

Fifth Grade

Pre and Post Field Trip Teacher Resources

TEKS Objectives:

5.b2B - Collect information by observing and measuring

5.b4A - Collect and analyze information using tools including calculators, **microscopes**, cameras, sound recorders, computers, **hand lenses**, rulers, thermometers, compasses, balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles.

5.b.5A - describe some cycles, structures, and processes that are found in a simple system

5.b.5B - Describe some interactions that occur in a simple system

5.b.9B - Analyze and describe the adaptive characteristics that result in an organism's unique niche in an ecosystem

5.b11C - Draw conclusions about "what happened before" using data such as from tree-growth rings and sedimentary rock sequences

HISD Objectives:

SCI.5.4A - Collect and analyze information using appropriate tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, metric rulers, metric thermometers, compasses, metric balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles

SCI.5.2B - Collect and analyze information by observing, measuring, and using numerical operations such as addition, subtraction, and scaling.

SCI.5.9B - Analyze and describe adaptive characteristics that result in an organism's niche in an ecosystem such as an organism using its sticky tongue to feed on insects

SCI.5.5A - Describe some cycles, structures, and that are found in simple systems such as in the water cycle, food webs, or the freezing, melting, and boiling of water.

SCI.5.5B - Describe and explain some interactions that occur in simple systems such as with the Sun's energy in the water cycle, energy transfers in food webs or water particles in the freezing, melting and boiling of water

Program Overview: An ecosystem is an ecological community made up of all the living and nonliving things functioning together as a unit.



Key Vocabulary Terms:

ecosystem, succession, diversity, ecology, environment, cycle, habitat, community, population

Objectives:

Apply ecological concepts in role playing and various hands-on activities.

Time Allocation: 30 minutes for each activity.

Background Information:

Ecology is the study of the living things on earth and how they interact or depend on the non-living things on earth. The word ecosystem refers to the system of interactions between the living and non-living things. It is a natural unit that includes living and non-living parts interacting to produce a stable system. Ecosystems can be as small as a puddle or as large as the earth. The place a plant or animal lives is its habitat. This doesn't just mean the shelter or sleeping spot - but the whole area where it fulfills its needs for food, water, air, shelter, protection, reproduction, etc.

Nature is the original recycler. Materials flow from the living to the non-living and back to the living parts of the ecosystem in a perpetual cycle. By means of these cycles, plants and animals obtain nutrients necessary for life. Water, carbon, sulfur, nitrogen, and phosphorus all constantly cycle through the ecosystem. Living things have cycles as well. Life cycles are the stages that plants or animals go through during their development.

The number of species in an ecosystem is a measure of diversity. One of the conditions that help to generate balance, or stability, in nature is complexity in the foods chains and webs. In a very diverse ecosystem, with many different species, a large number of different foods chains and more complex food webs are possible. The reverse is also true; low diversity makes for an unstable ecosystem. For example, farmers usually create an ecosystem with very little diversity: corn as the producer, raccoons and a few insect species as consumers. The ample food supply allows certain insect populations to reproduce quickly. There are few predator species in the corn fields and they cannot reproduce as quickly as the pests. Because of the low diversity, the corn crop is easily destroyed.

Because living things depend on each other, they interact with each other. Interactions are the clues you look for to tell the forest's story.

Plant to Plant Interactions

Large plants that shade smaller plants is an example of one interaction. Vines and lichens make use of other plants to climb or grow on. Some plants (like walnuts & pecans) release chemicals that inhibit or prevent the growth of other plants.

Animal to Animal Interactions

Look for predator - prey relationships: foxes eat rabbits, snakes eat mice. Competition occurs between different species and among members of the same species for space and food.

Plant to Animal Interactions

Plants are eaten by animals. Squirrels depend on trees for food, shelter and protection. Animals pollinate flowers and disperse seeds. A tree may have been accidentally planted by a squirrel.

