



CLEAN UP! *(Adapted for Clinch Valley SWCD)*

A Science Museum of Virginia Activity (Copyright 1998)

TARGET AGE GROUP: 3-6th Grades

ESTIMATED TIME: 45 Minutes

PURPOSE: In this activity, students investigate how human activity can change a wetland. They experiment with a variety of clean-up techniques that can help to minimize human impact on the wetland. Student will recognize some potential pollution sources in human land uses. Students will experiment with a variety of clean-up techniques to remove pollutants from water.

VA SOLs

Science 1.1, Science 2.1, Science 3.1: The student will conduct investigations.

Science 1.8: The student will investigate and understand that natural resources are limited. Key concepts include:

- a.) identification of natural resources (plants and animals, water, air, land, minerals, forests, and soil);
- b.) factors that affect air and water quality; and
- c.) recycling, reusing, and reducing consumption of natural resources.

Science 2.5: The student will investigate and understand that living things are part of a system. Key concepts include:

- a.) living organisms are independent with their living and nonliving surroundings; and
- b.) habitats change over time due to many influences.

Science 3.10: The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include:

- a.) the interdependency of plants and animals;
- b.) the effects of human activity on the quality of air, water, and habitat;
- c.) the effects of fire, flood, disease, and erosion on organisms; and
- d.) conservation and resource renewal.

Science 4.5: The student will investigate and understand how plants and animals in an ecosystem interact with one another and the nonliving environment. Key concepts include:

- a.) behavioral and structural adaptations;
- b.) the effects of human activity on the quality of air, water, and habitat;
- c.) the effects of fire, flood, disease, and erosion on organisms; and
- d.) conservation and resource renewal.

Science 4.8: The student will investigate and understand important Virginia natural resources. Key concepts include:

- a.) watershed and water resources;
- b.) animals and plants;
- c.) minerals, rocks, ores, and energy sources; and
- d.) forests, soil, and land.

Science 6.7: The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include:

- a.) the health of ecosystems and abiotic factors of a watershed;
- b.) the location and structure of Virginia's regional watershed systems;
- c.) divides, tributaries, river systems, and river and stream processes;
- d.) wetlands;
- e.) estuaries;
- f.) major conservation, health, and safety issues associated with watersheds; and
- g.) water monitoring and analysis using field equipment including hand-held technology.

MATERIALS

"About Habitats – Wetlands" by Cathryn Sill

Per Class of 25

1 4-liter bowl or bucket (clear, if possible)
4 liters of water
½ cup soil
½ cup cooking oil
2 tsp. garlic salt
2 tsp. black pepper
1 Styrofoam cup (broken into small pieces)
1 Tbs. powdered laundry detergent
2 6-oz. plastic cups (clear if possible)

Per Group of 5 Students

1 plastic cup (6 oz.)
1 small bowl
1 measuring cup
5-10 coffee filters
1 funnel
1 cup sand
1 cup mulch
cotton balls
paper towels

PART I: INTRODUCTION

If this is the first activity of the day, introduce yourself and the agency/organization you represent. Briefly discuss what you do and how it correlates with this particular lesson.

Instructor Dialogue Example: Good Morning! My name is Jane. I work for XYZ Soil and Water Conservation District. We protect and preserve the natural resources (air, water, soil, plants, and animals) of XYZ County.

Student Question: What is a natural resource? *Answer: A natural resource is something that occurs naturally and has value.*

The conservation district and our many partners primarily focus on five natural resources. Let's identify those five natural resources: S = Soil; W = Water; A = Air; P = Plants; A = Animals

Today, we are going to discuss Wetlands. **Student Question: How many of you have heard the term "wetland"? Does anyone want to describe a wetland or give a definition?** *Answer will vary.*

PART II: INTRODUCTION TO WETLANDS

To ensure students understand what a wetland is read the book "About Habitats – Wetlands" by Cathryn Sill. (Note: For older students read not only the pages in the book, but supplement with text from the "Afterwords" section of the book.)

Sum up the book by stating that wetlands are habitat to numerous plant and animal species and they are a filter that removes pollutants from the water. The next part of today's lesson will focus on wetlands as filters.

