

Lesson Plan: Ecosystem Ecology
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Lesson Goals:

1. Define what an ecosystem is
2. Give examples of an ecosystem
3. Model a simple ecosystem and simulate how changes in one part of a system may effect other parts
4. Recognize how the fundamental law “matter cannot be created or destroyed” applies to an ecosystem

Outline:

1. Introduce myself (3 minutes) 2:45
2. Intro topic (20 minutes) 2:48
 - a. What is an ecosystem?
 - b. What do ecosystems do?
 - i. Structure & function
 - c. Matter cycling
 - d. Energy flowing
 - i. Autotrophy & heterotrophy
 - e. People are parts of ecosystems
3. Carousel activity (40 minutes) 3:08
 - a. In 5 groups of 4 rotate through stations {have ppt slides to provide an example of what they are supposed to draw at each step}:
 - i. Decide what your ecosystem will be. (5 minutes)
 1. What are the bounds of the ecosystem horizontally?
 2. What are the bounds of the ecosystem vertically?
 3. Draw the ecosystem (will be a circle) and write a clear description of what the boundaries are.
 - ii. *rotate* Where is energy/carbon stored in the ecosystem? Draw these stock compartments & guess how much C is stored in each compartment. We will assume that all reduced carbon molecules have the same energy. (8 minutes)
 1. A big tree weights about 10,000 kg. 50% is carbon.

2. Humans are about 18% carbon. Most animals are similar.
- iii. *rotate* How does energy get into the ecosystem? How does it leave? What form does it come in as (photosynthesized? Imported?), and what form does it leave as? (e.g. is it respired, or is it exported?) Draw arrows to indicate this & guess at how many kg of carbon these represent (7 minutes)
 1. A tree fixes ~ 20 kg C per year and respire 10 kg C per year.
 2. The average person respire ~0.25 kg C per day.
- iv. *rotate* Based on the numbers (assume they are right!), is this ecosystem storing or losing energy? Is it *net autotrophic* or *net heterotrophic*? (5 minutes).
 1. Then: A major disease comes through and wipes out one species. Choose the species and note it on the paper
- v. *rotate* Adjust the numbers based on the loss of a species. (5 minutes)
- b. Report on what this ecosystem is doing. (10 minutes)
4. Break (5 minutes) 3:48
5. Questions (4 minutes) 3:53
6. Data Exploration – Hubbard Brook (<http://hbwater.org/>; 42 minutes) 3:57
 - a. Introduce Hubbard Brook (5 minutes)
 - i. Where, what & who
 - ii. NOTE FOR EVERYBODY ABOUT THE STREAMFLOW & PRECIPITATION
 - iii. How is stuff measured?
 - b. Explain the website project (2 minute)
 - c. Split into 4 pairs & 4 3s & work through the data stories (15 minutes)
 - i. Acid rain (http://hbwater.org:3838/data_stories/acid_rain/)
 - ii. Deforestation (http://hbwater.org:3838/data_stories/deforestation/)
 - iii. Answer questions:
 1. What was the experiment? Was it intentional or not?
 2. What was measured?
 3. What measurements are being compared to each other?
 4. Which measurements are being compared over time?
 5. What changed over the course of the experiment?

- d. Discuss answers in 4 small groups of 5 (5 minutes)
 - e. Jigsaw to 4 new pairs & 4 new threes to report & discuss: (5 minutes)
 - i. What is “the ecosystem” in these experiments?
 - ii. What do we know about the structure of this ecosystem? (i.e. what’s in it/what are the ‘compartments’?)
 - iii. What do we know about the function of this ecosystem? (does it store, export or transform things?)
 - f. Discuss answers in 4 small groups of 5 (5 minutes)
 - g. Discuss answers as a class (5 minutes)
7. Wrap up (5 minutes) 4:40
- a. Go back to lesson goals & have students answer #s 1,2 & 4