Field Trip Safety Preparation
The following strategies should be considered in part of the lesson planning for field experiences:

School Policy: The very first thing to do before considering a field experience is to check the board of education policy of out-of-lab learning activities either on or off-site.

Pre-Visit: Teachers should always visit potential out-of-doors areas to review safety hazards prior to students carrying out activities.

Chaperones: In most cases, the ratio of adult chaperones to students should be around 1:10. However, if there are younger students, students with special needs or other situations requiring closer supervision, a smaller ratio like 1:5 or in extreme cases 1:1 should be considered.

Behavioral Expectations: A list of acceptable behaviors is a must. The standards must be shared and also the consequences of not following the rules!

Hazardous Chemical Exposure: Keep clear of out-of-doors areas when may have been treated with pesticides, fungicides and other hazardous chemicals. Check with the school district's facilities director to make sure no chemical applications have been made in the areas where students will be working. In the location is off school property, attempt to secure pesticide and any other hazardous chemical application information from the owners or operators of the site.

Use of PPE: When working out-of-doors, students should use appropriate personal protective equipment or PPE including safety glasses or safety goggles (when working with hazardous chemicals), gloves, close toed shoes, hat, long sleeve shirt and pants, sunglasses and sun screen protection. When working near deep water, use life preservers or other floatation devices.

Exposure to Allergens: Caution students relative to poisonous plants (ivy, sumac, etc.), insects (bees, wasps, ticks, mosquitoes, etc.) and hazardous debris (broken glass, other sharps, etc.). Show pictures of poisonous plants so students can easily identify them. Review habitat locations where ticks and/or mosquitoes are likely to be found; e.g. leaves, ponding water, etc.

Trip/Fall Hazards: Caution students about trip/fall hazards like rocks, string/rope, etc. when walking out- of-doors. Also use caution for impalement instruments such as rusty nails, sharp sticks, etc. Make sure students are warned about climbing trees, standing too close to the edge of a cliff, etc.

Signed Acknowledgement Forms: Teachers need to inform parents in writing of field trips relative to potential hazards and safety precautions being taken. Require parents and students to sign the acknowledgement forms and keep the forms at least for the balance of the year.

Medical Issues: Teachers need to check with the school nurse relative to student medical issues; e.g., allergies, asthma, etc. Be prepared for medical emergencies. The teacher again should let parents know and secure permission to administer appropriate medication should an emergency develop requiring it.

Communications: Teachers need to have a form of communications available such as a cell phone or
two-way radio in case of emergencies. Always test the communications equipment ahead of time to make sure they are operational and within range.

Hand Washing: Wash hands with soap and water after completing activities dealing with hazardous chemicals, soil, biologicals (insects, leaves, etc.) or other materials. If soap and water are not available, use appropriate hand-wipes.

Contact Administration: Be certain to contact be main office prior to bringing classes out of the building for science activities.

Report Rubric

	1	2	3
Geographic Location	Includes only one piece of information on location	Includes either continent or longitude/latitude	Specifies continent, longitude, and latitude
Weather/Climate	Includes minimal weather or climate information or information is incorrect	Provides some weather or climate information	Provides complete information on weather or climate (number of seasons, temperature, and rainfall)
Living Things	Includes only partial information on one plant or animal, or information is incorrect	Includes some information on one plant and one animal	Includes information on one plant and one animal with two facts for each
Non-living Things	Specifies one non-living thing	Specifies two non-living things	Specifies three non-living things and how they relate to the ecosystem
Adaptations	Includes only partial information on adaptations or information is incorrect	Includes examples of adaptations for one plant or one animal	Includes examples of adaptations for one plant and one animal

Explanation Rubric

	1	2	3
Statement of Phenomenon	Does not introduce the phenomenon	Provides a partial introduction to the phenomenon of a food chain or food web	Clearly introduces the phenomenon of a food chain or a food web
Components and Examples	Explains only one relationship or explanations are incomplete	Explains two relationships for a food chain or food web or explanations are partially complete	Provides clear and complete explanations of the relationships for a food chain or food web
Summarizing Statement	Does not summarize the phenomenon	Partially summarizes the phenomenon	Provides a clear summary of the phenomenon

Ecosystem Unit Grade 5
Lesson: The Soda Bottle Ecosystem
Note: This was adapted from Science &Technology for Children's (STC) Ecosystem Unit Lesson 2: Setting Up the Terrarium. The structure of the lesson is based on the 7E model (Eisenkraft 2003).

Next Generation Science Standards
Performance Expectation:
5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in the soil) is changed by plants into matter that is food. Examples of systems include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations]

Science and Engineering Practice:
Developing and Using Models

Crosscutting Concept:
Systems and System Models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable through science and engineering.

Content Objective
SWBAT describe the living and non-living things in a meadow ecosystem by building a model of a meadow ecosystem in a soda bottle.

Language Objective
SWBAT orally discuss and write about how the model is similar and different to an actual meadow ecosystem.

