Protecting Our Water Resources: Student Activities for the Classroom

Water Resource Educational Activities
for Kindergarten through Ninth Grade

MRI

FLORIDA COMMUNITY COLLEGE

CONSORTIUM *for* POLLUTION PREVENTION EDUCATION

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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EPA

Midwest Research Institute

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Introduction

It has been established that Nonpoint Source Pollution (NPS Pollution) is the largest source of water pollution. Most nonpoint sources are related to land use activities. For example, rainwater washes over farmlands and carries topsoil and residues from farm chemicals into nearby streams. Primary nonpoint sources of water pollution include runoff from agriculture, urban areas, mining, forestry and construction activities. Pollution prevention, as it relates to NPS pollution, starts with understanding how everyday human activities affect the quality of air, land and water.

This activity guide has been intended to educate students in kindergarten through ninth grade to help them understand the definition of water pollution using the basic principles of science and mathematics. The activities focus on the four main types of water pollutants – sediments, nutrients, bacteria and toxins.

All of the activities are "hands on" and designed to blend with existing classroom curricula. Each activity is divided by classroom level and each of the activities is organized in the same way – detailing objectives, materials needed and background information.

Protecting Our Water Resources: Student Activities for the Classroom was planned keeping students and teachers in mind. As a teacher you are encouraged to try the activities in the guide and share the classroom successes and experiences with other teachers.

Preventing pollution will require an informed citizenry capable of understanding the complex issues surrounding how pollution occurs and motivating all of us to take action. The goal of this guide is to help teachers guide their students toward gaining awareness and protecting our valuable water resources.

Let's begin to understand and learn about NPS pollution and what YOU can do to save the earth…

Level One

The activities in this section have been designed to instruct students in kindergarten through the third grade.

- **What is a Watershed?**
- **Create Your Own Water Cycle**
- **Get the Dirt Out!**

Title: What is a Watershed ?

Time: 1 class period

Objectives:

- Understanding influences on the watershed.
- Predict where water flows within a watershed.
- Observe drainage patterns in a watershed.

Introduction:

During a rainstorm, the water that flows over the land as runoff collects in channels such as streams, canals, rivers, etc. The land area that drains water is called a watershed.

Areas of higher elevation called divides separate watersheds from each other. Water flows through a series of channels and eventually it collects in a wide river that empties into a body of water such as an ocean or lake.

From an aerial view, drainage patterns in a watershed resemble a network similar to the branching pattern of a tree. Tributaries, similar to twigs and small branches, flow into streams, the main branches of the tree. Streams eventually empty into a large river, comparable to the trunk. Like other branching patterns (e.g. road maps, veins in a leaf, the human nervous system), the drainage pattern consists of smaller channels merging into larger ones.

Advanced Preparation:

Gather materials necessary for activity.

Materials Needed

1. Sheet of white paper
2. Shallow pan
3. Water-based color markers
4. Spray bottle of water

Procedure:

1. Crumple sheet of paper and then partially smooth it out being careful to leave some ridges.
2. Using markers, color along the crease using different colors. The colors will represent pollutants such as fertilizers, pesticides, litter, pet waste, etc.
3. Lay sheet of paper in pan and shape it so it looks like a watershed.
4. Spray papers with water and watch colors begin to flow.

Evaluations:

Describe what happened at the highest and lowest point in the watershed.
Did the different pollutants mix together?

Title: Create your Own Water Cycle

Time: 2 class periods – 1 preparing and 1 for evaluation and observation.

Objectives:

- Describe how the water cycle works.
- Discover how water is recycled in nature.

Introduction:

All of the water found on Earth is recycled through the water cycle. When the sun heats the water on the earth's surface, some of the water changes into a gas or vapor. The change from a liquid to a gas is called evaporation. After water evaporates, it rises into the air. This warm vapor mixes with cooler air in the atmosphere to create moisture or condensation. The moisture that falls back to the earth as rain, hail, sleet, or snow is called precipitation. When it reaches the earth, it returns to oceans, rivers, lakes and wetlands or flows into the ground. This process of water moving from the earth into the atmosphere and back to earth again is called the water cycle.

This is nature's way or recycling one of its most important natural resources.

Advanced Preparation:

Gather materials necessary for the activity.

