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Revised Lesson Plan: A local ecosystem
Time: 60-105 minutes or 1-2 class meetings
Unit: Environmental Science: Ecosystems
5th grade

New Jersey Core Curriculum Content Standards for Science 5.1, 5.10

5.1 (Scientific Processes)

All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.

5.10 (Environmental Studies)

All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena.

Essential Questions

How do components of an ecosystem affect organisms living in the ecosystem?

How does human interference affect an ecosystem?

What can humans do to preserve the health of an ecosystem and prevent endangerment and extinction?

Enduring Understandings

Organisms interact with other components of an ecosystem. Living things interact with each other and nonliving things for the survival and health of its ecosystem.

Organisms live in specific ecosystems and suffer when the ecosystems are disturbed.

Human interference can help or harm the natural Earth.

Goals

Students will work in cooperative learning groups to identify and describe various features of a local ecosystem. Students will practice appropriate use of safety equipment inside and outside of the classroom. Ecological problems and hazards facing the local ecosystem will also be addressed. Students will observe, examine, and record data about the contents of a local ecosystem and analyze the interactions among the living and nonliving things as well as the living and nonliving things.

Description

In this activity, students will conduct a guided inquiry on how parts of an ecosystem interact with each other. Students will be led into the woods behind our school, observe the living and nonliving things there (biotic and abiotic), and collect a sample of the soil for further observation in class using magnifying glasses.

Students best learn science by doing science, and it is not merely a collection of facts and theories but a process, a way of thinking about and investigating the world in which we live. NJCCCS 5.1 addresses these skills that are used by scientists as they discover and explain the

physical universe and that are crucial part of learning science. Creating an awareness of the need to protect, conserve, and preserve natural resources is a goal of science education. NJCCCS standard 5.10 calls for students to develop knowledge of environmental issues.

Materials

Student:

- goggles
- disposable gloves
- magnifying glasses
- gardening tools: small shovels
- plastic bins
- display or class set of T-Charts
- display or class set of observation chart
- class set of Science Journal Reflection rubric

Teacher:

- projection device (SMARTboard or overhead)
- chart paper
- newspaper or something to line student desks with

Content

ecosystem
community
abiotic and biotic
ecological problems
endangerment
human impact

Skills

Students will be able to:

- observe and identify things as abiotic or biotic the local ecosystem, the woods behind our school.
- explain how organisms interact with other components of an ecosystem.
- describe the effect of human activities on various ecosystems.
- evaluate the impact of personal activities on the local environment.

Baseline and Post Assessments

Teacher Note: Choose one or both of the assessments for each of your students as you see fit. Provide drawing paper for students that will be assessed using the first choice. Administer the Baseline Assessment(s) prior to the lesson.

- Illustrate what a forest or wood ecosystem looks like, label its parts, show any interactions that occur (See Appendix A for rubric)
- Objective assessment determining students' views and conceptual understanding of a forest ecosystem (See Appendix B)

Assessment

Teacher observation

Science journals: students' predictions, classifications of abiotic and biotic things, observations, conclusions and analyses of the health of the woods

Growth from baseline to post Assessments

Activities

1. Whole class discussion (2-5 minutes)

Display and pose the question to students: *What do you expect to find in the woods? Why?*

Generate responses and record them on a media where students can later refer to (on chart paper, transparency, or SMARTboard page).

Teacher Input: *abiotic vs. biotic – nonliving things vs. living things. The term biotic means living or having lived (Ex. a frog, a leaf, a dead tree, or a piece of wood). The term abiotic means non-living, or never having lived (Ex. metal, rock, glass, brick, and cement.)*

Teacher Note: *soil has both abiotic and biotic components.* Challenge students to think of what are the abiotic and biotic components of soil. Students may extend their exercise and explore <http://www.safs.msu.edu/soilecology/soilecology.htm> to present new information to the class.

2. Pairs or small group (2-5 minutes)

Students identify the items they have named as *biotic* or *abiotic* and create a T-Chart to organize their thoughts.

Teacher Note: *a T-Chart is a type of graphic organizer in which a student lists and examines two facets of a topic. Here, students will title their chart “Things expected to be found in the woods”, and the columns will be labeled “abiotic” and “biotic” (See Appendix C).*

Pairs/small groups share their T-Charts with another pair/group.

Teacher Note: *circulate the room to clear any misconceptions (Ex. a fallen log is not living therefore it is abiotic) and reinforce the new terms.*

3. Observation of the local ecosystem in small groups (15-25 minutes)

Teacher Input: *Organisms interacting with one another and with their physical environment make up an **ecosystem**. Today you will be observing a local ecosystem: the woods behind our school. Organisms that live together in an ecosystem make up a **community**, just like we are a part of the neighborhood and school community.*

Students are divided into teams of 3-4 and get ready to go enter the woods with “scientists’ eyes”. Students are assigned a specific role: task manager, supplies manager, observer, and recorder. Explain and display the “job descriptions” of the roles.

