conservation.)
2. In paragraph two, Leopold speaks of the practical, concrete implications of the presence of wolves. What are some of these realities surrounding the existence of wolves in a given area particularly in regards to other animals, hunters, and ranchers.
3. In the third paragraph, Leopold addresses the hidden, mysterious implications of living in wolf country. Imagine, and describe, going for a hike in a land where large mammalian carnivores like wolves and grizzly bears are present. Even though their presence might represent little danger to humans, explain how their existence would add to the atmosphere of your hike compared to one done in a place devoid of large predators.
4. Leopold makes the connection between removal of wolves (and other predators) from an ecosystem and the subsequent overpopulation of their prey. Research the significance of the Kaibab deer herd.
 - a. When did the removal of predators from the Grand Canyon National Game Preserve begin? Why were predators removed in the first place? That is, what was the underlying rationale for removing mountain lions, wolves, coyotes, and bobcats from the area?
 - b. Construct a graph showing the population of deer on the Kaibab from 1905 to 1930.
 - c. Did the removal of predators on the Kaibab have the desired results? Explain the results of the predator removal program.
5. Over the years the accuracy of the Kaibab Deer Story has been questioned (see Burk. 1973. *The Kaibab Deer Incident: A Long-persisting Myth* for example). However, the underlying premise that removal of predators is detrimental to not only their prey but to the ecosystem is considered valid (see Brinkley et. al. 2006. *Was Aldo Leopold Right About the Kaibab Deer Herd?*)

A classic example in our time of predator/prey/ecosystem interaction has been the reintroduction of wolves to Yellowstone National Park. Wolves are considered a keystone species. Such a species plays a critical role in determining the structure of the ecosystem within which it lives. Why were wolves removed from Yellowstone N.P. in the first place? When did they cease to exist in the park?

- a. When were wolves reintroduced to Yellowstone N.P.? Where did they come from?
- b. Since their reintroduction, wolves have created a so-called trophic cascade within the park. What is a trophic cascade?
- c. Explain how the reintroduction of wolves to Yellowstone has created a trophic cascade in regards to these particular species: elk, coyotes, willow trees, beaver, pronghorn antelope, and songbirds. For help in answering this question, view *How Wolves Change Rivers* on YouTube.

6. Language Arts: Leopold's writings are full of rich metaphor and symbolism. Consider the incident in which a young, trigger-happy Leopold took part in the killing of the female wolf.
- Leopold says that when he reached the old wolf he saw, *"a fierce green fire dying in her eyes. There was something in those eyes known only to her and to the mountain."* What is Leopold trying to say to us here?
 - We know that mountains aren't alive and, in the literal sense, cannot hear. What then does Leopold mean when he says that, *"only the mountain has lived long enough to listen objectively to the howl of a wolf"*?
7. In the essay *Escudilla*, Leopold refers to the government trapper's killing of the bear as toppling *"the spire off an edifice a-building since the morning stars sang together"*.
- What is an edifice? A spire? What does this metaphorical passage mean from a biological or ecological point of view?
 - "Bigfoot claimed for his own only a cow a year and a few square miles of useless rocks, but his personality pervaded the county."* What does this suggest about the danger the bear represented to humans? What is Leopold suggesting about the status of the bear as legend?
 - What is Leopold suggesting about the march of human progress when he says that, *"we were the captains of an invasion too sure of its own righteousness"*?
 - After the killing of the bear, there were no longer any grizzlies in the area. Leopold laments this by saying, *"Escudilla still stands on the horizon, but when you see it you no longer think of bear. It's only a mountain now."* How do you think it is that the presence of large mammalian carnivores might give land a feeling of matchlessness, rareness, and individuality? You might think about what it would be like to hike in a place like Yellowstone N.P. where there are bears and wolves. Then compare this to hiking in a local state park where these animals have been extirpated.

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