Materials Needed

1. Glass jar with lid
2. Bottle cap
3. Small stones
4. Sand
5. Soil
6. Few small plants

Procedure:

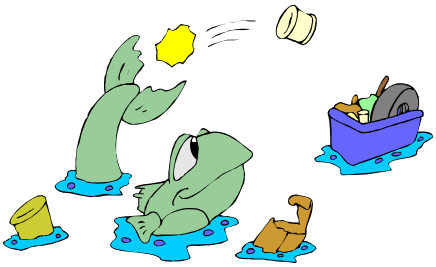
1. Using a large jar with a wide top (example: pickle jar) layer small stones in the bottom and then cover with sand.
2. Fill jar with soil until half full. Place a few small plants in the soil.
3. Fill the small cap (example: soda bottle cap) with water and place next to the plants.
4. Tighten the lid on the jar. Place jar in the sun for a few days.

Evaluations:

Make an educated guess about what will happen.
Over the next few days observe what takes place.
Did condensation form? Explain where, why and how it formed.
Describe the water cycle and how it affects living things.

Title: Get the Dirt Out!

Time: 2-3 class periods



Objectives:

- Describe water pollution.
- Compare clean and dirty water.
- Describe the importance of clean water for daily use.

Introduction:

All living things require clean water for survival. Human activities can add materials to water that make water unfit for use, or pollute the water. Polluted or dirty water affects the lives of plants and animals to the point of making them unhealthy. In extreme cases, polluted water can kill plants or animals. The best solution to water pollution is to prevent it from happening. This is not always possible, so methods have been devised to remove some pollutants from waters. Filters are used to remove sediment. Undisturbed soil is a natural filter. As water passes through it, pollutants are trapped. There are also human-made filters. For example drinking water treatment plants use sand filters. Other filters, like silt screens and straw bales, are used for construction sites. Filters help clean water but do not remove all of the pollutants. Filters do not necessarily remove some contaminants such as soluble chemicals and bacteria.

Advanced Preparation:

Gather materials necessary to conduct activity.

Materials Needed

1. 3 clear plastic glasses
2. Tap water
3. Pencil shavings
4. Paper strips
5. Styrofoam peanuts
6. Filtering material (coffee filter, cheesecloth)
7. Sand / Soil
8. Vinegar & Detergent

Procedure:

1. Explain water pollution and its affects on everyday life prior to conducting demonstration.
2. Pour water into 2 clear plastic glasses. Set one glass aside.
3. Allow students to add items such as pencil shavings, paper strips, Styrofoam peanuts, detergent, vinegar, etc. to the first glass.
4. Take filtering material to top of polluted glass and have students filter off water to separate glass.
5. Ask students to compare the two glasses and discuss the importance of clean water for drinking, swimming, and bathing.

Evaluations:

Discuss the results of the experiment. Is the water “clean”? Have the students feel it, smell it, test it for pH balance. Discuss that even though water looks clean it’s not necessarily clean.

Level Two

The activities in this section have been designed to instruct students in fourth through the sixth grade.

- **Too Many Nutrients**
- **Pond Scum**
- **From Streets to Streams**
- **How Much Water Falls Here?**

Title: Too Many Nutrients

Time: **5-6 class periods**

Objectives:

- Observe algae growth caused by excess fertilizer use.
- Discuss how using too much fertilizer can be detrimental to aquatic life.

Introduction:

Farmers, foresters, homeowners, and business people can pollute water by improperly using chemical fertilizers. For example, in urban areas, homeowners often apply more than the recommended amounts of fertilizer to lawns, gardens, and flowers. Farmers applying too much manure or fertilizer at the wrong time can cause similar problems. For instance, it is not good to apply fertilizer during the rainy season. After heavy rains, fertilizer can wash into rivers and lakes and supply the aquatic plants with too many nutrients. As a result, algae can multiply faster and cause algae blooms. Algae blooms can reduce the supply of oxygen in the water because oxygen is required for algae respiration and growth. During the day, algae photosynthesize and produce more oxygen than they can use. But at night when photosynthesis ceases, algae may use more oxygen to grow than may be available. This can deplete the supply of dissolved oxygen in the water. When the algae dies, oxygen is required to break down or decompose the dead algae. Both respiration and decomposition can make oxygen unavailable to fish and other aquatic life and may cause fish kills. When plants and animals die, they settle to the bottom. Under normal conditions this causes the water body to gradually fill with sediment and organic material. This process is called eutrophication. This process is accelerated when excess nutrients and sediment are added to a water body.

Advanced Preparation:

Gather materials necessary to conduct activity.

