Food Webs: Interconnectedness of Organisms in Ecosystems

Activity 2: Food Web Systems

Key Question
How do different organisms influence food web systems?

Objective
Students will **model** the interrelationships of ecosystems.

Grade: 6-8 Time: 30-40 minutes Location: Classroom or outside

Materials
- Tape
- Index cards
- White Board
- Marker
- String or cord (optional)
- Internet access
- EOL Food Web examples on website
  - Simple (13 species): New England Rocky Intertidal Habitat
  - Complex (36 species): Okaloosa County (Florida Panhandle) Urban Habitat

Culminating Activity
The purpose of this exercise is to demonstrate the complexity and interconnectedness of food webs. Students will model how a complex system operates and how some parts of a complex system have more leverage or influence on the rest of the system. Students will relate this to the food webs that they are exploring.

Directions

Setup: Number each student with an index card and tape in a visible location. Ask the group to form a circle. Tell students that we are creating a system with a simple cause and effect structure. Draw a diagram of numbers in a circle on the whiteboard. See Figure 1 (below).

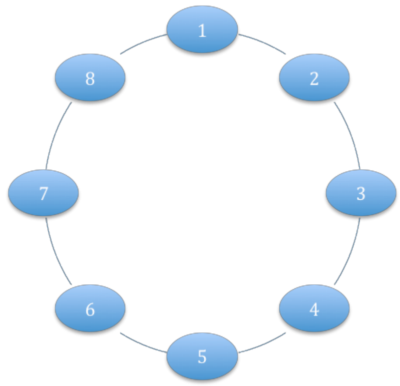

Figure 1: Setup

In each round, students will pick two other people as *reference points,* or “triangle people” around the circle. The goal of this activity is to remain equidistant from both reference points. When the instructor says “go” the students should make themselves equidistant from their reference points by forming a triangle with themselves and those two points. The system will keep moving as each person tries to stay equidistant from reference points. The system will behave differently each round due to the amount of influence of certain individuals in the system. For example, if all students happen to pick the same person as a reference point, that reference point will influence the system greatly. Allow students to move around for 20-30 seconds each round.

Round 1 (practice): Everyone should pick two random reference points in the circle. Instructor will say “go,” and everyone will get equidistant from references. Play for a few minutes, and if the system does not slow down or quit moving, stop the game and discuss.
Return to original circle. Using the diagram on the board, have students draw lines between their own numbers and those they chose as reference points. Or, use rope or string to make connections within the circle. Ask students to explain how the system behaved. See Figure 2 for example.

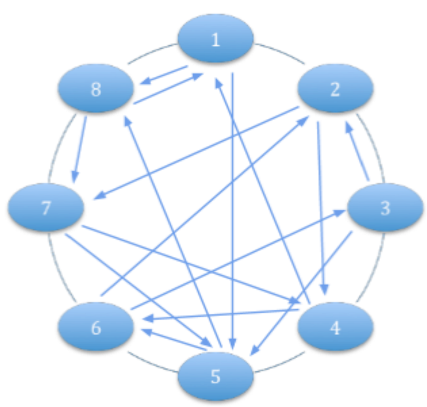

Figure 2: Round 1 Example

Round 2: Repeat the activity, but in this round, if the instructor asks any number to stop at any time, that number must stop moving. Ask students, "What do you think will happen when one person stops moving (i.e. Person #1)?"

Round 3: Everyone must choose a specific person (such as Person #2) as one of the reference points. And, then **no one** may pick someone with a particular characteristic, X (such as red shirt or boots) as their second reference point. During this round, ask one of the students with the X characteristic to stop (it should not affect system). Ask the specific person (such as Person #2) to stop (it should influence the whole system).

Return to original circle. Using the diagram on the board or rope in circle, have students connect lines between their own numbers and those they chose as reference points, like Figure 3. Ask students to explain how the system behaved. Did any reference point influence the system more than others? That person has high leverage or **influence** within the system.

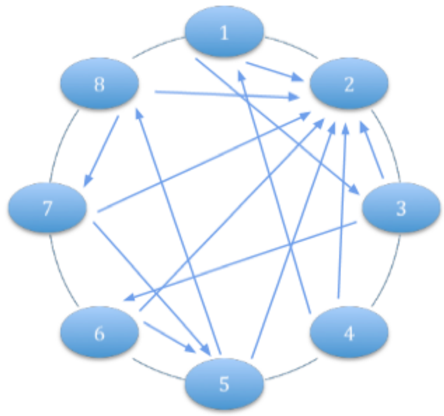

Figure 3: Round 3 Example

Round 4: Pick new references. In this round, introduce a new leverage point of different scale. Maybe all odd numbers have to choose person #8 as one of their reference points.

Elaborate/Evaluate:
If possible, project an EOL Places Food Web on screen. For a simple food web (13 species), view the [New England Rocky Intertidal Habitat](). For a more complex food web (36 species), view the [Okaloosa County (Florida Panhandle) Urban Habitat](). Discuss the following questions, and after each one, manipulate the food web to demonstrate how each part of the web influences the rest of the web if moved or reorganized.

- How did the system change when one person had more leverage? Looking at the food web, what organisms do you think have a lot of influence in the habitat?
- How did the system change when one person had no leverage (the person that no one was allowed to use as reference?) Looking at the food web, what organisms do you think have the least amount of influence in the habitat?
- Notice that humans are a part of this food web. When we view humans as omnivores and consumers, how much influence do you think our species has on the ecosystem?
- When we extend our role as humans beyond energy flow to include our use of tools and technology, how much influence do you think our species has on ecosystems?

Extensions or Modifications

As an assessment at end of lesson (after activity 4), students can work to design their own "ecological scenarios." After exploring the Food Web Tool, how could they design a round to model an ecological event or concept? They should create a visual model and explanation to support their design.

Next Generation Science Standards

Performance Expectations

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Science and Engineering Practices

Asking Questions and Defining Problems

Developing and Using Models

Constructing Explanations and Designing Solutions

Encyclopedia of Life
eol.org + education.eol.org

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