

Earth Systems: Our Abiotic World

Water Cycle, Watersheds, Water Conservation

Transpiration Carnation

Purpose: Intro to transpiration. Lead into phloem and xylem discussions.

Materials: Clear vases, food coloring, and white carnations (or any other white flower)

Procedure:

1. Fill five vases with water and add food coloring to each, creating a rainbow: red, yellow, green, blue, and purple. Then add a white carnation to each vase, making sure the freshly cut stem is submerged in the water.
2. Have students come up with a hypothesis about what they predict will happen. Then watch what happens.
3. Even after a day, you should start to see colors appear in the white carnation. Allow a week for a full transformation of the flower.
4. Discuss with students what happened. How did the color get into the end of the flower? Leads to a further discussion of transpiration.

Mini Water Cycle

Purpose: Demonstrate the different phases of the water cycle. Students can create their own environments, if there are enough supplies.

Materials: Plastic rectangular tub with lid (one per student, pairs, class), rocks, grass, aluminum foil, and water.

Procedure:

1. Using a plastic rectangular tub (old rotisserie chicken containers work great!), have students add a rock to represent a mountain, grass for the vegetation, and a small pond made from aluminum foil and filled with water.
2. Close the lid and place in the sun, or under warm lamp if it's raining. Observe evaporation, transpiration, condensation, precipitation, and run-off!

Geology (Earth science, shaping of the earth, erosion)

ROCKS ROCK!

Purpose: Intro to geology, students learn to differentiate between rocks and can later learn to identify using certain characteristics.

Materials: Students bring in their own rocks, mineral/rock keys for further identification

Procedure:

1. Have each student collect as many different rocks as possible, either brought into class or walk around campus)
2. Back in the classroom, divide the class into four teams. Let the students pool their rocks and arrange them in various ways: from smallest to largest, lightest to darkest, by sharpness and smoothness, etc. If the students have learned to identify rocks and minerals, let them group them by kind. Any rocks that cannot be identified could be set aside. As a special challenge, these might be identified using rock and mineral keys.

Tectonic Plates

Purpose: Intro to the Earth's structure, plate tectonics, and Pangaea.

Materials: Colored craft foam sheets, construction paper, play dough, and scissors

Procedure:

1. Have students/partners cut out craft foam to create South America and Africa (print out traceables). Then fold a piece of construction paper into an accordion. First set continents close together placing a piece of play dough to weigh them down. Then as they pull each side of the construction paper, see the continents move!
2. What does the construction paper represent? Do the continents move slow or fast? What will the earth look like in the future?

Human Impact: Erosion and Pollution

Acid Rain Pollution

Purpose: Learn the importance of clean rainwater versus acid rain. Connect experimental data to real world issues.

Materials: 3 potted plants, 3 spray bottles, and lemon juice or vinegar

Procedure:

1. Discuss with your students what some of the different uses of water are. Ask why they think we need clean water. Be sure to remind them that we all need clean water not only for drinking and bathing, but also for growing crops.
2. Discuss the ways in which our air can be polluted. Give some examples of pollution they may have seen in your area, like the exhaust from your car or a factory on the side of the highway. Explain how pollution in the air travels up into the raindrops in the clouds in the sky. This means that our rain can become polluted too, which can sometimes lead to what is known as "acid rain."
3. Next, explain that you are going to do an experiment that will show what acid rain does to plants. It will also show how important it is to have clean water for plants and animals.
4. Label the first plant and spray bottle "a little acid". Label the next plant and spray bottle "a lot of acid". Finally label the third plant and spray bottle, "plain water."
5. Make solutions in the spray bottles using lemon juice or vinegar as the acid: "a little acid" = $\frac{1}{4}$ cup of acid, "a lot of acid" = 1 cup of acid, "plain water" = water. Fill the rest of the spray bottles up with water.
6. Have students create a small "Observation Journal" using the spiral notebook or notepad. Label the first page with the date and have them draw pictures of each plant with each of their corresponding labels. You may want to have them write or dictate a sentence or two describing each plant's appearance, which at this point should be the same for all three plants: green and healthy.
7. Water the plants (being sure to use only about a $\frac{1}{4}$ of the spray bottle each time at the most). Every two or three days continue to water the three plants using the water from the spray bottles. Be sure to make note of and discuss which plant looks best. Which one looks the worst? How do the plants differ in color? Continue to have students record all of their observations in the journal by drawing and writing what they see after each watering. Water and observe the plants for at least one week. Throughout the experiment, discuss the changes that have occurred in the three plants and ask the results turned out the way they did.
8. At the end of the experiment, talk about which plant is the healthiest and which plant is the least healthy. Record all of the conclusions in their journals.

9. Assist in making the connection between this experiment and our own environment and the effects of acid rain in our world. Brainstorm solutions!

Naturally Good Manners

Objective: Students will be able to list guidelines for appropriate behavior on trails, participate safely and actively in learning activities at Outdoor Education, discuss natural resources that may be found at Outdoor Education and develop a personal trail user code of ethics.

Materials: Create a transparency of "People Versus Nature", paper, and pencils.

Procedure:

1. Begin by asking students about natural resources. What are they? Where do they come from? Do we need them? Why or why not?
2. Discuss natural resources that may be found at Outdoor Education.
3. Display transparency, "People Versus Nature."
4. Ask the students to study the drawing and try to list eight inappropriate outdoor behaviors shown there. Make a list of these on the chalkboard. Discuss the impact of each of these on the environment and other people.
5. Let the students know that at Outdoor Education they will be walking on many trails to learn about ecosystems and the plants and animals in them. Discuss the reasons why appropriate trail behaviors are essential at Outdoor Education.
6. Have students think about which appropriate school behaviors would apply to Outdoor Education, e.g., following directions, respecting others.
7. Now have the students generate a list of appropriate alternatives to the behaviors seen in the transparency. Brainstorm additional appropriate Outdoor Education behaviors. Make a list on the board.
8. Divide class into small groups. Ask them to develop their own "Trail User Code of Ethics." This can be completed as a list of rules, a statement, a pledge, etc.
9. Have each group share their code of ethics with the class.

PEOPLE VERSUS NATURE



Conservation of Resources: Renewable and Non-renewable resources

We All Need Trees

Purpose: Understanding of where most everyday products come from. Think about amount of trees used everyday.

Materials: Backpack with tree products (fruit, pencil, journal, sunscreen, gum)

Procedure:

1. Children are often surprised to learn how many different products we get from trees. Use this activity to help children learn just how much we depend on trees in our daily lives.
2. Take a walk with children, and bring along a daypack filled with a few tree products, for example, fruit (e.g., apple, orange, mango), a pencil and a journal or a book, sun block, and chewing gum. Pick up a downed tree branch and ask where it came from (a tree). Eat the fruit, and ask children where it came from (a store? a tree?). Ask children to think of other items that come from trees. Discuss some unusual tree products, using the samples from your daypack. Ask critical questions, including:
 - Have you used anything that comes from trees today?
 - How are tree products alike and how are they different?
 - What do you like most about trees?
3. In addition to giving us wood, paper, food, and other products, trees are invaluable assets to our communities. Take a neighborhood walk, and look for newly planted trees and shrubs. How are they protected? Find a place without trees, and compare it with a place with many. Which place do you like best? Why?