Materials

Group	Individual
• Clean, empty, clear, 2-liter soda bottle • Ruler • Box cutter • Scissors • 4×4 inch piece of screen • Rubber band • Plastic cup • 1 ½ cups of gravel • 2 ½ cups of soil • 20 rye seeds • 20 mustard seeds • 20 alfalfa seeds	• Science notebook • Pencil

• ½ cup of leaf litter • Sticker labels or a permanent marker • Water and dropper • 2 note cards	

Engage: A Big Question
Each lesson starts with a big question to engage the students in the day's learning task. When students enter the classroom they are expected to begin copying the big question on the next page in their science notebooks.

Big Question
"How can we build a model of a meadow ecosystem?"

Elicit: Find Out What They Know
Students are asked to share what they already know about ecosystems from our previous lesson where we identified living and non-living things in the outdoor classroom. Ask the students probing questions.

What do we know about the ecosystem in our outdoor classroom?
What was living?
What was non-living?

Explore: Build the Soda Bottle Ecosystem Model
Then teacher introduces the idea of a model by telling the class, "We are going to build a model of an ecosystem to observe in the classroom." Teacher then asks, "Why do scientists use models?" Students will share their ideas and then the teacher poses the question, "Could we bring an entire meadow ecosystem inside the classroom to observe?" *Posing a question like this helps students to discover one of the reasons why scientists build models is to study things that are too large to bring inside the lab on a smaller scale.

Then the teacher explains the directions for building the soda bottle ecosystem.

Directions
1. Place the 2L soda bottle on its side with the bottom flat against the wall.
2. Measure 3–4 inches from the bottom of the bottle. Make a dot.
3. Holding the bottle in place flat against the wall with the marker in the same spot twist from the top one rotation so it has a line going all the way around the bottle.
4. Use the box cutter to make a 2-inch slit on the line and have the students cut the rest of the top off with scissors. Save the top.
    a. Safety Precaution: Only the teacher uses the box cutter
5. Wrap the 4×4 inch screen around the mouth of the bottle covering the hole completely. Use the rubber band to hold the screen in place.
6. Flip the bottle over so it rests of the top of the plastic cup.
7. Fill the bottle with 1 ½ cups of gravel first.
8. Then 2 ½ cups of soil.

9. Cut 2 inches off the side of the note cards.
10. Cut a 2-inch slit in the center of the note cards.
11. Flip one upside and slide the slits in place so that the cards are in a T-shape.
12. Place the note cards on top of the soil so you have four sections.
13. Label each section with its contents, "rye seeds," "mustard seeds," "alfalfa seeds," and "leaf litter" using the permanent marker or the labels.
14. Place 20 of each type of seed in its section and the leaf litter.
15. Remove the cards and have students write their name or group number on the outside of the bottle in small print so it does not take away from the observations.

Explain: Observe the Beginning
After students finish their soda bottle ecosystem they should draw and write an observation of what the ecosystem looks like on day 1. As they recording their observations students are asked to discuss which things in their model are living and non-living.

Small Group Discussion Questions
What is living and non-living in your model of the meadow ecosystem?
What would we consider a seed? Why? (dormant)
What category would the seed be in after it germinates?

Have students make predictions about what will change in the soda bottle ecosystem between now and next science class.

Elaborate: Compare the Model to the Meadow
The whole class discusses how this model is similar and different to a real meadow ecosystem. The teacher facilitates the discussion.

Whole Group Discussion Questions
How is this like a real meadow ecosystem?
How is the model different?
What is this ecosystem missing? (animals, water, sunlight)
What could we do to make this model more like a real ecosystem (Add animals from the outdoor classroom)
What kind of animals would live in a meadow? (ants, pill bugs, worms, grasshoppers, etc.)

Outdoor Connection: When students suggest adding animals to the soda bottle ecosystem tell them that in two weeks we will venture into the outdoors and collect one or two of each type of animal to add to our ecosystems. If students don't make the suggestion, the teacher can suggest that they collect animals outdoors.
*Safety note: When collecting animals outdoors, make sure students wash hands before and after collecting animals.

This is why it's important to save the part of the bottle that was cut off. Once the animals are added tape it back on keep them inside making sure to poke air holes.

Evaluate: What Did We Learn Today?
Students are given 5–7 minutes of quiet time to answer the big questions in the "*What I Learned*" section of the notebook including other information they learned, things they are wondering about and questions they might have from the lesson. Then students are asked to share with the class what they learned so the teacher can add it to the class learning log for ecosystems which is hung up in the room.

Allow students to add 50 drops of water to their ecosystem.

Extend: From Terrestrial to Aquatic
Students are to think about the model of a meadow they built today and design a model of an aquatic ecosystem for homework including a materials list and directions on how to build the model.

Reference

Eisenkraft, A. 2003. Expanding the 5E model. *The Science Teacher* 70 (6): 56–59.