Weird Webs

Still in the character of the ecosystem elements they received in ***Who Am I***, students use a ball of twine to create a 'food web' that shows the interactions between the members of the ecosystem. Teachers are provided with key discussion questions that help students appreciate the interconnections within the natural community and identify food chain relationships and energy flows within the "web of life."

Time required: 20-30 minutes:

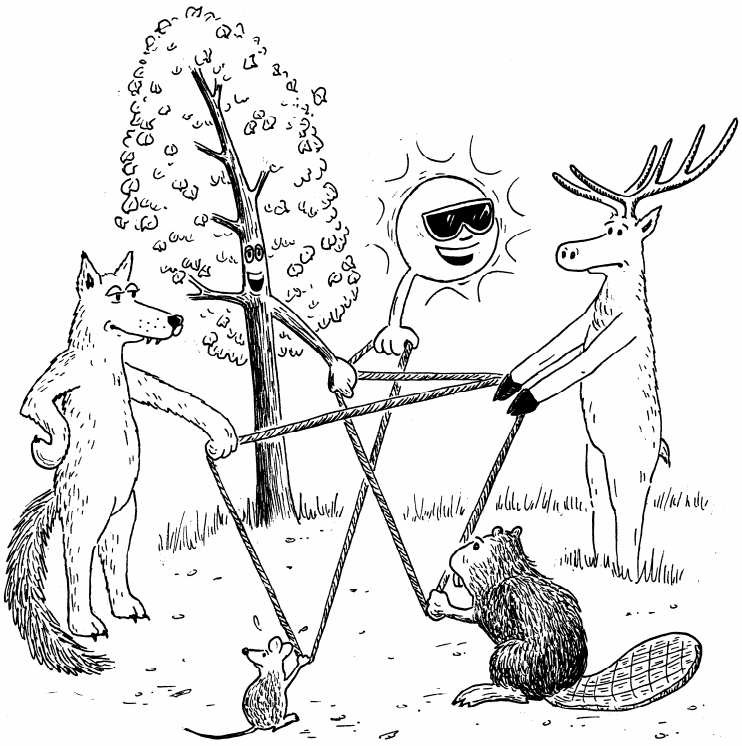
Materials:

- Signs from ***Who am I?*** activity
- Ball of at least 100m of string, wool or very thin rope

Instructions for the Teacher:

1. Instruct students to stand or sit in a circle, showing the signs they received in the ***Who am I?*** activity. You should also be part of the circle. Tell students that you will be playing the role of the sun, the ultimate source of life for all things (as befits your role as teacher!). Pass the ball of string to the tree, and say "I am passing the ball to the tree, because it needs me to survive. I give energy to the tree."

2. Tell students that they can pass the ball of string to another ecosystem element in the circle ***only if it needs you in order to survive, or if you need it in order to survive.*** For example, the squirrel could pass the ball to the tree (which it needs to survive) or to the owl (which needs it to survive).



3. Make sure that each exchange is justified by each student as they pass the ball, and that the whole group understands and agrees with the rationale that is given. Challenge students to try to make connections with everyone in the circle, so that no organisms are left out.

4. When every organism is connected, have students pull gently to make the string taut. Ask students to examine the pattern they have created. Tell them that this pattern represents the very complex pattern of

interconnections between organisms that occurs in a natural ecosystem. For this reason, interrelationships within an ecosystem are sometimes referred to as ***the web of life.*** Ask students if this web is more complex or more simple than the web of life which exists in a nearby natural area or park (your classroom web is ***much*** more simple).

5. Tell students that something has just happened to change this ecosystem: a new community is being built nearby, and an area of the forest will need to be logged to provide the space. Keeping the string taut, ask the "tree" student(s) to suddenly release the string when you count to three. After the string is released, immediately ask if anyone felt the tension in the string change when the tree dropped out (several, including the squirrel, should say yes). Ask those affected by the loss of the tree to say how they are affected.

6. Count to three again, and ask these "affected" students to in turn drop the string. Keep going until everyone has dropped the string. Have students drop the string in front of them so they can pick it up again for the next round. Students should realize that any change to an ecosystem - whether slight or profound - is felt throughout the system. Tell students the golden rule of ecology: ***In an ecosystem, you can never just do one thing.***

   Easy Option: Rather than have students drop their strings, ask them to gently tug on the string. Those feeling the tug can tug in turn, and so on. This eliminates the need to pick up the dropped string.

7. Ask students to repeat this activity using the following changes to the ecosystem:

   - A developer drains a wetland to build a new community
   - The municipality sprays to remove pesky mosquitoes from the area
   - Decreasing ozone levels allows more ultraviolet radiation, which kills cells and slows the growth of the trees
   - A species of worm goes extinct. This worm specialized in breaking down deer and elk poop and releasing the nutrients back into the soil
   - The forest is in a park - but the park is too small to preserve large carnivores, causing them to be extirpated from the area

   Emphasize two points to students:

   a) Recent studies are showing that carnivores are far more important than previously thought. Their presence or absence may actually dictate how healthy the entire ecosystem is. This is known as the ‘top down’ or regulatory effect.

   b) Humans usually understand only a small amount of what actually goes on in an ecosystem: the relationships and interdependencies are normally too complex. This often makes our attempts to ‘manage ecosystems’ almost comical! The following true story of 'Cats in Parachutes' by Bart Robinson elaborates on this.

Cats in Parachutes

In the early 1950's, the Dyak people of Borneo were suffering from Malaria. The World Health Organization was called, and they had a ready-made solution, which was to spray copious amounts of DDT, a chemical made to kill mosquitoes, all over the place. As a result, the mosquitoes died off and the malaria diminished. So far, so good.

There were some side effects, however. One was that the roofs of the houses began to fall in on their owners' heads because the DDT had not only killed mosquitoes, it had killed a species of parasitic wasp that up to that point had controlled a population of thatch-eating caterpillars. Furthermore, the DDT affected a great many species of small bugs that were eaten by lizardy-type creatures called geckoes, which were in turn eaten by the many resident cats.

In time, the DDT worked its way up the food chain and the cats begin to die, and when the cats died, the rats began to multiply and flourish, and soon the Dyak people were suffering from typhus ***and*** sylvanic plague, which was much worse than the original malaria. The World Health Organization was called again, except this time they didn't have a ready made solution and had to invent one, which was, believe it or not, to parachute live cats into Borneo.

Operation Cat Drop, courtesy of the Royal Airforce.

All of which is to say simply that... If you don't understand the interrelatedness of things, the cause of problems is often solutions... And that simple questions often require complex and reflective thinking if good solutions are to be found.... And that, as the Father of Ecology Aldo Leopold once said:

"The first law of intelligent tinkering is to keep all the pieces."

- by Bart Robinson, reprinted with permission (based on a story originally told by Amory Lovins).