

Upper Valley Linkages for Environmental Literacy (UVLEL)

Unit Plan

Teacher name: Vanessa Stern

Grade level: 3rd

Unit title: Using Pollination as an Example of Interdependence in Ecosystems

Length of Unit:

Timeline:

Goal(s) of this unit:

- **Essential questions addressed:**
- How are plants, animals, and environments of the past similar or different from current plants, animals, and environments?
- What happens to organisms when their environment changes?

Students will know that:

- Fossils provide evidence of animal adaptation to environmental change.
- Animals and plants may, or may not, adapt to changes in their environments.
- Humans have positive or negative impact on the environment and the Earth's species.

Students will be able to: (3rd grade next generation standards)

- Analyze and interpret data from fossils to provide evidence of the organisms and the environment in which they lived long ago. **(3-LS4-1)**
- Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there might change. **(3-LS4-4)**

Common Core State Standards Connections:

ELA/Literacy – RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1) **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time,

sequence, and cause/effect. (3-LS2-1) **W.3.1** Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1)

Mathematics – MP.4 Model with mathematics. (3-LS2-1) **3.NBT** Number and Operations in Base Ten (3-LS2-1)

Lessons:

All of the lessons are written in “Before-During-After” (BDA) format. One can think of the “Before” as the short activity to hook or engage the students by activating prior knowledge, the “During” as the activity designed to teach the concept, and the “After” as the activity designed to inspire reflection upon the lesson. There are several on-line resources about this format.

Although the lessons are numbered (Lesson 1, Lesson 2, etc.) several will likely take more than one lesson time to cover. “Exit Tickets” and “Do Nows” are always completed in writing in the students’ science notebooks.

Lesson 1: Introduction to Citizen Science

Objective (s): Students will understand that we call all help to provide stewardship for the Earth and its species.

Before: Introduce the students to the unit. Explain that we will be studying the role “pollination” plays in an ecosystem, and that we will be creating a pollinator garden for our school during this unit. Whole Class brainstorm: (Write their responses on a chart and discuss responses.)

What is pollination?

Can you name a pollinator?

Why are pollinators important?

Students will be introduced to Journey North and how it will be used throughout this unit: <http://www.learner.org/jnorth/>

During: 1.) Students will view and discuss the Citizen Science slide show from Journey North at:

<https://www.learner.org/jnorth/tm/monarch/sl/47/o.htm>

Discussion question: How might our pollinator garden support our roles as citizen scientists?

2.) Read-aloud and discussion of Chapter 1 (Fall Butterflying) from Citizen Scientists by Loree Griffin Burns. Explain that we won’t be tagging butterflies, but that our garden will provide habitat for butterflies (and other pollinators) and will serve as an outdoor lab in which we will be able to make observations about butterflies.

After: Exit Ticket- What really stood out for me from the Read-aloud was _____. I was surprised that _____.

Lesson 2: Close Observation and Documentation

Objective (s): Students will learn to differentiate between scientific illustration and other types of art; Students will enhance their observation and drawing skills.

Before: Students will observe and ask questions about the work of a science illustrator.

During: 1.) After examining and discussing three twig species (ex. Black Cherry, Beech, and Hawthorn), the students will be given one to sketch and write about in their science notebooks. Magnifying glasses and measuring tools are used to encourage attention to detail.

2.) Hold a "Gallery Walk" so that the students can view each other's work.

After: Voluntary share-out of work with each volunteer "sharer" taking up to 2 questions or comments.

Lesson 3: Trip to Magic Wings Butterfly Conservatory and Gardens

Objective (s): Students will make observations about butterfly habitats; Students will be inspired to create a butterfly garden at our school

Before: Draw a picture of what you expect to see at the Conservatory. Write a sentence or two explaining your drawing.

During: Students will observe butterflies in their habitats and will spend time sketching and writing about their observations.

After: Using a variety of media (oil pastels, water color, colored pencil, and crayon) on 11" by 17" paper students will create a reflection drawing about their experience at the conservatory. Write a few sentences about the highlights of your trip.