- Supplies manager: gets observation supplies for soil collection
- Task manager: keeps each member of the team accountable and on-task
- Observer: collects soil sample with gloves, goggle, plastic bin, and gardening tools
- Recorder: takes notes of any observations made by the team on a chart (See Appendix D)

Teacher Note: There may be more than one observer or recorder if there are more than 4 students in a group. The recorder should not handle observation materials, but you may want the observer and recorder to switch roles halfway through the indoor observation time.

Supply managers line their desks/observation areas with newspaper prior to leaving the class in preparation for a close look at their soil sample when they return from the woods. Students are then led to the woods for natural observation. Point out things that students may overlook. Ask guiding questions (questions may differ depending on the factors of the woods):

- *What do you see that you expected?*
- *What things did you not expect would be here?*
- *Are there things that do not belong here? How might these been brought here?*
- *Are there things that you do not see but know they live or belong here?*
- *What things have you seen travel into the woods? Why don't you see some of those organisms?*

Remind students to use their sense of sight and hearing and make inferences of organisms that are not seen but are known to live in the woods. Remind task managers to be sure each member of the team is making contributions to the recorders' notes.

Direct observers to collect a soil sample of the woods. They may put other items such as trash or a piece of bark into their plastic bins as well.

4. Closer observation (20-30 minutes)

Students bring their soil sample back to the classroom. Supply managers get goggles and magnifying glasses for the observers. Observers remove and dispose their gloves prior to putting their goggles on. They put a pair of clean gloves back on prior to handling the soil sample again.

Teacher Note: You may have students put their gardening tools in a separate area (Ex. a dirty supplies bin) other than the student observation area.

Recorder takes notes of the soil sample on their chart.

5. Clean up and prepare for small group discussion (5-10 minutes)

Students clean up their observation area.

Recorders share their notes with their teams, and all members of the team record their observations in their own charts.

Teacher Note: Charts can be reproduced for students and attached to their science journals, or students can make a chart in their journals.

*****If you need to separate this lesson into two class meetings, stop here and resume at next meeting*****

6. Small group discussion (10-20 minutes)

Students discuss among their teams what interactions they believe occur between:

- Living things and other living things
- Living and nonliving things
- Nonliving and other nonliving things

Students brainstorm implications of the trash found in the woods. *How would each item affect living organisms in the woods?*

7. Whole class discussion (3-5 minutes)

Students share their teams' thoughts with the whole class.

Teacher Note: Record students' responses on chart paper/overhead transparency/SMARTboard page.

8. Independent practice: Science Journal Reflections

Hand out the accompanying rubric to students (Appendix E)

Assign as independent work or homework: *Reflect on what you observed today in the woods and in the soil sample you brought back to the classroom.*

- *What do you think of the health of the woods?*
- *What are some natural or positive interactions that occur in the woods?*
- *What are some negative interactions among living and nonliving things?*

9. Closing whole class discussion (3-5 minutes)

Display and ask:

- *How do components of an ecosystem affect organisms living in the ecosystem?*
- *How does human interference affect an ecosystem?*
- *What can humans do to preserve the health of an ecosystem and prevent endangerment and extinction?*

10. Follow up

- Share Journal Reflections with a partner or in a large group
- Discuss what you liked best about the lesson
- Administer Post Assessment(s)

Appendix A

Baseline Assessment and Post Assessment A: Illustration

Directions: Illustrate what a forest or wood ecosystem looks like. Label its parts and show any interactions that occur. Be descriptive in your coloring and labeling.

Scoring Rubric

	Exemplary	Proficient	Progressing	Not there yet
Content (12 points)	The illustration clearly depicts important features of a forest or wood ecosystem, the organisms that live within it, and the interactions between the components of the ecosystem. (12-10 points)	The illustration depicts important features of a forest or wood ecosystem, the organisms that live within it, and the interactions between the components of the ecosystem. (9-7 points)	The illustration depicts some features of a forest or wood ecosystem, the organisms that live within it, and the interactions between the components of the ecosystem. (6-4 points)	The illustration clearly depicts few features of a forest or wood ecosystem, the organisms that live within it, and the interactions between the components of the ecosystem. (3-0 points)
Overall Appearance (8 points)	The illustration is visually appealing; it draws the viewer in for a closer look. There is a balance between drawings and few words that describe parts of the illustration clearly. (8-7 points)	The illustration is visually appealing, but there may be too much writing that distracts from the drawing. Parts of the illustration may lack written description. (6-5 points)	The illustration is somewhat appealing. Many parts of the illustration may lack written description. (4-3 points)	The illustration is visually unappealing, or parts of the illustration are unclear or incorrectly drawn. (2-0 points)
Creative Expression (8 points)	Creativity and neatness are used in the completion of the illustration. (8-7 points)	Some creativity and neatness are used in the completion of the illustration. (6-5 points)	Little creativity and neatness are used in the completion of the illustration. (4-3 points)	No creativity and neatness are used in the completion of the illustration. (2-0 points)

Teacher Notes:

Appendix B

Baseline Assessment and Post Assessment B: Objective

#1-3: Circle 5 if you strongly agree with the statement, 4 if you agree with the statement, 3 if you neither agree nor disagree with the statement, 2 if you disagree with the statement, or 1 if you strongly disagree with the statement.