Pre-Field Trip Activities:

Activity One (Wildlife at Work)

All living things have a job in the community where they live. Even in "unused" places, wildlife is at work. When people change the use of a piece of land, often the balance of nature is disturbed. What can we learn about yielding to animal and plant communities so they can live and work?

Without the clean up crew of slugs, beetles, worms, and ants, there would be a big pile of dead dinosaurs downtown! Forests would be buried in fallen leaves. Without insect-eating bats and birds, the air would be swarming with pests. Many beneficial critters can share city spaces when we keep healthy habitats available.

Materials:

- ribbon as survey markers
- popsicle sticks
- tape
- yarn or rubber bands
- pencils

- scissors
 - "Wildlife at Work Community Survey Sheet" copied onto yellow paper
1. Discuss some of the jobs that living things do. Examples are:
 - Pest controllers** - praying mantis, ladybugs, spiders and snakes
 - Cleanup Crew** - snail, slug, earthworms, flies, fungi, beetles, ants, vultures, crows
 - Food Producers** - Plants
 - Soil Conditioners** - earthworms, fungi, decaying plants
 - Oxygen producers** - plants
 - Population controllers** - animals that eat other animals
 - Pollinators** - bees, hummingbirds, butterflies, moths, beetles
 - Leaf eaters** -sowbugs, caterpillars
 - Mosquito eaters** - fish, dragon flies
 2. With ribbon mark an "unused" area that is to be changed into a busy, people place like a shopping mall. Pretend construction is to start soon, but the developer needs to give the city a report about the impact the changes will have on the habitat.
 3. Cut out the yield signs. Tape Popsicle sticks to the back of signs and thread others with yarn.
 4. Go outside and challenge students to find out what wildlife is at work in the area. The community is made up of the populations of plants and animals that live together in a habitat. On a yield sign, record the living thing found and its job in the "proposed development site." Remember, if a critter can't be found, maybe evidence of its work can be.
 5. Wherever wildlife is at work, post or hang the signs. Ask one surveyor to keep a list of the living things found and their jobs.
 6. Discuss the community survey, keeping in mind that the developer needs a report. Was the area really unused? Is there any living thing that is unemployed in the area? Which of the workers will lose their jobs because of the changes to the land? If the jobs they do don't get done, how will this affect humans? How can this land be shared by humans and wildlife?

Conclusion: Animals and plants do important jobs that also benefit humans. Some even have more than one job! As we learn more about their jobs, we can yield to their habitat needs as we plan for development of land. There is a balance in nature that is complex because all living things are connected. Plants and animals, including humans, depend on each other to survive. If we lose species of animals and plants from habitats, then the whole system might be thrown off balance, and eventually the quality of life for humans will suffer. Preserving wildlife habitats also means preserving life on earth for humans.

Post Field Trip Activities:

Activity One (Observing Ecological Succession)

Succession is a process that takes place in ecosystems as they mature. Although a lawn appears to be a stable environment, only careful cutting and regular maintenance prevent it from changing. Left to its own devices, the lawn fills with weeds. Taller plants grow up and choke the grass and it becomes shrubby. Groupings of plants, animals and micro-organisms are replaced gradually by others until the complete character of the community is altered. Seeds and spores are the agents of change in this ecosystem. Because plants don't move, they have developed ways to spread their seeds by using the environment (wind or water) or animals.

In this activity students will observe ecological succession on a small scale by growing microorganisms.

Materials:

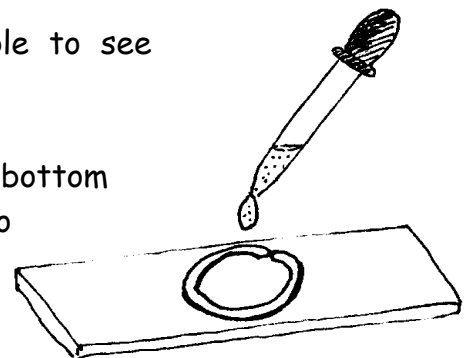
- coverslips or overhead transparency
- micro aquariums
- droppers
- magnifiers
- microscope
- spring water (buy from grocery store- make sure you get spring water, not distilled water)
- straw, hay or grass

Ecological succession in a forest or grassland is a process that can take hundreds or thousands of years. To get an idea of how populations change during a time period your students can create and observe a microenvironment in your classroom.