Lesson 4: What Do Fossils Tell Us?

Objective (s): Students will know that fossils provide evidence of animal adaptation to environmental change.

Before: Read-aloud and discussion of Fossils by Alikei

During: 1.) Students will examine a selection of live fossils. They will sketch images in their science notebooks and write their ideas. (What kind of organism was it? What kind of fossil is it? What might it tell us about the environment in which it was found?)

2.) Introduce “A Brief History of the Fossils of the Champlain Valley” (<http://www.anr.state.vt.us/dec/geo/pdfdocs/BriefFossilHistoryVT1992.pdf>)

Project the image of the fossil drawings. Discuss: What does this tell us about Vermont millions of years ago? Why, and how, did our environment change? Do you think our environment is still changing?

3.) Hand out copies of chapter 2 from Fossils: Clues to Ancient Life by Rona Arato. Read aloud as the children follow along. Discuss and clarify as needed.

Have the students re-read the article independently, highlighting what they think is the “most important” sentence in each paragraph. Share out of sentences. Write the sentences on chart paper to be posted in the room.

4.) Give each student a print-out of the fossils of the Champlain Valley and a slab of clay approximately $\frac{3}{4}$ ” thick and 6” in diameter. Using tools such as toothpick and Craftsticks, they will carve a trace fossil into the clay, carving the name of the species, as well.

After: Exit Ticket- In a million years from now, what do you think people might discover about our lives from fossils they find then?

Lesson 5: What is Pollination?

Objective (s): Students will understand the role that pollinators play in our world.

Before: Whole class brainstorm (write responses on the board)- What is “pollination?” Why is it important? Where can we find pollen?

During: 1.) Read-aloud the article Pollination by Betty Debnam from “The Mini Page” with the students following along with copies.

<http://dc.lib.unc.edu/cdm/compoundobject/collection/minipage/id/15074/rec/17>

Discuss and clarify as needed. 2.) Give each student a flower of the same species, ie. a daffodil. Have them dissect it to see if they can find and indentify its pollen. They should sketch and label the process in their science notebooks. 3.) Discuss the students’ findings.

After: Exit Ticket-I now know _____ about pollination. I was surprised to see _____. I still wonder _____.

Lesson 6: Methods of Pollination

Objective (s): Students will understand the relationship between pollinators and the flowers they visit; Students will be able to explain how flowers have adapted to benefit from their pollinators.

Before: Do Now-List three facts you know about pollination. (Voluntary share out of facts.) Write on chart paper.

During: 1.) Whole class read aloud and discussion of the article “ Methods of Pollination”

[http://www.aginclassroom.org/School%20Gardens/School Gardening Lesson Plans/Pollination%20Lesson%20-%20Grade%204%20-](http://www.aginclassroom.org/School%20Gardens/School_Gardening_Lesson_Plans/Pollination%20Lesson%20-%20Grade%204%20-) 2.) Text rendering of

the article-Students will silently re-read the article highlighting the sentence or sentences that state the properties of the flower that attract the specific pollinator; 3.) Students will dissect a variety of flowers, sketching and labeling the parts in their science notebooks 4.) Students will choose one flower, and write about what pollinator they think it attracts and why.

After: Exit Ticket-I now know _____ about pollination. I was surprised to see _____. I still wonder _____.

Lesson 7: Bees as Pollinators

Objective (s): Students will learn why bees are important pollinators

Before: What have you heard about bees? (Students will write for 5 minutes everything they have heard about bees.) Pair/share with a neighbor.

During: 1.) Students will watch, and discuss, the following video clip:

<http://www.vanishingbees.com/> As they are viewing it, they will be completing the Vanishing of the Bees viewing notes found in the on-line packet (URL below)

2.) Visit from a Bee Keeper (Bee PowerPoint); 3.) Written response to the following prompts:

- What is pollination?
- Why is it important?
- What might happen if honeybees are no longer able to perform that function?
- What can we do to help?

