Museum Ecology: Using Fine Art to Reinforce Ecological Concepts

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Biography

Mariëlle Hoefnagels is an associate professor in the Departments of Botany-Microbiology and Zoology at the University of Oklahoma. She earned her PhD in botany and plant pathology at Oregon State University. She has won multiple teaching awards at the University of Oklahoma for her nonmajors biology courses, and she is the author of a biology textbook entitled *Biology: Concepts and Investigations* (published by McGraw-Hill).

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Introduction

The main objective of this exercise is to reinforce the correct use of the terms and concepts taught in the ecology portion of an introductory biology course. At the same time, students experience our campus art museum, scrutinize original paintings, and debate ambiguous details. This lab therefore combines appreciation of both biology and fine art.

The exercise consists of three parts. In the first part, a guest lecturer introduces the art collection that we use in the lab. In the second part, students work in groups to answer a common set of questions about the paintings of their choice. In the third part, the instructor assigns a different painting to each group of students. Students answer additional questions about that painting and then orally present their answers to the class.

Preparation time includes the time needed to adapt questions to each instructor's needs and to the available art collection. Arranging for a guest lecturer, if desired, requires additional time. Once the lab is organized, the only setup required is to copy and distribute the worksheets. The lab itself takes about two hours to complete.

Although we use this exercise in a nonmajors introductory biology course, students studying ecology in higher-level courses could answer similar questions; their responses could include a more sophisticated or detailed set of terms and concepts.

The material provided in the following student outline is taken from the worksheet we use at the University of Oklahoma. Instructors can replace the rules, maps, point values, and names of specific paintings to customize the worksheet for use with any art collection.

Student Outline

A few rules while you are here:

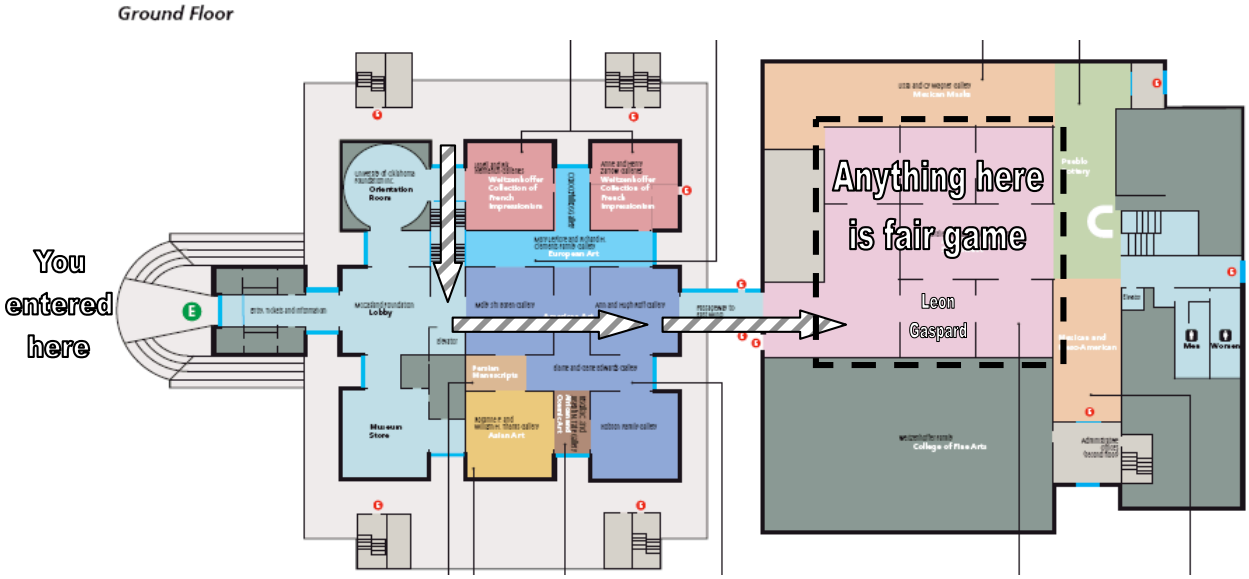
- No pens are allowed in the museum galleries – pencils only.
- Do not touch any painting, ever. Do not even look as if you are going to touch any painting – the security guards and other museum personnel cringe whenever you come too close.
- Do not lean on the walls or use them as a "desk" for filling out your worksheets.
- Museum galleries are typically places of quiet reflection. We don't expect you to be silent while you are here, but please talk quietly and try not to shout to your friends across the gallery.

