



Brandwein CSI: Exploring the Past Based on Observations Today

Essential Question: What will observations of natural communities tell us about land use in the recent past?

Introduction/Background:

All natural communities change over time. But human activity frequently impacts natural communities in disproportionate ways, accelerating change. For example, whenever humans farm or ranch, changes to the natural community are likely to occur. Even many years after the human activities have ceased, careful scientific observations can lead to inferences about human activity in the past.

In the tri-state area of New York, the Brandwein Nature Learning Preserve (BNLP) offers tantalizing evidence about human intervention in its recent past. In this activity, which can be adapted to any area where humans have lived, students first observe evidence of recent human impacts. Then they will search back farther in time for clues to 19th Century agriculture.

National Science Education Standards

Unifying Concepts and Processes: As a result of their activities in grades 5-8, all students should develop an understanding of:

- Systems, Order and Organization

Content Standard A: As a result of their activities in grades 5-8, all students should develop an understanding of:

- Scientific Inquiry

Content Standard C: As a result of their activities in grades 5-8, all students should develop an understanding of:

- Populations and Ecosystems
- Diversity and Adaptations of Organisms

Student Learning Objectives

As a result of these activities, students will:

- define natural succession.
- draw inferences from aerial photos.
- draw inferences from first hand observations.
- compare and contrast areas at various stages of succession.



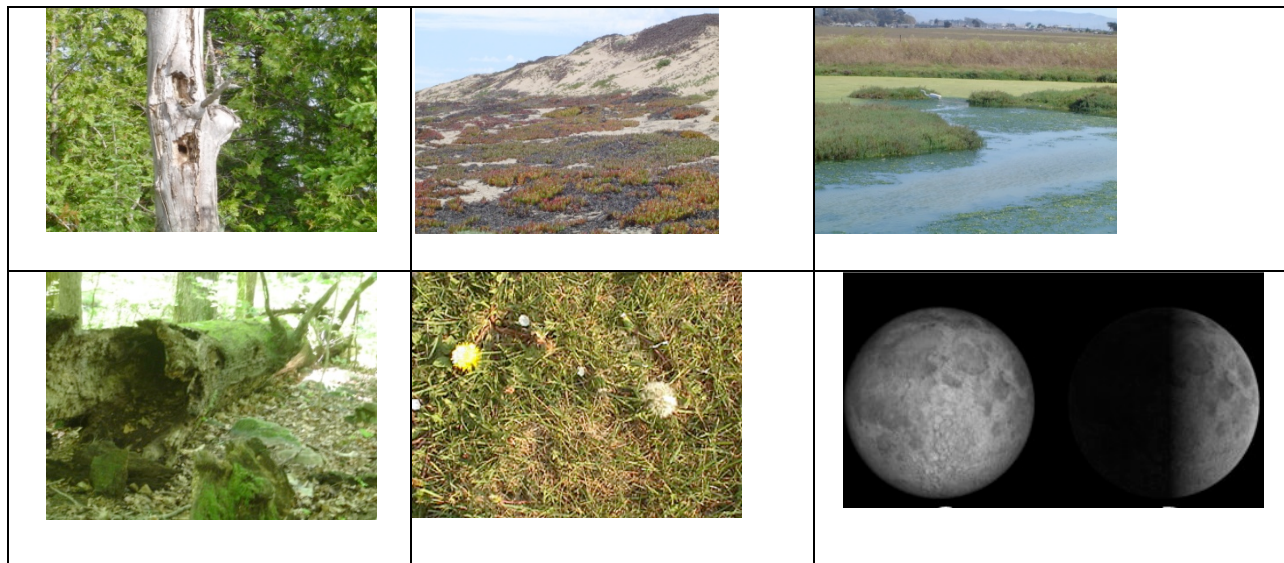
- recognize the time frames in which certain observed changes occur.

Materials List

- Picture file (photos printed below for study of BNLPP or photos taken in another area to be studied) to be used with Part I of the activity.
- GoogleEarth™ photo of BNLPP or other land area to be used with Activity 2. You can use a physical address or GPS coordinates. For example, the Brandwein BNLPP's longitude and latitude are Latitude: 41°20'33.86"N and Longitude: 74°35'40.15"W.
- Map of the area to be used with Activity 3
- Cameras or sketchbooks and journals, to be used with Activity 3
- Images of area to be used with Activity 3 if class is unable to visit the location.

Procedures

Part I: Project photos like those below, in order to generate discussion. Ask: "What changes are occurring in this photo?" "What clues do you see?" "How long did these changes take?" [Sample photos: Woodpecker holes and animal burrows in a dead ash tree (2 to 10 years). Erosion and colonization of a sandy dune (2 to 10 years). Meander and rechannelization of a stream (yearly to many decades). Rotten log (10 years or more). Flower blooming (several days). Moon phases (2 weeks).]



Ask students to put the photos in order of the time necessary for the change to occur.



Part II: Explore succession in a selected area of a natural community.

Explain that a natural community consists of organisms coexisting in a given place. The members of a community might be determined by the availability of abiotic factors such as moisture, soil type, and temperature, or biotic factors such as predators, and prey.

As organisms grow, they change their own habitat including the abiotic factors around them. As they do so, they may change the conditions which favor various organisms and the community gradually changes over time. This relatively predictable series of change over time is called “succession.”

Observe the picture below of succession from old field to deciduous forest with students; ask them to discuss:

- How succession might begin (clear cutting or farming)
- What kinds of abiotic factors change over time (light, soil moisture)
- What the end result of the process would be (stable forest)





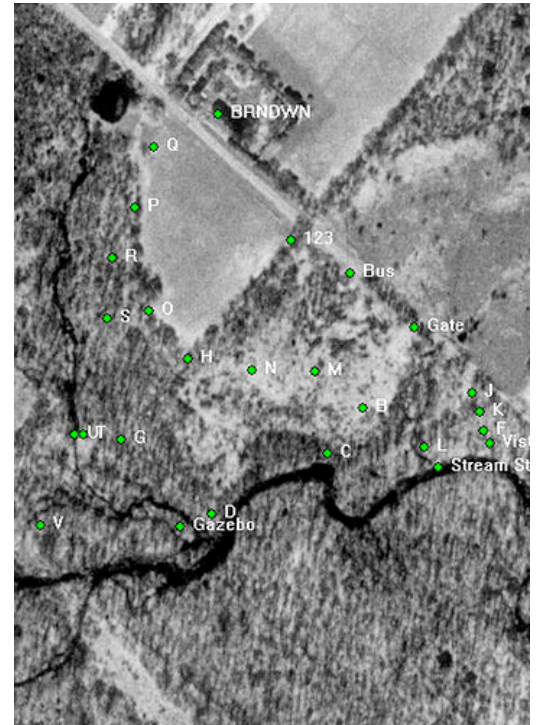
Part III: Observe further: Hand out or display an aerial photo of the area to be studied and ask the students to identify different patterns observed in the photo. Ask, “Why do



you think these different colors/textures are present in the photo?” Encourage students to identify the noticeable straight line boundaries for the natural community within the power line corridor. Other obvious pattern changes are the pond, the hayfield, and the lawns around the homes.

A black and white photo of the same general area also shows evidence

that there are different communities in the old field, south woods, and west woods areas.



Several years ago, in the BNLP, a power line was built carrying hydroelectricity from nearby lakes to the population centers just beyond the mountains. Ask students to identify the area which was cleared to make that line. To prevent the normal succession from pioneer plants to trees, the power company seeded the area with plants that do not grow very tall (shrubs). Ask students to speculate on how this would change succession.

For example:

- Periodic mowing/maintenance would encourage flowers and shrubs while discouraging large trees.
- Trees reflect light differently than do grass, hay, flowers, and shrubs.
- Canopy coverage will change the reflected light seen from the air. Communities with extensive, well established canopy will reflect less light than those communities which haven't established a dominant species that creates extensive canopy.



Part IV: Whether studying the BNLP or a similarly human-impacted area, ask students to investigate the assertion that the area may have once been used to graze cattle. They might observe an actual area that has succeeded from field to forest. This can be done on a field walk or using photos of the area.

Please caution students about road side safety, proper hydration, proper foot wear, poison ivy, and insects. To save time you may wish to create teams of six students to investigate and sketch three sections of the trail at time

Data Sheet

Encourage students to develop a detailed scientific journal documenting the observations that support their assumptions. Students should bring their sketch books, journals, or cameras as they walk the area.

Divide the area to be studied into sections and use a key to designate each section. (Students can sketch the flora, take a digital picture of the area, and identify the plants that they encounter.



Observations

Date: _____ Location: _____ Name: _____

Section(s)	GPS Info(optional)	Plants Identified	Community Type
A		Maple Ash Poison Ivy (sparse)	Upland Mixed Deciduous Forest
B			
C			
D			
E			
F			
G			
H			



Student observations will vary. The photos below indicate just a few of the clues that they might find. Left: A rotten log indicates that many years of decomposition have occurred since the tree was felled. Middle: An old rock wall was once used for cattle. Students might observe lichens, moss, and animal nests in the wall to indicate it is not new. Nearer the stream, the wall has been disrupted by spring flooding and meanders. Right: A barbed wire from a fence line is embedded into the trunk of a tree. In order to estimate how long it might take for the tree to grow ~ 5 cm in diameter, they might find a cut tree stump and count tree rings.



Using any trail map that is available (or one students make on their own) ask them to document their observations in as quantitative a manner as possible.

Conclusions

There is ample evidence that grazing has occurred in the BNLP. What does the evidence show in your area?

Adaptations/Elaboration

Groups might suggest other hypotheses that could be supported or refuted by observations. Examples might include:

- The succession of plants in the BNLP has been changed by exotic plants.



Evaluation

Rubric for evaluation:

	Acceptable	Good	Excellent
Safety Precautions	Generally followed	Strictly Followed	Helped others follow
Date, Location, and Name are supplied	Name and Date	All three present	All correctly spelled
Notes are legible	Generally	Easily read	Easily read, nice formatting
Plants correctly identified (2 per section)	With few exceptions	No exceptions	No exceptions and wide variety of species
Non flora evidence	One noted	Two noted	Biotic and Abiotic example noted
Community correctly identified	Generally	No exceptions	No exceptions, correctly spelled

Sources for Related Activities

Students may wish to create their own presentations on succession using public domain photo libraries such as the image library at www.fws.gov or their own photos of local areas.