After: Exit Ticket: I think the “big message” from this lesson is

_____.

Curriculum for this lesson is found at:

http://www.mcnabbconnolly.ca/resources/vanishing_of_the_bees_study_guide.pdf

Lesson 8: Butterflies as Pollinators

Objective (s): Students will learn why butterflies are important pollinators

Before: Do Now- Do you think bees and butterflies are attracted to the same flowers? Why or why not?

During: 1.) Read Aloud and discussion of A Butterfly is Patient by Dianna Hutts Aston will 2.) Students will view and discuss the “Local Pollinators” PowerPoint

3.) Respond in writing to the following prompt: When we are designing our pollinator garden we need to consider the following 4 facts we have learned about pollinators so far.

After: I think the most important thing to consider in creating a pollinator garden is _____.

Lesson 9: Hummingbirds as Pollinators

Objective (s): Students will learn why hummingbirds are important pollinators

Before: Whole class braistorm:What do you know about hummingbirds? Write responses on Chart paper.

During: 1.)Read-aloud and discussion of About Hummingbirds: A Guide for Children by Cathryn Sill 2.) Students will take notes in their science notebooks about hummingbirds, and will sketch pictures of the species we might find in our garden 3.) Using the SmartBoard and the internet, research hummingbird attracting plants and have the students take notes in their science notebooks

After: Exit Ticket-Three new facts I learned about hummingbirds are:

Lesson 10: Garden Design

Objective (s): Students will be able to indentify which plants attract certain pollinators; Students will use the design process to investigate the facts they need to know to plant a pollinator garden.

Before: Voluntary share out of the last lesson's "After" activity. ("I think the most important thing to consider in creating a pollinator garden is _____.")

During: 1.) View and discuss the "Pollinator Garden Flower Guide" PowerPoint 2.) Divide the students into groups of 4-5. Each group will be

given a print out of one of the PowerPoint slides. They are to sketch and label the flower(s) of their choice in their science notebooks (Pass the print outs from group to group so that each students sketches and labels a variety of flowers.)

After: Exit Ticket- I think we should plant _____ in our garden because_____.

Lesson 11: Mapping the Site/Drawing to Scale

Objective (s): Students will be able to draw a model to scale to represent a product.

Before: Whole class brainstorm: What do we need to know before mapping out the garden site? Write responses on the white board.

During: 1.) Draw a circle on the white board labeling the dimensions of the garden. (Our garden design was a circle 21' in diameter, with 3' paths separating the garden into 4 "pie wedges") Discuss how we will transfer these dimensions to scale to the outside space.

2.) Human Compass: Using a string the length of the radius of the circle (circular garden), a tape measure, and lime (to "draw" the shape) the students will be guided through marking out the shape of the garden on-site. (The next day, an adult used marking paint to make the outline more permanent for digging purposes.)

3.) Using drawing compasses, the students will draw the circular garden to scale on the graph paper in their science notebooks. (Including the four 8' quadrants and the 3' wide walking paths.)

After: Exit Ticket- I learned _____ about drawing a shape to scale. I am still confused about _____.

Lesson 12: Garden Design with a Focus on Color

Objective (s): Students will be able to draw a shape to scale, and base a design on information that has been gathered.

Before: Show the Pollinator Flower Guide on the SmartBoard to review the kinds of flowers we might have in our garden

During: The students will finish drawing the garden design to scale on graph paper; Referring back to the flowers seen on the Pollinator Flower Guide, the students will start designing the garden by filling in the graph paper blocks with colors from the guide; They will then create a color key: For example, yellow = yarrow, marigolds, or Calendula

After: Voluntary share out of designs and explanations of color choices

Lesson 12: What is Soil?

Objective (s): Students will understand the difference between soil and “dirt”; Students will understand that soil must contain nutrients for plants to grow optimally.

Before: Do Now- What is soil? Why is it important to us?

