Cross-Curricular Activities Connected to Life Science, Grade 5

The following activities from ***Matter and Energy in Ecosystems,*** integrate math, social studies, English Language Arts (ELA), art, and more into life science topics. These cross-curricular connections help students see how science is related to their lives, and the world they live in. These activities reinforce and extend ideas about ways in which living things obtain energy and how they use that energy and are perfect for learning-from-home lesson plans. Permission is granted to incorporate these activities into teacher and parent lesson plans.

Typical and Atypical (ELA)

If students struggle to distinguish between biotic and abiotic, introduce the terms "typical" and "atypical." Explain that "typical" means something is expected and usually happens, while "atypical" is something that is unexpected or rarely happens. Guide students to recognize events that are typical, such as the Sun rising, and events that are atypical, such as a meteor impact. Make the connection that biotic factors typically move around, grow, and reproduce, while it is atypical for abiotic factors to move or grow.

Nature Walk (Social Studies)

Locate a safe area near your school that students can walk to and explore. Have students record the biotic and abiotic factors they observe and note any interactions between these factors. Challenge students to think about how the scene might change if the climate changed. You might ask students to focus on plants. Ask them to identify the different types of plants in the area. Ask them to compare the leaves, size, and structures of each plant. Discuss how each requires energy from the Sun to perform photosynthesis.

Sun Blocker (Science and Engineering)

Explain that although energy from the Sun is important to life in an ecosystem, the energy from the Sun can also be harmful. Animals have fur, feathers, or other special coverings to help protect against sunburn. Humans must rely on other ways to protect themselves from the Sun. Invite small groups of students to think of different ways people protect themselves from the Sun. Then challenge them to design a new way for people to protect themselves from the Sun and to share their designs with the class.

Ecosystem Math (Math)

Present students with the following story problems:

- There are 10 mice in a schoolyard ecosystem. If there are 40 animals in the entire ecosystem, what fraction of the animals in the ecosystem are mice? Solve, and write the fraction in simplest form. (Answer: 10/40, or 1/4)
- The remaining animals in the schoolyard ecosystem include 12 squirrels, 1 hawk, 13 salamanders and 4 sparrows. What fraction of the total is birds? (Answer: 1 hawk + 4 sparrows = 5/40 or 1/8)
- What fraction of the ecosystem's population is mice and birds? (Answer: Add 2/8 + 1/8 = 3/8 or 10 mice + 5 birds = 15/40 or 3/8)

Food Chain Energy Pyramid Attributes (Math)

Direct students to create a food chain energy pyramid. Challenge them to describe the shape of the pyramid based on its attributes. Ask the following questions, and have groups work together to answer them in their notebooks:

- How many lines are in the pyramid?
- How many angles does it have?
- What types of angles are they?

Have groups share their pyramids and answers with a neighboring group. Then challenge each group to write three math questions about their pyramid to exchange with another group. Be sure students solve their own problems so they can tell the other groups if their answers are correct!

African Plains Ecosystems Math (Math)

Challenge students to solve the following word problem: In one ecosystem in the African plains, there are 10 lions, 30 zebras, 40 antelopes, and 20 elephants. Determine what fraction of the population is represented by each animal in this ecosystem. Next, convert all the fractions to decimals.

Solution: Students can present their answers in a two- or three-column chart or in a list as shown below. Students should:

Determine that the total amount of animals in the ecosystem is 100.

Determine the fraction of the population represented by each animal in the ecosystem.

Simplify and convert to decimals:

- Lions = 10/100 = 1/10 = 0.1
- Zebras = 30/100 = 3/10 = 0.3n Antelopes = 40/100 = 4/10 = 0.4
- Elephants = 20/100 = 2/10 = 0.2

Habitats on the Bookshelf (ELA)

Have available some or all of the following books or other titles that explore some of the habitats mentioned in the lesson. Have each student select and read two books, and then compare and share about two habitats with a partner.

- What If There Were No Lemmings? A Book About the Tundra Ecosystem (Food Chain Reactions) by Suzanne Slade
- What Can Live in a Desert? by Sheila Anderson
- Life in a Coral Reef by Wendy Pfeffer and Steve Jenkins
- Here Is the African Savanna by Madeleine Dunphy

Nature's Recyclers (Literacy)

Read aloud Composting: Nature's Recyclers by Robin Michal Koontz. Challenge students to compare the information in the text with their observations from the investigation in this lesson.

Cooking Up Some Knowledge (Science)

Have students make connections between kitchen activities and the water cycle. Show a video of a pot of boiling water and ask students to think about how this relates to the water cycle. Next, discuss how condensation occurs on the outside of a cold can soda or a tub of frozen ice cream.

Food Log (ELA)

Have students log what they eat on an average day. Ask them to research the sources of their food and write a summary of how their daily diet affects ecosystems. Challenge them to research diets or practices that have limited human impact.

Humans in the Food Web (ELA)

Instruct students to create a food web for a specific habitat and add humans into the web. All food webs should show evidence of the vast variety in the human diet. Have students compare their food webs to draw conclusions about humans' impact on the transfer of energy in an ecosystem. Discuss how the human diet affects other biotic factors and draw connections to agriculture.

Recycling Center (Social Studies)

Review the process of recycling with students. Draw attention to programs that exist in your local area and point out the different symbols and colors to represent recycling. If possible, organize a field trip to a recycling center near you. Alternatively, you may form class teams and have students compete to develop a recycling program for your class. Challenge students to practice recycling in their own homes.

The Forest—Aerial Photographs of Deforestation (ELA)

Have students work individually or in small groups to explore photographs of deforestation by David Maisel. After viewing the photos, ask students to respond in their science notebook to the following prompt:

- How can art call our attention to environmental issues that humans need to resolve?

Students' responses can be in the form of a poem, a story, or an expository paragraph. Allow students to share their writing with the class.

Environmental Disasters (Social Studies)

Assign students a Science in the News Article (Appendix B) about one of the following topics. You might choose an article for the class or small groups to read, or you can allow students to choose their own articles. After students have read an article and completed a Science in the News Article Report, discuss the effects on the ecosystem and the efforts made to fix the problem or lessen human impact. For more information on Science in the News Articles, see Appendix B of this Teacher's Guide. Choose from these topics:

- Deepwater Horizon oil spill
- Love Canal toxic waste site
- Great Pacific Garbage Patch
- Effect of plastic shopping bags in ocean
- Coral bleaching due to temperature changes and chemicals
- Deforestation of the Amazon Rain Forest

Mercury Poisoning (Science)

Mercury is a chemical element that is found in coal, petroleum, and discharge from mining and paper factories. Mercury is toxic to most living things and can produce harmful effects on the nervous, digestive, and immune system of humans. Mercury can enter the body through inhalation, skin absorption, or ingestion. When mercury pollutes water, it seeps into the soil and is taken in by plants. There have been many cases of mercury poisoning in humans who eat seafood, suggesting that the mercury is accumulating inside fish. Introduce students to mercury poisoning and discuss the implications of mercury poisoning on the seafood industry. Have students construct a food pyramid that demonstrates how mercury is transferred to humans.

Modeling Positive Human Impact (Engineering)

Challenge your students to think about ways they can make a positive impact on the ecosystem around your school. Have students share their ideas with the class. If possible, choose a reasonable idea and complete it as a class. Examples include:

- Planting a school garden
- Raising butterflies and releasing them into the wild
- Cleaning up the school grounds
- Setting up a recycling center in the lunchroom or classroom
- Encouraging the use of reusable water bottles
- Hosting a technology recycling center

Encourage students to expand these practices into their own homes by educating their parents about positive impacts they can make on the ecosystem.