Ecosystem Restoration: Matter and Energy in a Rain Forest (Grade 5)

Opportunities for Unit Extensions

Field Trips and Other Resources

If time allows, you may wish to complement the content of this unit by organizing a student experience such as a field trip, a guest speaker, or even a virtual field trip. For the content of the *Ecosystem Restoration: Matter and Energy in a Rain Forest* unit, we recommend the following:

- After Lesson 1.4, if you wish to enrich this unit with an experience outside of the classroom, you could organize a field trip to a local wildlife conservation area, zoo, aquarium, or science museum (that includes animals students can observe). In order to find such a location near you, conduct an online search using the search terms "wildlife conservation areas in [your state]" or "directory of _____ (aquariums/zoos/science museums) in [your state]." Engage students by having them observe animals eating food. You can ask students to describe and explain how animals eat food in order to grow their bodies.
- After Chapter 1, take students to visit a local pond, river, lake, estuary, or tidal pool. Visit your local library and pick up local field guides that have information about the kinds of plants and animals living in this type of ecosystem. Have students make observations through drawing and writing descriptions about the living organisms they find there. After you return to your classroom, ask students to research and collect evidence about the relationships between organisms they could find or read about in field guides and make food web models of the specific ecosystem they were able to observe.
- After Lesson 3.4, organize students to take a walk in a local forest. Have students conduct a literal "Walk in the Woods" as described in the book and complete a scavenger hunt for decomposers living in the forest. Be sure to discuss appropriate safety with students for observing organisms, such as looking and pointing rather than touching or disturbing decomposers and obtaining teacher help or guidance for getting a closer look when students would like to observe in places such as under a small log. As a class, you can collect pictures or drawings of decomposers or evidence of decomposition that you find and make your own "Walk in the Woods" book with pictures and written descriptions.
- After Chapter 3, have students complete a virtual field tour of a unique ecosystem: hydrothermal vents. Conduct an online search using the search terms "hydrothermal vents and microbial life" to find videos showing life under the sea in hydrothermal vents. Ask students to investigate the question *How do the organisms in this unique environment obtain matter and energy to grow and thrive?* as they watch a video about

hydrothermal vents, the organisms that live there, and how they obtain matter and energy, without sunlight, to live and grow. Be sure to point out to students that the new evidence they find may require that they expand their thinking about the claim *All energy in an ecosystem can be traced back to the sun*.
- Anytime during this unit, invite a guest speaker from the ecology or environmental sciences department of your local university, or an environmental educator or ranger from a local conservation area, to speak to your students about ecosystems and ecosystem restoration. Encourage your guest speaker to talk about a specific ecosystem they have studied, human impacts on that ecosystem, and restoration efforts that have or could be made. Guest speakers should be selected in such a way as to represent diverse demographic groups in terms of sex, gender, culture, ethnicity, race, sexual orientation, and persons with disabilities.

The experiences above could support the disciplinary ideas addressed in this unit, as well as practices such as Constructing Explanations and crosscutting concepts such as Energy and Matter.

Media and Library Research Extension

Part 1: Information Literacy and Library/Media Research
Information literacy involves students' facility with identifying points at which additional information is needed and subsequently seeking out, assessing, and making use of relevant information to further understanding. Information literacy is particularly beneficial in the domain of science learning as it enables students to extend their understanding of a phenomenon under investigation.

Supporting students with effective use of library and media resources within and beyond your school setting is a key avenue for cultivating information literacy skills. Students' development of information literacy includes the following four components (Note: These are adapted from the Model School Library Standards for California Public Schools):

- Component 1: Accessing information.
- Component 2: Evaluating information.
- Component 3: Using information.
- Component 4: Integrating information literacy skills into all areas of learning.

In the next section, we offer suggestions of instructional strategies and learning activities as part of a research project to support students with these components of information literacy and to enhance students' learning about the central phenomenon they investigate in this unit.

Part 2: Research Project

At the end of the unit, students can work together in various grouping options to conduct a research project. You might release more responsibility for the research to students and have them work in partners/small groups or individually.

Identify what additional information is needed.