During: 1.) Read-aloud 2 chapters from How is Soil Made? (Crabtree Publishing) Students will follow along on their copies of “What is Soil?” and “Nutrients in Soil”; discussion and clarifying questions

2.) Text-rendering activity: Students will independently read one of the 2 chapters, highlighting what they think is the most important sentence in each paragraph 3.) Students will write (in their science notebooks) a paragraph using the 3-4 sentences they highlighted, putting them in their own words.

3.) Students will add peat moss, lime, and organic fertilizer to the screened loam as they fill the garden bed.

After: I now know _____ about soil.

Lesson 13: Plant Research

Objective (s): Students will be able to identify plants that attract specific pollinators in both the larval and adult stages and explain why

Before: Do Now-What are some properties of plants we need to consider when designing a pollinator garden? List at least 3.

During: 1.) Students will re-watch the “Local Pollinator” PowerPoint, stopping to list the plants they want to further research. 2.) As a whole group, we will research each plant for more information (annual or perennial, height, sun needs) (Students will take notes in their science notebooks to be used to make final plant choices: ie. Which plants attract more than one species of pollinator? Which plants would provide an attractive balance of colors and heights? How many perennials/annuals should we have?)

After: Using the research from today, choose 3 plants you would like to have in the garden (1 short (up to 8”), 1 medium (10-20”), and 1 tall (over 20”) and explain why.

Lesson 14: Writing Essays about Plant Choices

Objective(s): Students will be able to write an opinion piece on a topic, supporting their point of view with evidence from a variety of texts

Before: Whole class lesson-Modeling the completion of the 3-paragraph graphic organizer about plant choice

During: 1.) Students will complete their graphic organizers about plant choice-Each paragraph will be about a plant (varying heights) they are requesting to have in the garden and will list 3 reasons why 2.) When the graphic organizers are completed, use the SmartBoard to model how to write the first paragraph (indentation, capitalization, punctuation, supporting the plant choice with 3 details) 3.) Students will write 1st and 2nd drafts

After: Voluntary share out of writing

Garden Planting!

This was an exciting day. Our fabulous maintenance crew dug up the sod with a tractor and the Springfield Garden Club worked with the children on amending the soil, and putting in the wood and brick borders.

They returned another day with plants that the children had requested and we planted them together. Four hummingbird feeders were also hung.

Assessments of learning-

- ❖ Performance Task (end of unit assessment)-Review the article on Methods of Pollination. Have the students design and create a new flower (using colored paper and pipe cleaners) and explain in writing what pollinator it will attract and why (Complete lesson plans are found on the "Pollination Lesson" PDF)
- ❖ 3-paragraph essay on plant choice
- ❖ Science Notebooks
- ❖ Informal Writing Samples

Supplemental activities:

- ❖ Planting starts for the garden (parsley, zinnias)
- ❖ Butterfly/flower window transparencies
- ❖ Advocacy signs to post around the garden site (Please Care for our garden, etc.)
- ❖ Poetry workshop about pollinators (We read and discussed a variety of poems about bees, butterflies, and hummingbirds before the students wrote their own poetry. We spent several days on the writing process-drafting, revising, editing.)
- ❖ Written reports on a pollinator of choice

When the garden is established, it will be used as an outdoor science lab. Students will explore what colors attract more pollinators, what kinds of pollinators are attracted to specific plants, etc. Incorporating math skills, the students will graph and analyze the data.

Supporting Texts:

Citizen Scientists by Loree Griffin Burns.

Fossils by Alikei

Fossils: Clues to Ancient Life by Rona Arato

A Butterfly is Patient

A Butterfly is Born

About Hummingbirds: A Guide for Children by Cathryn Sill

How is Soil Made? by Heather Montgomery

PowerPoint Presentations: Attached

Pollinator Garden Flower Guide (created by Jim McCracken-UVLEL Content Specialist)

Local Pollinator PowerPoint (created by Jim McCracken-UVLEL Content Specialist)

Bee PowerPoint (created by James Harris-Beekeeper)

Pollination Lesson PDF (Massachusetts Agriculture in the Classroom)