1. There is nothing I can do to contribute to the health of an ecosystem.

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

2. An ecosystem stays the same and does not change.

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

3. In an ecosystem, there are no nonliving things; everything in nature is living.

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

4. Define each item as abiotic or biotic

- | | |
|--------------------|-------|
| a. rotting wood | _____ |
| b. rain | _____ |
| c. squirrel | _____ |
| d. plastic wrapper | _____ |
| e. glass bottle | _____ |
| f. fallen leaves | _____ |
| g. tree | _____ |

Circle True if the statement is true, or circle False if the statement is false

- | | | |
|---------------------------------------------------------------------------------------|------|-------|
| 5. Humans cannot harm an ecosystem such as the woods. | True | False |
| 6. When a living organism dies it does not affect the ecosystem in which it lives in. | True | False |
| 7. Nonliving things do not affect living things in an ecosystem. | True | False |
| 8. Living things do not affect other living things in an ecosystem. | True | False |
| 9. People cannot do anything to benefit an ecosystem. | True | False |
| 10. Nothing I do can help or hurt the Earth. | True | False |

Appendix B

Baseline Assessment and Post Assessment B: Objective
Answer Key

#1-3: Circle 5 if you strongly agree with the statement, 4 if you agree with the statement, 3 if you neither agree nor disagree with the statement, 2 if you disagree with the statement, or 1 if you strongly disagree with the statement.

Look for student changes of beliefs of the human impact on an ecosystem and clarification of misconceptions

1. There is nothing I can do to contribute to the health of an ecosystem.

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

2. An ecosystem stays the same and does not change.

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

3. In an ecosystem, there are no nonliving things; everything in nature is living.

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

4. Define each item as abiotic or biotic

- rotting wood biotic
- rain abiotic
- squirrel biotic
- plastic wrapper abiotic
- glass bottle abiotic
- fallen leaves biotic
- tree biotic

Circle True if the statement is true, or circle False if the statement is false

- | | | |
|-------------------------------------------------------------------------------|-------------|--------------|
| 5. Humans cannot harm an ecosystem such as the woods. | True | <u>False</u> |
| 6. When a living organism dies it affects the ecosystem in which it lives in. | <u>True</u> | False |
| 7. Nonliving things affect other living things in an ecosystem. | <u>True</u> | False |
| 8. Living things do not affect other living things in an ecosystem. | True | <u>False</u> |
| 9. People cannot do anything to benefit an ecosystem. | True | <u>False</u> |
| 10. Nothing I do can help or hurt the Earth. | True | <u>False</u> |

Appendix C

Student T-Chart

Things expected to be found in the woods	
biotic	abiotic

Appendix D

Observation Chart

	Biotic (living things)	Abiotic (nonliving things)	Not sure whether biotic or abiotic	Interactions
Woods				
Soil Sample				

Appendix E

Science Journal Reflection Scoring Rubric**Enduring Understandings**

Organisms interact with other components of an ecosystem. Living things interact with each other and nonliving things for the survival and health of its ecosystem.

Organisms live in specific ecosystems and suffer when the ecosystems are disturbed.

Human interference can help or harm the natural Earth.

	Exemplary	Proficient	Progressing	Not There Yet
Content (12 points)	Response indicates an excellent understanding of the enduring understandings. (12-10 points)	Response indicates thorough understanding of the enduring understandings. (9-7 points)	Response indicates satisfactory understanding of the enduring understandings. (6-4 points)	Response indicates limited understanding of the enduring understandings. (0-3 points)
Development (8 points)	All opinions and ideas are relevant and insightfully developed. Accurate details and examples support, explain, and clarify ideas. (8-7 points)	All opinions and ideas are relevant and supported with accurate details and examples. (6-5 points)	Many opinions and ideas are supported with minimal accurate details. (4-3 points)	Few ideas are developed or supported with details. Some information may be unrelated or inaccurate. (2-0 points)
Organization (8 points)	Ideas and information are logically written in paragraphs. Includes an effective opening and ending that engage the reader. (8-7 points)	Ideas and information are logically written in paragraphs. An opening and closing is included. (6-5 points)	Ideas and information are presented with little organization. An opening or closing is lacking. (4-3 points)	Ideas and information lack organization. There is no opening or closing. (2-0 points)
Conventions (4 points)	There are few spelling, capitalization, punctuation, or usage errors. (4 points)	There is no consistent pattern of errors in spelling, capitalization, punctuation, or usage. Errors do not interfere with meaning. (3 points)	Errors or patterns or errors in spelling, capitalization, punctuation, and usage are evident. (2 points)	There are numerous errors in spelling, capitalization, punctuation, and usage that interfere with the meaning. (1-0 point)

Teacher notes: