

# Earth's Resources: Air and Water

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<b>Strand</b>	Earth Resources
<b>Topic</b>	Five senses and Earth's natural resources
<b>Primary SOL</b>	1.8 The student will investigate and understand that natural resources are limited. Key concepts include b) factors that affect air and water quality.
<b>Related SOL</b>	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) the senses are used to observe differences in physical properties; b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy; c) objects or events are classified and arranged according to characteristics or properties; f) inferences are made and conclusions are drawn about familiar objects and events; h) predictions are made based on patterns of observations; i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; j) simple investigations and experiments are conducted to answer questions.

## Background Information

Air, water, and sunlight are natural resources that nearly all living things need to survive. Air and water pollution have always accompanied civilizations.

Some of the factors that affect water quality are:

- natural contaminants which are completely outside our control. These include contamination caused due to dried leaves, dead insects, bird droppings, and animal feces reaching the natural sources of water.
- agricultural runoffs, fertilizers, and cleansers
- industrial wastes being dumped directly in rivers (There are many, many regulations in place now which help to limit this.)

Some factors that affect air quality are:

- combustion, construction, mining, and agriculture
- motor vehicle emissions which are one of the leading causes

## Materials

- Air freshener in a spray container
- Three large pieces of cardboard to use as fans

- For each team of two to three students, put the following on a large tray:
  - Three containers of water about ½ full (containers can be large clear plastic cups)
  - Three plastic spoons
  - Enough salt to get a large spoonful of salt
  - A small container (small bathroom-sized paper cup) of vinegar
  - A small container (small bathroom-sized paper cup) of water with a couple drops of red food coloring in it
  - A few paper towels at each table
  - Student goggles
  - Student aprons if available
  - A Water Pollution Testing sheet for each team
- Student journals

### **Vocabulary**

*Natural resources, air pollution, water pollution*

### **Student/Teacher Actions (what students and teachers should be doing to facilitate learning)**

#### *Introduction*

1. In a large group, review with the class what natural resources are. Review which natural resources are renewable and which are nonrenewable.
2. Discuss with students what we mean when we say air pollution or water pollution. Ask the students what they think might cause problems with our air or water.

#### *Procedure 1*

3. Tell students that today they are going to be scientists and are going to conduct some science experiments about the natural resources of air and water.
4. In the first experiment the class is going to explore the air. Have students close their eyes and put their heads down. While students have their eyes closed, spray a couple squirts of a room freshener.
5. Have students open their eyes and using their sense of smell, tell you what is different. Ask the students what they think of the new odor? Ask them how they would feel if the new odor smelled like dirty feet? Relate the new odor to pollution in the air. Ask students if they have any suggestions for how we could clear the air?
6. Tell students we are going to try an experiment that shows how wind helps “mix” the air so that the new odor is not as strong.

7. Select three students to use three large pieces of cardboard as fans. Ask students what they think will happen when these three students begin to fan the area? Ask them if they think the odor will still be in the air?
8. Have the three students use the cardboard to fan the area for 30 seconds.
9. Have students describe what they smell now. Ask them if what they predicted previously happened? Have them explain why it did or why it did not.
10. Ask the students if we sprayed other substances in the air, would the same thing happen? Why or why not?
11. Discuss with the students how winds can help dissipate air pollution, but have them discuss again that the pollutants are still in Earth's air, just not in a concentrated area.

*Procedure 2*

12. Tell students that they are now going to conduct a second experiment that deals with water.
13. Demonstrate a few techniques that they will want to use when conducting their experiment.
  - a. Remind students to wear goggles while conducting the experiment.
  - b. Show them how to safely pour the items into the containers of water.
  - c. Show them how to smell the water using a wafting technique. This consists of waving your hand over the container in such a way as to gently push the vapor towards you while keeping the container itself well away from your face. It's basically the same way a cook smell hot food without sticking his/her head right over the pot and getting a faceful of steam.
  - d. Show them what is meant by "stir gently."
14. Divide the class into groups of two to three students each. Have each group move to a table to work.
15. At each table, have the following supplies on a large tray:
  - a. Three containers of water about  $\frac{1}{2}$  full (containers can be large clear plastic cups)
  - b. Three plastic spoons
  - c. Enough salt to get a large spoonful of salt
  - d. A small container (small bathroom-sized paper cup) of vinegar
  - e. A small container (small bathroom-sized paper cup) of water with a couple drops of red food coloring in it
  - f. A few paper towels at each table

- g. Student goggles
  - h. Student aprons if available
  - i. A Water Pollution Testing sheet for each team
16. Have students follow the directions on the Water Pollution Testing sheet. (Depending on reading ability, some teams may need more assistance than others.)
  17. When the teams have finished their experiment, have them put all their materials back on their tray. Collect the trays and put them to the side for later clean-up.
  18. Ask students to describe what happened when they put the salt in the water. Could they see the salt in the water? Could they smell the salt in the water? If this was their drinking water, would they want it to contain salt? Ask if they think the salt could be removed? (Accept all answers for this question.)
  19. Ask students to answer the same questions for the water and vinegar, and the water and red water.
  20. Ask them if water pollution might be a problem?
  21. Ask for suggestions for preventing water and air pollution.

### **Assessment**

- **Questions**
  - What happens to the air and to water if things are added to them?
  - Are all things that are added to air or to water bad?
  - How can people help keep our air and our water clean? Support your answer with details.
- **Journal/writing prompts**
  - Draw a picture and describe the experiments we conducted today about our air and water.
  - Explain what we can do to help keep our air and water clean.
- **Other**

### **Extensions and Connections (for all students)**

- Celebrate Earth Day, Arbor Day, or Earth Hour with the class or schoolwide to reinforce the concepts of caring for the planet and the resources available to all. Viewing Earth as one community is an important concept of each celebration. (Kindergarten Science K.10), (History and Social Sciences/Geography 1.6, Civics 1.10, 1.12b) (Science 1.4, 1.5)
- Take a field trip to a local nature center, area and state park, wildlife refuge area, or rescue center. This would reinforce the idea of protecting our natural resources.

- Guest speakers from area environmental education chapters or centers would also be valuable resources.
- Adopt-a-Spot on your school or playground area to begin protecting and taking care of as a class. If your school does not already have an Outdoor Classroom, explore ways to bring one to your school by exploring grants or resources available in your area.
- Make posters encouraging natural resources and wildlife protection. Create bookmarks, t-shirts, banners, or blogs.
- Join or help create a school environmental group which could assist in outdoor classroom projects, school Beautification Days, and support environmental literacy within the school.
- Take group trips and conduct projects to help build awareness. Invite local leaders to come and speak about local concerns for the environment and how those may affect the school and community.

### **Strategies for Differentiation**

- Have students use a camera to document their experiments.

# Water Pollution Testing

Names: \_\_\_\_\_ Date: \_\_\_\_\_

Directions:

You are going to test water.



1. Put on your goggles.
2. Get a cup of water and a spoon.
3. Get the cup of salt.
4. Put one spoon of salt in the water.
5. Stir the water gently.
6. What do you see?



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7. What do you smell?

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8. Put the salt and the glass of water on the tray.

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1. Get a cup of water and a spoon.
2. Get the cup of vinegar.
3. Pour the vinegar in the water.
4. Stir the water gently.
5. What do you see?



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6. What do you smell?

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7. Put the vinegar and the glass of water on the tray.

1. Get a cup of water and a spoon.
2. Get the cup of red water.
3. Pour the red water in the clean water.
4. Stir the water gently.
5. What do you see?



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6. What do you smell?

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7. Put the red water and the glass of water on the tray.

8. How can you help keep water clean?

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