Put a handful of hay, straw, or grass in a large jar or small aquarium. Pour enough spring water into the container to fill it about half way. Cover the jar loosely with cloth. After about a week, you should start seeing protists. Your jar may start to smell, but that won't hurt the organisms living there. Add more spring water as the water level drops. Do not add tap water, the chlorine will kill many of your organisms.

If you shine a light through the hay infusion, you may be able to see organisms without magnification.

For the smaller organisms, collect a dropperful of water from the bottom of the container and put it into a micro aquarium. Make a micro aquarium by rolling a very thin piece of modeling clay about 1 inch long. Shape this strand into a circle and press it firmly onto a microscope slide.



Fill the reservoir with a dropperful of water from the hay infusion. Cover with a cover slip. Don't have cover slips? Cut small squares from a new sheet of overhead transparency film

Sample the populations in your small ecosystem once or twice a week for a month. Draw the animals you find in each sampling. How do the populations change? Do you find the same animals in every sample?

Cross-Curricular Activities:

Social Studies and Language Arts:

Houston: Then and Now

Create a classroom history of Houston. Cities, towns and settlements - succession also happens on the lands where we live. When people move into an area, the animals and plants they bring in to make it more home-like and the ways they make a living, change the original ecosystem into a new urban environment. Read about the early days in Houston to find out what was here in the early 1800's and how the original ecosystem is different from to the one we know today.

When the Allen Brothers first came to Houston, they found a swampy land with lots of mosquitoes, large trees and a prairie out west (in west Harris County).

Tell students that they will write a history book about Houston. Have students research Houston's recent past by interviewing friends, neighbors and family members. Ask what was different in their youth and what things have remained the same. Broaden your investigation into early Houston by consulting your school library, the public library and the internet. Students should record their findings by writing a paragraph or two. Children can illustrate their papers with drawings or by photo-copying family pictures.

Language Arts:

Write a thank you letter to the naturalist or docent who led your walk during your field trip. Ask students to describe a favorite plant or animal and its habitat. The address for the Houston Arboretum is 4501 Woodway Drive, Houston, TX 77024

List of Suggested Readings:

Batten, Mary. "Aliens from Earth: When Animals and Plants Invade Other Ecosystems". Peachtree Publishers. 2003

Biskup, Agnieszka. "A Journey into Adaptation with Max Axiom, Super Scientist". Capstone Press. 2007

Biskup, Agnieszka. "Exploring Ecosystems with Max Axiom, Super Scientist". Capstone Press. 2007

George, Jean Craighead. "Firebug Connection: An Ecological Mystery". Topeka Bindery. 1999

Locker, Thomas. "John Muir: America's Naturalist". Fulcrum Publishing. 2003

Ross, Michael Elsohn. "Pond Watching with Ann Morgan". Carolrhoda Books. 2000

Walker, Pam. "Ecosystem Science Fair Projects". Pam Walker and Elaine Wood . 2005

List of Suggested Websites:

National Wildlife Federation-

<http://www.nwf.org>

The Children & Nature Network-

<http://www.cnaturenet.org/>

Acorn Naturalists-

<http://www.acornnaturalists.com/>

Specializes in nature-related educational materials for kids.

Texas Park and Wildlife-

<http://www.tpwd.state.tx.us/learning>

Hooker Oak Elementary School-

<http://www.csuchico.edu/%7Epmaslin/nature/honature.html>

Here is a wonderful example of what one group of parents and teachers did at their school! It's truly turned into a community project. The page has links at the bottom to some other very useful information and teaching materials, all hosted by California State University at Chico .

PBS-

<http://www.pbs.org/kratts/world/content.html>

This is a great resource for students to use to do research on different animals around the world. They can even make a movie!