Part I – Orientation to the Gallery

We are going to visit only a small part of the art museum today – it's a gallery that includes paintings from the Taos Society of Artists. The lab will begin downstairs in the museum auditorium, where you will view a 15-minute lecture and slide show about the Taos Society of Artists.

Part II – General Ecology Questions about Paintings of Your Choice (10 points)

After the lecture is complete, get into a group with no more than two other people, go back upstairs, and head for the gallery shown in the diagram below.



For this part of the lab, you will work with your group to answer a series of ecology-related questions about any painting in this gallery. You must pick a different painting for each of the questions in Part II – any painting is fair game, except that **you cannot choose any painting from the list below:**

Paintings you MAY NOT use in Part II (because we'll use them in Part III):

BJO Nordfeldt – *Santa Fe Landscape*
Ernest Blumenschein – *Haystack, Taos*
Ernest Blumenschein – *Yellow Cottonwoods*
Irving Couse – *In Ambush*
Irving Manoir – *Aspen and Snow*
Josef Bakos – *Cienega*
LaVerne Nelson Black – *The Trading Post*
Oscar Berninghaus – *Taos Indians on Mesa*
Walter Ufer – *Indian on Horseback with Colt*
William Penhallow Henderson – *Road to Taos at the Rio Grande*

1. Find a painting (other than those on the list on page 2) that depicts a **population** of any species (plant or animal, including humans).

   a. Title:

   b. Artist:

c. General description of subject:

d. Choose any species you can see in the painting. What is it? _____

- Describe the population's density (number of individuals per area) and pattern of dispersion (random? clumped? a combination?)

- What is an example of a density-dependent control on the growth of this population? (It can be either evident in the painting or implied)

- What is an example of a density-independent control on the growth of this population? (It can be either evident in the painting or implied)

2. Find any painting (other than those on the list on page 2) that shows **high species richness** (that is, a large number of different species, which is a measure of diversity).

a. Title:

b. Artist:

c. General description of subject:

d. Describe any of the autotrophs you can see in the painting:

e. Describe any of the heterotrophs you can see in the painting:

f. Which are more prominent in the painting, the heterotrophs or the autotrophs?

g. Give an example of a type of organism that MUST be in the scene (because you know how ecosystems work) **but that isn't actually depicted**.

3. Find a painting (other than those on the list on page 2) that shows (or implies) a **community interaction** of any type (interspecific competition, predation, or symbiosis).

a. Title:

b. Artist:

c. General description of subject:

d. Describe the community interaction.

4. Find a painting (other than those on the list on page 2) that you think shows ***the most*** **human impacts** on the environment.

   a. Title:

   b. Artist:

   c. General description of subject:

   d. How does this painting show human impacts on the environment?

5. Find a painting (other than those on the list on page 2) that you think shows ***the fewest*** **human impacts** on the environment.

   a. Title:

   b. Artist:

   c. General description of subject:

   d. What clues in the painting suggest that there are few human impacts on the environment?

6. Visit the room in the gallery that contains paintings by Leon Gaspard (see the map on this handout). Choose any one of those paintings. Other than the title, how can you tell that the subject of this painting is not in Taos, New Mexico?

Part III – Group Presentation (5 points)

We have printed the names of ten paintings from the Taos collection on separate slips of paper. Your group will choose a slip, find "your" painting in the gallery, and answer the questions below about it.

When everyone is done, an instructor will call the class together. Your instructor will choose someone at random from your group to give a brief presentation about your painting to the rest of the class, explaining your answers to the questions. Each person in your group should be prepared to give the presentation, and everyone in your group will get the same grade based on that person's presentation.

