



Biodiversity in a Local Context

Goal: Connect students with their local environment, Mt. Monadnock, and improve their ecological literacy.

Reserve Design

1. Introduction: Google Earth tour of the mountain and surrounding landscape.
Gather students impressions of the mountain in relationship to towns, rivers, and other mountains.

Definition: conservation

Have students work in pairs to develop a working definition of conservation. Pairs can report out to the whole class. Refine the definition as suggestions are offered.

2. Mini lecture on reserve design – theoretical models (discussion based format)

The concept of setting land aside is relatively new (US started it about the turn of the 20th century) and more prevalent in affluent, industrialized countries. Why do you think this is?

Describe some of the land that has been conserved in the US? Where is it? What type of ecosystem is it?

Newer reserves are intended to protect ecosystems, habitats, or individual species rather than aesthetically pleasing landscapes. The size of these reserves is based on money and political will as much as it is based on science.

Conservation biology uses the term SLOSS (single large or several small) to describe the opposing pressures in conservation.

Large reserves can protect lots of land, allow animals to move about more freely, and maximizes the reserves ability to recover from a major disturbance like fire or hurricanes.

Smaller reserves can be just as useful, if the biotic elements of the ecosystem can move between the islands using habitat corridors.

These ideas have been adapted to form the biosphere reserve concept. Biosphere reserves focus on ecologically important areas and use concentric rings of land use to mesh the varying perception of acceptable land use within a conservation area. External rings allow for extractive use and human settlement, inner rings focus on research and ecotourism, while the core is left “wild”

How does this model fit on Mt Monadnock?

Would it change the use or management of any of the parcels?

Given the mountain's isolation, how much area would you set aside?

3. Small group work with maps and management plans: (20 mins)

Rotate through stations to answer the following questions:

Station 1: How much land is conserved? (GIS maps of acreage)

Station 2: How far away is the closest similar community?
How many of these communities are there in the state?

Station 3: Are there any roads or trails that fragment the property?

Station 4: Who owns the parcels on Monadnock?
What is their major goal/objective for the land?

Supplies:

GIS map of ownership of lower mountain parcels

Map of NH granite balds

Ownership of parcels and their management plans

Monadnock quadrangle maps

Groups report out: list info gathered on board (10min)

How do these elements connect to reserve design principles?

Biodiversity in a Local Context: working with diversity

1. Select a field-based lab that compares the diversity of two parcels. See Project Learning Tree, Project Wet, Project Wild or Earth Partnership for Schools
2. Ecological controls on biodiversity: succession and disturbance (review) {if time allows, otherwise give out a summary reading, or cover in third class}
 - a. History of fire on the mountain (see Mount Monadnock Educator Guide)
 - b. Last class we established that the size of the reserve was important. What do you remember of ecology that would help us understand why size is important?
 - c. Review Niches, diversity, ecotones, succession,
 - d. Are ecosystems static?
 - e. What was the term for evolving ecosystems? Succession
 - i. How does the process of succession alter a reserve?
 - ii. What events restart the successional process? Disturbances
 1. Fire, hurricane, flood, drought, pest epidemic, climate change
 - f. Therefore: reserve designers must anticipate that succession will alter their ecosystems, making them less favorable for targeted species or a disturbance event could occur, making the reserve less habitable for species.
3. Let's apply this to Monadnock: on a small scale, what disturbance have you worked with when researching crevice communities? Foot traffic
 - a. On a macro scale, the mountain is in a late seral stage of succession. It was mostly deforested during the early 1800's for farmer, particularly sheep. (Images available in the Educator Guide).
 - b. The highest elevations weren't actively farmed, sometimes used for pasture. The top of the mountain was forested!
 - c. What animal would farmer's worry about when farming sheep.... Wolves! Legend has it that a forest fire was set (controlled burn?) to remove the cover (trees) for wolves on the mountain.
 - d. We do know that two fires and a hurricane affected the mountain in the early 1800's. The first occurred around the turn of the century, followed by a hurricane in 1815 which resulted in significant blowdowns and fuel loading. The final fire in 1820 burned hot enough to burn to mineral soil. The bare soil was later eroded off of the granite, exposing the summit. Burned again in 1860's, 1880's, 1953 (75 acres above 2000' on the Jaffrey side
4. Homework: answer this question: Why did/do the people of Jaffery, greater Cheshire County, and others want to protect the mountain? You can ask friends and family, research at the library, or use the internet. One typed paragraph, proper citations!

Biodiversity in a Local Context: why and how to maintain diversity on Mount Monadnock

1. Value of biodiversity
 - a. Why did the people of Jaffery, Cheshire County, and others want to protect the mountain? Ask students what they came up with, list on board, break into two major categories.
 - i. Intrinsic value
 - ii. Instrumental value - Ecosystem services
2. How do you maintain biodiversity? (15-20min)
 - a. Ecosystem approach:
 - i. Management plans
 - b. Monitoring: MERE project, crevice community work
 - i. Concern with fragmentation
 - ii. Climate change
 - c. Species approach:
 - i. Identification of threatened or endangered species:
 1. Threatened: while still abundant in it's natural range, declining numbers indicate it will be endangered in the near future.
 2. Endangered: so few individuals that the species is poised to become extinct in all or most of its natural range.
 - ii. Invasive species
3. Protecting the bobcat: species approach or ecosystem? (15min)
 - a. Split into small groups; how would you begin to develop a management plan to protect them? Write down questions you would need to answer if you get stuck.
4. Homework: finish protecting the bobcat, treat it like an AP essay.

Bobcats are a rare and protected species in New Hampshire. Despite twenty years of state protection, their numbers haven't significantly recovered. Sightings are the highest in the southwestern corner of the state, where Mt. Mondanock is located.

- A) What are the two levels of legal protection that the bobcat might have at the state level?
- B) Describe the species approach to management including what steps might be indicated in the article
- C) Describe the ecosystem approach to conservation
- D) Could Mt. Monadnock be considered a refuge for bobcat? Be sure to explain why it would or wouldn't be suitable.
- E) Give two examples of how the habitat could be managed to improve bobcat habitat on the mountain.