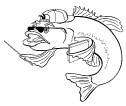
Materials Needed

1. Two 5 gallon aquariums or similar containers
2. Surface water to fill aquariums
3. Index cards
4. Permanent ink pen
5. Tape
6. Plant fertilizer
7. Measuring spoons
8. Grow light or sun lamp (optional)

Procedure:

Introduction

- Explain that plant fertilizer and animal wastes have nutrients in them that make plants grow.
- Discuss how small amounts of fertilizer help plants grow stronger and faster and how animal waste is also a fertilizer because they contain the same nutrients.
- Tell the students that animals on farms leave a great deal of waste material. (With very young students, discuss pet wastes in yards to help them understand the situation.)
- Often animal wastes are washed into nearby streams, or worse yet, the animals are allowed to stand in the stream, and their wastes go directly into it. These wastes enter the water at many different locations, so it is considered nonpoint source pollution.
- Have the students guess what types of problems this can cause. (Messy, smelly, health problems, etc.)



- Explain that some of the wastes soak into the ground and pollute the water underground also.
- Tell the students that this is a lesson will show them how too many nutrients can cause too much algae growth.
- Explain that animal wastes also have nutrients (such as nitrogen and phosphorous) in them and those nutrients are released as the waste "breaks down" over time.
- Since animal wastes also contain bacteria, which can be harmful to humans and other animals, explain that you will use another source of nutrients for the experiment rather than animal waste. Plant fertilizer will be used as the nutrient source.
- Emphasize that when the plants absorb animal wastes and plant fertilizers, they do not cause water pollution problems. If more nutrients are applied than the plants can absorb, the excess nutrients end up in the surface water and groundwater.

1. As the class watches, select volunteers to help you fill two fish aquariums with 5 gallons of pond or stream water.
2. Label one aquarium "A" and one "B" on an index card taped to each one (see illustration).
3. Place 6 tablespoons of plant fertilizer in aquarium "A" as you explain that you are adding nutrients in the form of fertilizer in the water.
4. Aquarium "B" gets one half teaspoon of fertilizer.
5. Place aquariums near a window for light. If sunlight is unavailable use a grow light or sun lamp. Note: Do not place them in a cold place.
6. Have students record their observations on a daily basis for a week.

Evaluations:

Discuss the results of the experiment. Have the students guess why there is a difference in the two aquariums. Ask them which aquarium looks more polluted.

Discuss how nutrient pollution could affect aquatic life. (Plants use oxygen to grow or respire and oxygen is used to decompose the dead plants. Lots of plant use lots of oxygen and this makes the oxygen unavailable to other aquatic life. When this happens, the other animals can't breath and sometimes get sick or die.) Have the students imagine they are fish and decide which bowl they would rather live in. Explain that after algae dies the oxygen in the water is used up, which the fish also need to breath to stay alive. Ask which bowl will use up the most oxygen when the algae dies. Conclude that small amounts of nutrients are beneficial, but too many are not good. Animal wastes washed into water bodies is a nonpoint source pollution problem that needs to be prevented.

Title: Surface-Water and Groundwater Pollution

Time: 1-2 class periods

Objectives:

- Observe the connection between surface water and groundwater.
- Experience the difficulty in cleaning polluted water.

Introduction:

Surface waters (rivers, streams, lakes, ponds) and groundwater's are interconnected in some areas. That is, water can move from surface water bodies to groundwater bodies and vice versa. If surface waters become polluted, this pollution can also affect the area's groundwater system. Likewise, polluted groundwater can move into lakes, streams, or rivers. The following activity demonstrates the movement of pollutants from surface water to groundwater as well as the difficulty in cleaning up the pollution.

Materials Needed

1. One 266 ml clear plastic cup
2. Sufficient clean pea-sized gravel to fill the 266 ml clear plastic cup ¾ full
3. Three 240 ml paper cups
4. One pump dispenser from soft-soap or hand lotion containers
5. 3.9 L of water
6. One bottle of food coloring

Advanced Preparation:

Gather materials necessary to conduct activity.

Procedure:

1. Divide class into groups of three. Provide each group with one clear plastic cup ¾ full of pea sized gravel, one paper cup with holes in the bottom, one paper cup with no holes punched in the bottom, and one paper cup ¾ full of water, and one pump dispenser.
2. Instruct the students to hold the 240-ml cup with holes in the bottom over the cup containing the pea-sized gravel. Then add the water contained in the other 240 ml cup. Ask the students what they think the water simulates (rain).
3. Explain to the students that rain enters the gravel and becomes groundwater. This process is called infiltration.
4. Instruct the students to dig a hole in the center of the gravel. Ask them what the hole simulates. (Answer: lake or pond). Have students observe the connection between the level of water in the lake and how it corresponds to the level of water in the gravel.
5. Add two drops of food coloring (to simulate pollution) to each model lake. Have the students place the pump dispenser in the gravel beside the lake and pump water into the paper cup with no holes. Observe the color of the water in the cup.
6. Have students add small amounts of clean water to their models while pumping. Continue to add water and pump out polluted water until it becomes clear.