PART III: WETLAND FILTERING ACTIVITY

1. Fill the 4-liter bucket or bowl with water. Explain to the students that this represents the lake in their community. Remove a cup of clear water and set it aside for comparison purposes.
2. Divide the class into the 5 groups listed below and give each group the appropriate pollutant.
 - a. Homeowners: Garlic & Pepper
 - b. Farmers and Construction Workers: Soil
 - c. Commercial Interests: Detergent
 - d. Service Station Owners/Workers: Cooking Oil
 - e. Parks and Recreation Planners: Styrofoam pieces
3. Explain that a community has been built around the lake. As the community grows, the water quality can be affected by human land use by the following groups and in the following ways:
 - a. Homeowners: Household wastes enter the lake through the sewage and drainage systems. (Have one of the homeowners dump the species into the lake.)
 - b. Farmers and Construction Workers: Soil from the plowed fields has been washed into the lake by rain and irrigation. Soil from a new house site has been washed into the lake by rain. (Have one of the farmers/construction workers dump soil into the lake.)
 - c. Commercial Interests: Chemicals and commercial wastes from factories and businesses have been washed into the lake from the sewage and drainage system. (Have one of the commercial interest group members dump the detergent into the lake.)
 - d. Service Station Owners: Oil from the cars has been washed into the lake through the drainage system and off the highways. (Have one of the service station group members dump the cooking oil into the lake.)
 - e. Parks and Recreation Planners: Litter from the picnickers has been washed into the lake. (Have one of the Parks and Recreation Planners dump the Styrofoam pieces into the lake.)
4. Compare a cup of the polluted lake with the cup of clear water. Emphasize that we all contribute to water pollution. If students are required to keep a science notebook, you may ask them to describe the look, smell, and touch of the two water sources.
5. Give each group a 6-oz. cup of polluted water and an empty bowl. Explain to them that they may use any of the supplies to try to clean up the lake. (Supplies: Coffee Filters, Funnel, Sand, Mulch, Cotton Balls, Paper Towels) Students should keep track of the procedure they use. Encourage students to try to achieve the cleanest water with the least amount of supplies (waste). Make the following suggestions about how to proceed:
 - a. Place a coffee filter in the funnel and pour the water through the filter into the empty bowl. Notice the pollutants trapped by the filter.
 - b. Pour the water back into the cup and wipe the bowl out with a paper towel.
 - c. Remove the used coffee filter from the funnel and replace it with a clean one. Put some sand in the filter. Slowly pour the water through the filter into the empty bowl. Notice the pollutants trapped by the filter and the sand. (In natural systems, leaves and soil filter the water as it seeps in the earth.)

- d. Repeat steps (b) and (c) with the mulch. (The mulch is used to collect and absorb the oil from the surface of the water. Some clean-up operations use straw as well.
 - e. Repeat steps (b) and (c) with the cotton balls.
 - f. Be creative. Try various combinations of materials to try to clean the water.
6. When the groups have removed as much pollution as they can, have the class discuss the results. Stress that even if their water appears clean, it may still contain chemicals and it is NOT safe to drink.
- Teacher Note: Some pollutants require special chemical treatment and others cannot be removed at all. The garlic powder is used to stimulate this problem and to illustrate an important point: humans do not have the solution to all the environmental problems we create.

PART IV: CLASS DISCUSSION

Observations: Compare the polluted water to the original lake water. Describe the differences.

Conclusions:

What methods removed the solid pollutants from the water? Do you think that you were able to remove all the solids?

Did any of the methods successfully remove the oil?

Are there pollutants that could not be removed? Do you think that this happens in real water-treatment systems?

How do you think these pollutants would affect wildlife living in the lake?

For Your Information:

All human land use affects wildlife habitat, positively or negatively. The way people use and develop land is a reflection of their priorities and lifestyles. Some people view undeveloped areas of natural environment as raw material for human development and exploitation. Others would like the natural environment to be preserved w/out regard for human needs. Still others yearn for a balance between economic growth and a healthy and vigorous natural environment. Very real differences exist between well-meaning people.

Wetlands, which are often seen as swampy wastelands, are the nurseries for hundreds of forms of wildlife and the habitats of a wide variety of aquatic, amphibious, and terrestrial plants and animals. Wetlands are highly vulnerable to development, pollution and to human interference with the natural flow of water. Hundreds of thousands of acres of valuable wetlands are lost each year to draining and development, dredging, filling, and pollution.