W 1104

NATURE KALEIDOSCOPE

The Shapes We See in Nature Reveal Biodiversity

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The Shapes We See in Nature Reveal Biodiversity

Skill Level
Intermediate (6th-8th grades), Advanced (9th-12th grades)

Learner Outcomes
The learner will be able to:

- *Define new vocabulary words*
- *Differentiate between a healthy soil and unhealthy soil using simple field indicators.*
- *Use an observational metric to evaluate biodiversity between different habitats.*

Educational Standard(s) Supported
GLE 0807.5.5
CLE 3255.4.5
GLE 0807.Inq5

Success Indicator
Learners will be successful if they:

- *Describe the level of biodiversity of the habitat they observed.*

Time Needed *45-60 minutes*

Materials List

- Clipboard
- Flags or colored rope and stakes
- Measuring tape or meter stick
- Garden trowel
- Tweezers
- Container for soil sample
- Notecards
- Thick black sharpies
- Scissors
- Colored markers or pencils

Author(s)

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Introduction to Content

This lesson introduces the concept of biodiversity and what determines it. What does biodiversity mean? What does biodiversity look like in nature? The presenter will describe the difference in shapes in the schoolyard (turf grass field) as compared with that of an old forest or wet meadow. The presenter should highlight that biodiversity is expressed by having a variety of shapes.

Introduction to Methodology

Students will have the opportunity to apply new vocabulary and terminology during hands-on activities in nature and use them to create their own kaleidoscopes. Students will think critically about habitats and soil health to complete the activity.

Terms/Concepts

Biodiversity: The variety of different types of life found on earth.
Soil Health: The continued capacity of soil to function as a vital living ecosystem.
Organic Horizon: Soil layer that is dominated by organic material.
Metric: A standard of measurement.
Transect: A straight or narrow section across the earth's surface.
Habitat: An ecological area that is inhabited by a particular species of plant, animal or other type of organism.

Setting the Stage

Say, *"The earth is covered in unique ecosystems that depend on soil health to sustain plants, animals and humans. An area's biodiversity can greatly depend on the health of the soil in it, and at the same time, the biota of an area greatly affects soil health. Soil health can be described through an observational metric that identifies qualities of the soil present due to the biota that inhabit it. Soils are an important part of a plant or animal's habitat."*

Ask, "*What does biodiversity mean? What does biodiversity look like in nature?*" Encourage students to describe the difference in shapes they envision in their schoolyard (turf grass field) as compared with that of an old forest or wet meadow. Highlight that biodiversity is expressed by having a variety of shapes and different types of life found on Earth.

Experience

Divide the class into groups of 3-5. Allow them to work together to mark off a "habitat" plot along the previously indicated divide. These plots should be at least 5 yards by 5 yards. Ask the students to take a soil sample and place it in a tray. Use the worksheet to evaluate the soil health metric scores, identifying with a simple tally of the indicators that are present (one tally if it is present, maximum score is 8). Then ask students to draw shapes of the living things they see in the habitat in the space on the worksheet. Point out things like leaf shapes, grass shapes, tree or shrub twig structures, flower shapes, insects, etc.

The students are going to use these shapes to make their pattern for a kaleidoscope, so the simpler the better. Try to impress upon them that they should just capture the general characteristic shape or outlines. The more complex their shapes, the longer it will take to complete their kaleidoscope. However, make sure they accomplish some variability and creativeness with their shapes. It would be best to first create your own kaleidoscope to become familiar with the methodology and comfortable with the time requirements.

Ask students to select 4-6 of their favorite shapes from their habitat to create stencils by redrawing them on a notecard and cutting them out. This allows for the students to try different arrangements of shapes (and overlap them if they like!) before committing to the final kaleidoscope design. Make sure that some of the shapes touch or go outside of the triangle pattern.

Strategies to Increase Student Engagement

- This activity can be done indoors or outdoors depending on the weather.

Teacher Notes

Experience Continued

Once they are satisfied with the shape layout, ask them to trace the stencils with pencil then go back over with a thick black marker.

To save time and if you think the students will understand the process enough, you can skip the stencils and ask that they redraw their shapes in an interesting pattern in the triangle. Be sure to trace the pencil lines in thick black marker so that the lines bleed through. Cut out the triangle after the black lines are drawn.

The students should then put the triangle pattern behind the kaleidoscope square matching up with one of the blank triangles. Then the students should trace the pattern in pencil. Then flip the pattern over and move to the next triangle. Repeat the flipping in the same direction and tracing until all triangles are filled. The lines touching the edges of the triangle should match up with those on the next triangle; if not, you have flipped the wrong way. Then trace in black marker and color in the different shapes of the kaleidoscope.

If possible, cut out the kaleidoscope square and trace a black border around it. Then mount on a piece of black poster board or construction paper. The square is 8 inches by 8 inches, an easy dimension to frame.

Share
Allow groups to share their kaleidoscope and explain.

Process
Write a haiku or short story about the habitat your nature kaleidoscope reflects. Include information like the kinds of animals that inhabit the space, what the seasons look and feel like, how the plants change as the seasons change, and what kinds of natural happenings occur there.

Generalize
Have each group research online to find an example of a kaleidoscope. Ask them to compare and contrast their designs to the example they found online.

Apply
The advantage of having students cut out and glue plants is that students will have something to leave in the classroom to show off.

Suggest to students that they complete a “walkabout” around where they live. Are there things they see in this area that they may not have included in their kaleidoscope?

Educational Standards Addressed

GLE 0807.5.5 Prepare a poster that illustrates the major factors responsible for reducing the amount of global biodiversity.

CLE 3255.4.5 Describe how biodiversity relates to stability of an ecosystem.

GLE 0807.Inq5 Communicate scientific understanding using descriptions, explanations, and models.

TIPPS
Life Skills

4th Grade
- Follow instructions. (Heart)

5th Grade
- As part of a group, identify and agree on a common task (set a goal). (Hands)

References

Geometry in Nature - http://list25.com/25-examples-of-perfect-geometry-found-in-nature/

Discovery Education, Looking for Biodiversity – http://www.discoveryeducation.com/teachers/free-lesson-plans/ looking-for-biodiversity.cfm

Teach Kids Art - http://www.teachkidsart.net/kaleidoscope-lettering-design

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