- Ask students to share the sources of information they have used to figure out the central phenomenon in the unit (e.g., texts, photos, videos).
- Set a question for further research.
    - **Option A:** Share a question relevant to the phenomenon that students have been investigating in this unit. For example:
        - How has human activity impacted an ecosystem in your area? Research and describe one example in your local area, region, or state.
        - How can we use a food web to model energy and matter flow in a specific ecosystem? Research a specific ecosystem in your area and create a food web to model energy and matter flow in that ecosystem.
    - **Option B:** Invite students to generate questions they are still wondering about with respect to the central phenomenon they investigated. Then, have students select the question they are most interested in researching.

Access information (Component 1)

- Invite students to share where they think they could find information to answer that question.
- Provide access to these sources (e.g., texts, magazines, newspapers, photos, videos, Internet) in your classroom, at your school library, or at the local public library. You might choose to collaborate with your school librarian on this project so that he/she can support your students in finding the resources most relevant to their research question.

Evaluate information (Component 2)

- Have students evaluate the information from each source by addressing the following questions as the information is collected:
    - Does this help us answer our question?
    - Which information that we collected is best for answering our question? Why do you think this?
    - What additional information do we need to help answer our question?

Use information (Component 3)

- Provide students with a culminating opportunity to use the information they have gathered to answer their question. You might choose to create your own culminating project or choose from the following suggestions:
    - Have the class create posters or a newsletter for the school.
    - Have the class create an informational video or performance for the school, their families, or the community.
    - Have students use the information they collect to create a specific project related to the content they are studying (e.g., If students are studying habitats and

collecting information about this topic, you may ask them to think about the information they have collected and decide together how to use this information to help them decide where to place new plants on the school grounds to support the local habitat).

Integrate information literacy skills into all areas of learning (Component 4)

- Invite students to think of questions they have that are related to learning happening across other disciplines (e.g., math, social studies, art) and provide opportunities for them to engage in library and media research in these domains.

STEAM Extension

STEAM—science, technology, engineering, art, and mathematics—is an educational approach of integrating art and design into science, technology, engineering, and mathematics (STEM) disciplines. This integration is a natural extension of the ways that art and design overlap with STEM. Observing, visualizing, communicating, and problem-solving are all areas in which students can authentically engage in both art and STEM. A growing body of evidence shows that for students who are socially and economically disadvantaged, authentic engagement in the arts not only increases motivation and engagement, but also leads to greater academic achievement in STEM subjects. Integrating art and science can provide new opportunities for students who are typically underrepresented in STEM to understand and communicate science concepts, thus helping to address inequities in science and engineering.

Opportunities to engage in art and design happen naturally as students engage in science and engineering practices. Students engage in art as they draw careful observations of natural objects and events, develop models to communicate meaning, and think creatively to design solutions. When these natural connections to art arise in the STEM classroom, students should have the opportunity—supported through instruction—to create work of high artistic quality and to reflect not only on their science learning but also their artistic process. The following extension activity provides an additional opportunity for students to engage in STEAM.

Throughout the *Ecosystem Restoration* unit, students have investigated science concepts and phenomena connected to the Unit Question: *How do organisms in an ecosystem get the matter and energy they need to grow and thrive?* Have students utilize their creativity and explain their ideas about scientific concepts connected to the central unit question by creating a song or choreographing a dance. First, have students form groups of 3–5 students and choose one kind of organism to focus on: plants, animals, or decomposers. Next, have them brainstorm their ideas about the question *How does my organism get the matter and energy it needs to grow?* Provide students with ample time to plan, design, practice, produce, and refine their song or dance. At some point in this process, ask students to submit a draft of their work through writing a draft of their song or through drawing, labeling, and explaining the key roles/parts for each student in their group and key movements and formations in their dance. Challenge student groups to write a short paragraph explaining how their song or dance helps to provide answers to the Unit Question. After providing students with enough time to practice and receive feedback on their creations, hold initial dress rehearsals and final performances. Allow students to create

and use props or costumes. You may choose to create a class video collage of student songs and dances. After each performance, be sure to ask students to describe how they used song or dance to demonstrate their understanding of the Unit Question.