Percent Cover Learning Activity

Revised from *Lessoning Loosestrife* by Elizabeth B. Duff, 2008

Purpose

- To practice estimating percent cover, using a method where estimates can be double-checked.

Overview

Students will learn what percent cover is and why it is used in scientific fieldwork. They will then practice estimating percent cover using simulated square quadrat frames and pennies.

Student Outcomes

Students will be able to:

- Understand how percent cover estimates are made.
- Accurately estimate percent cover on a simulated sample site.

Questions

Content

- How is percent cover helpful for calculating carbon storage in a field site?

Science Concepts

Grades 9-12

Scientific Inquiry

- Design and conduct a scientific investigation
- Use mathematics in all aspects of scientific inquiry

NGSS (Black- covered directly, gray-addressed, but not directly covered)

- *Science and Engineering Practices*
  - Analyzing and interpreting data
  - Using mathematics and computational thinking
- *Crosscutting Concepts:*
  - Patterns
  - Scale, Proportion, and Quantity

Time/Frequency

25-30 minutes

Level

Secondary (Middle & High School)

Materials and Tools

- Pencil (per student)
- Square quadrat frames made of paper
- Bag of pennies or other tokens

Preparation

- Cut out 5-10 paper quadrat frames (enough for each group of 3-4 students to have one frame). For an example, see the picture on the next page
- Fill one bag with pennies, or other tokens, for each quadrat. Fill each bag with a different number of pennies so that the students can practice estimating different amounts of percent cover.

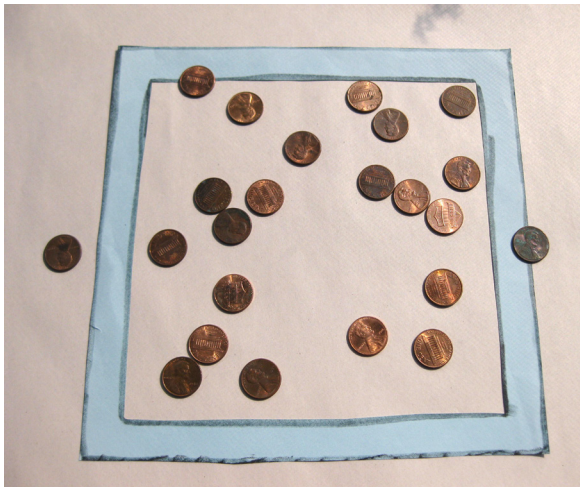
Background

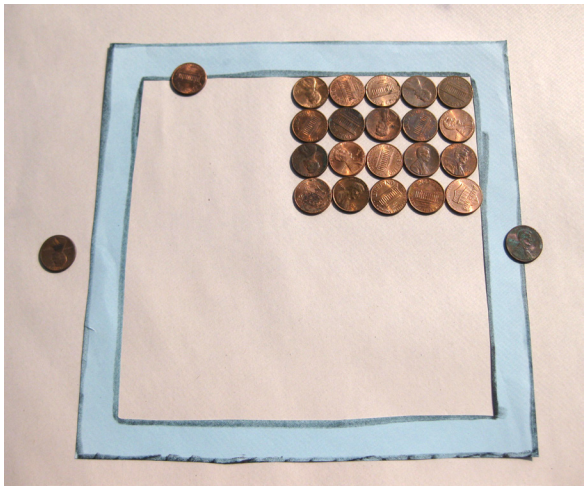
Percent cover is an efficient means of understanding the relative abundance and contribution to the ecosystem made by different plants. Percent cover is a measure of how much space a plant is taking up. Because plants may be persisting, dropping out, or coming into an ecosystem, it is valuable to monitor percent cover over time.

In the GLOBE Carbon Cycle Field Activities Protocols, percent cover estimates are used during Sample Site Set up to determine what types of plants need to be measured for the Sample Site carbon and biomass calculations. Percent cover is also needed in the allometric equations used to calculate shrub and sapling biomass and carbon storage. A visual estimate is a good way to double-check the percent cover values that are calculated in the Shrub/Sapling protocol.

Although visual estimations of percent cover are a relatively quick and popular way to measure cover, they do require some training. Practicing in the classroom is a way to enhance estimation skills and maintain consistency while in the field.

On the next page are example paper quadrat frames. The picture on the left would be used to estimate percent cover, and the pictures on the right would be used to check the estimate.





ENGAGE	**Grouping:** Class	**Time:** <5 Minutes

- Define the term 'percent cover.'
- Ask students why they think this measure is useful in scientific fieldwork. Discuss their answers.

EXPLORE/EXPLAIN	**Grouping:** Class	**Time:** 5 Minutes

- Set up a sample quadrat at the front of the class, either on a desk, projector, or use pictures in a PowerPoint presentation.
- Scatter pennies in the quadrat. Have students make initial estimates as a class.
- Use this time to discuss which ones count towards the estimate (Pennies on the edge or outside the frame do not count, just as plants whose stems originate from under the frame or outside the quadrat do not count).

ELABORATE	**Grouping:** Small Groups	**Time:** 15 Minutes

- Split students into groups of 3-4 students. Give each group a paper quadrat frame and a bag of pennies.
- Students choose one member of their group to dump the bag of pennies onto the quadrat frame. All members of the group individually write down their estimate. When all group members are ready, students can rearrange the pennies to check their estimate.
- After 2-3 minutes, have students put the pennies back in the bag, and swap bags with another group to repeat the steps.

EVALUATE	**Grouping:** Class	**Time:** <5 Minutes

- Come back together as a whole class. Discuss students' experience and the challenges of making estimates.
- Describe how percent cover estimates will be used in the field (During site set up, percent cover estimates are needed to determine whether to measure shrub/sapling and herbaceous biomass. Shrub/Sapling protocols should only be performed if they cover greater than 25% of the site area and Herbaceous Vegetation protocols should only be performed if they cover greater than 50% of the site area).

Extensions

- In the field, shrubs, saplings and herbaceous vegetation will not be of uniform shape and size. To give students practice estimating percent cover under these conditions, choose tokens that are of different sizes and shapes when practicing in the classroom.
- For a similar activity and more experience see the GLOBE Atmosphere: Estimating Cloud Cover Learning Activity.

Resources

- Revised from Lessoning Loosestrife by Elizabeth B. Duff. 2008.