Activity: "Symbioses and the Interconnectedness of Life"

Lesson Objectives: Students will be able to:

- Define and use the term symbiosis
- Derive connections between soil nutrients and their own lives
- Create a "web of life" including animals, plants, bacteria, fungi, nutrients, and themselves
- Determine what human induced changes can do to systems

Time Required: 1 class period

Materials Needed: 30m long rope
Place cards for each student (N, ohia, K, fungus, P, bacteria, koa, C, wiliwili, ti, birds, insects, humans, fertilizer, pesticides, soil, ferns, moss, lichen, sugar, etc)
Bucket/jar (to draw place cards from)
Site Plan worksheet

Standards Addressed: Domain I: 1. Doing Scientific Inquiry
2. Living the Values, Attitudes and Commitments of the Inquiring Mind
3. Using Unifying Concepts and Themes
5. Relating the Nature of Technology to Science

Domain II: 3. Malama i ka Aina
4. Unity and Diversity
5. Interdependence
6. Cycle of Matter and Energy Flow
9. Cells, Tissues, and Functions

Instructor Notes:

- Begin the class by asking the students to recall what they talked about last time. Terms like: Symbiosis, Limiting Factors, and Nutrients should come up in the brief discussion. Go over items that might be required for things to grow and survive (this will be helpful so that the students understand what is going on in the web of life)
- Explain to them that today they will be creating a "web of life," complete all of the procedures/instructions before proceeding
- Give each student a place card
- Have the students stand in a circle
- Have the student holding the nitrogen place card begin the web. Why? Nitrogen is often considered the limiting factor in systems because it is a component of the building blocks of life (DNA, RNA, proteins) but no organism can use N in the gaseous form. Each student's card should be visible for others to see. The N

student must pick an item that it is connected to out of the choices from the class and explain why N and ___ is connected. An example answer would be: "bacteria" because they help fix nitrogen for plants.

- Continue this process until each student is holding a part of the rope so that it looks like a web.
- EXCEPT, Make sure that the students holding "human," "sugar," "fertilizer," and "pesticides" are the last one to get the rope
- After all the other students are holding a piece of rope, tell them a story about sugar. Explain to them that the humans decided to plant sugar on this land, so they cut down all the plants (Instruct students: all the plants besides sugar need to let go of the rope)
- They planted tons of sugar and used fertilizers and perticides, what did that do? (killed of the insects, bacteria and fungus with plant associations no longer lived cause plants got their nutrients from artificial place)
- After everyone has let go of the rope except for the students holding humans, fertilizer, sugar, and pesticides begin a discussion about how this situation is related to their lives, the lands of Island School, and the whole island of Kauai.
- Have students begin to suggest solutions to what they think should be done to the land before the ohia planting, based on their knowledge of symbioses
- Develop a list of suggested plants and processes

Resources:

Retrieved 3-2-2004
Mycorrhiza
http://dmsylvia.ifas.ufl.edu/mycorrhiza.htm
http://www.backyardnature.net/f/mycorhza.htm
http://helios.bto.ed.ac.uk/bto/microbes/ectoimag.htm
http://www.oldkingdom.org/UG_projects/Diane_Howarth/nutrients.htm
Bacteria
http://ice.agric.uwa.edu.au/soils/soilhealth/bacteria/
http://www.ucc.ie/impact/agri2f.html
http://www.eco-grow.co.nz/soil.php
Food Webs
http://www.vtaide.com/png/foodchains.htm
Nutrient Cycles
http://cgee.hamline.edu/see/questions/dp_cycles/dp_cycle_nutr.htm
http://www.ppi-ppic.org/ppiweb/ppibase.nsf/$webindex/article=5203CB87852569B50057E346C0116272