1. What are the names of the other people in your group?

2. What is the title of the painting you were assigned, and who is the artist?

3. Give a brief, general description of what is going on in the painting.

4. What can you infer about the weather or climate in the painting? Based on what clues?

5. What types of plants and non-human animals (if any) can you see in the painting? Is there enough realism in the painting for you to be able to see any of their adaptations to their climate? If so, what?

6. Is there a source of water in the painting? If so, is it flowing or still? How can you tell?

7. What can you infer about the people (if any) in the painting? (Their clothing, activities, posture, etc. may give you clues).

8. What are three human impacts on the environment that this painting either *depicts* or *implies*? If you can't see three, think about the title and/or the subject and think about some other impacts that are implicit in the subject of the painting.

   a.

   b.

   c.

9. How does each of the three impacts you chose affect the living and/or nonliving environment?

   a.

b.

c.

10. Name any one thing that the artist had to have KNOWN about BIOLOGY in order to be able to paint this work.

Materials

If this lab takes place in an art museum, the only materials required are worksheets. If a physical art collection is not available, it is possible to simulate an art gallery in a classroom by posting 30 or more high-quality paper printouts of a variety of paintings. Alternatively, students can view a selected collection of paintings online. Having students view the paintings in person is preferable, however, because important details may not reproduce well on paper or in digital copies.

Notes for the Instructor

Participants in the ABLE workshop in June 2008 provided several suggestions that might improve or supplement this activity. These ideas included:

- The activity does not have to be limited to ecology. Depending on the collection of available art, students could seek out images depicting (for example) signs of environmental degradation or people with health problems. Or students could be asked to compare biomes or to compare images of the same location over time.
- The activity could include links to websites with digital copies of landscape paintings. The website for the Fred Jones Jr. Museum of Art at the University of Oklahoma (www.ou.edu/fjjma), for example, includes digital copies of many of the paintings used in this lab activity. Instructors could also use online digital libraries such as ARTstor (www.artstor.org) to find an enormous variety of paintings.
- The guest lecturer could explain how artists go about painting landscapes, in addition to (or instead of) introducing the art collection. This added perspective might help students answer the final question in Part III of the activity.
- The final question Part III could be replaced or supplemented with a variation on the same theme, such as "Do you see anything in this painting that is inconsistent with what you know about biology?"
- Instead of viewing art, students can create their own photography collections using many of the ideas in this worksheet. For example, students can be instructed to go outside with their digital cameras or cell phones and take pictures of autotrophs and heterotrophs, or areas with high biodiversity, low biodiversity, high human impacts, low human impacts, etc.

Acknowledgments

Several staff members at the Fred Jones Jr. Museum of Art have helped with this lab: Sarah Griswold helped develop the questions; Susan Baley has been generous with her time as our expert guest lecturer; and Gail Anderson provided the paper printouts we used in the 2008 ABLE workshop. In addition, participants in the workshop provided many of the helpful and creative suggestions that appear in the "Notes for the Instructor" section of this article.

Appendix

We use the following list to create the slips of paper each group draws from to choose a painting for part III of the lab.

Your group's painting for part III is: BJO Nordfeldt – *Santa Fe Landscape*

Your group's painting for part III is: Ernest Blumenschein – *Haystack, Taos*

Your group's painting for part III is: Ernest Blumenschein – *Yellow Cottonwoods*

Your group's painting for part III is: Irving Couse – *In Ambush*

Your group's painting for part III is: Irving Manoir – *Aspen and Snow*

Your group's painting for part III is: Josef Bakos – *Cienega*

Your group's painting for part III is: LaVerne Nelson Black – *The Trading Post*

Your group's painting for part III is: Oscar Berninghaus – *Taos Indians on Mesa*

Your group's painting for part III is: Walter Ufer – *Indian on Horseback with Colt*

Your group's painting for part III is: William Penhallow Henderson – *Road to Taos at the Rio Grande*