BioSciences at Rice University
Owls Outreach

Ecosystems and Food Webs

Background

Ecosystems are the community of living organisms along with the non-living components of their environment that are linked as a system by flows of energy and resources. Thinking about nature as an ecosystem is useful because it helps us to understand connections between the diverse organisms in nature and the environment. If you walk outside, you can see plants growing using energy from the sun, animals that eat those plants, and other animals that eat those animals.

In order to build food webs, we consider the connections between species and the flow of energy between them. Organisms can be **primary producers**, **primary or secondary consumers**, apex **predators**, or **decomposers**. Arrows represent the flow of energy, where the direction of the arrows should match the direction of the flow of energy.

For this activity, we will build our own food web and then we will think about how our food web might be affected by some common environmental and human-caused changes. You might not know right away how the species here interact, but that is okay. In nature, oftentimes, it is very hard to know the diet of each species unless we observe it, and so we must make educated hypotheses. Read the instructions below carefully, and build your food web on the third page of this sheet.

Supplies

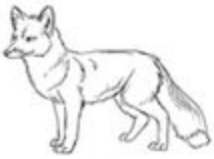
For this activity each student will need:

- Food Web Activity Sheet
- Pencil or Pen

Activity Instructions:

1. On the next page, take a second to consider the role that each organism is playing in the ecosystem, and what it might be eating. You will see that some organisms are labeled and some are not. Some organisms are missing. Draw arrows between each organism in the direction that energy is flowing through the food web.
2. Label each organism as a primary producer, primary consumer, secondary consumer, or apex predators.
3. Draw the sun into your food web with an arrow indicating where its energy primarily goes.

4. A drought has caused all of the plant life to die out! Cover up the primary producers. Which organisms will be most directly impacted if the primary producers were to die out and how?
5. A fungal infection has spread throughout the frog population! Cover up the frogs. Which organisms will be most directly impacted if the frogs die out? How might this affect the populations of the affected organisms?
6. Exotic game hunters have killed all the lions for personal trophies. Cover up the lions Which organisms will be most directly impacted if the lions die out and how?
7. An invasive species has moved into your ecosystem! Draw in a new organism to your food web along with arrows showing how energy flows to and from that organism to others. How would the addition of this organism impact the other species in your food web.



Apex Predator

Primary Producer

Think about what we've learned:

- How are all of the organisms in a food web connected? (Hint: think about what passes from one organism to another) Would a species going extinct in an ecosystem have a bigger impact if it was connected to a lot of other species or a few?

- Human activity can have unpredictable effects on natural ecosystems. Do you think having lots of species (as opposed to few species) in an ecosystem would make it more or less susceptible to disturbances such as pollution, hunting, or habitat destruction?

- There are many different ecosystems on the planet. Why might it be important for humans to preserve many different kinds of ecosystems? (Hint: think about what benefits humans get from nature).

Detailed Instructor Activity Instructions:

1. Give each participant, or small groups the handout. Alternatively, you may be able to project this page onto a projector screen and go through the activity as a class.
2. Go over the instructions and give the participants time to fill out their food webs.
3. Once the food webs are filled out, you may consider discussing why they chose to fill in the blanks in the way that they did.
4. Give students time to discuss each change representing various human impacts that they make to the completed food web.
5. Alternatively, you may be able to print and cut out organism outlines and distribute to small groups. Then, have them construct their own food webs from scratch.