Evaluations:

Where does the pollution pumped from the ground water come from?
How can pollution from a lake get into the ground water?
Was it easy to clean up all the pollution in the water?

Title: From Streets to Streams

Time: 3 class periods

Objectives:

- Define the term runoff.
- Define the terms point and nonpoint source pollution.
- Classify pollution sources as either point or nonpoint source.

Introduction:

Rainwater running off roofs, lawns, streets, and parking lots can wash a variety of water pollutants into lakes and streams. These pollutants include nutrients from garden fertilizers; bacteria from pet wastes and rotting litter; sediment from erosion; toxic chemicals from pesticides, gasoline, and trace metals from emissions and grinding car parts (lead, mercury, and cadmium); zinc from roofs and gutters; and road salt or sand.

In developed areas, these pollutants usually collect on hard-surfaced parking lots and streets where they collect in such high concentrations that they kill fish when they are washed all at once by a heavy rain into a water body. This is called shock-loading. To prevent this from happening, urban planners are now planting grass filter strips, diversion switches, and holding ponds to collect the runoff. This slows down runoff and allows it to seep slowly into the ground so that less pollution enters storm sewers or washes into the water body. A grass filter strip is an area of land planted with grass where water can flow instead of running into a storm drain. A diversion ditch is a channel lined with grass or riprap (rocks) used to direct water away from an area. Diversion ditches channel untreated water to open lands or ponds where it can collect and slowly absorbed into the ground.

Advanced Preparation:

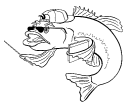
Gather materials needed to conduct activity.

Materials Needed

1. Illustrations
2. Piece of brick, concrete, or asphalt
3. Piece of sod
4. Measuring cup
5. Tap water
6. 3 shallow baking pans
7. Trash bags
8. Poster board
9. Glue

Procedure:

1. Place a piece of brick, concrete, or asphalt and pieces of sod into separate shallow pans and set the pans on a table for the students to observe.
2. Have students guess what will happen when water is poured on each surface.
3. Pour one cup of water on the hard surface and have students describe what is happened, then repeat the procedure on the piece of sod.
4. Explain that the excess water that does not soak is called “runoff”.
5. Have students relate this experiment to what happens to runoff in a city. Runoff occurs more often in areas where there is concrete, paved roads, or other hard surfaces, and much less in areas covered with vegetation.
6. Explain that wastes from pets, birds, and rodents, are often carried in the runoff, as well as litter, oil, chemicals, and pesticides.



Evaluations:

Discuss how litter contributes to urban water pollution by having the students describe what kinds of litter they frequently see in their community and what happens to it after a heavy rain. Then have students create a plan for their community to reduce the amount of litter in their area.

Have students create a “micro-litter” poster. Allow students to collect litter from school grounds avoiding dangerous items such as glass. Bring the litter back to the classroom and have the students glue litter to a poster board. Brainstorm with students a catchy environmental slogan about preventing nonpoint source pollution by preventing litter. Add message to poster and display in the school or community.

Title: How Much Water Falls Here?

Time: 90 minutes (can be divided into two class sessions)

Objectives:

- Calculate the area of the school parking lot.
- Understand the differences in pervious and impervious surfaces.
- Determine the volume of water that falls on the school parking lot.

Introduction:

Pollutants can enter our water supply from a variety of sources. Runoff from large areas of pavement is particularly likely to contain pollutants, since none of the water or pollutants can be absorbed through the pavement. Urban stormwater runoff may contain sediment, debris, oil, gasoline, and heavy metals.

Urbanization and other development may adversely affect water body health by increasing the volume of surface runoff while decreasing runoff times. When it rains in areas with lots of impervious surfaces (parking lots, roads, and roofs), water runs off at a higher rate because it is not absorbed into the ground. Potential pollutants are transported more quickly to the receiving water body. This sometimes causes a phenomenon to occur called “shock loading”. This can result in fish kills or algae blooms depending on the type of pollutants in the runoff. Suspended materials in the runoff can also absorb and store heat, which increases water temperature. Changes in water temperature can also harm aquatic life. Areas with lots of vegetation absorb rainwater, slow runoff and filter pollutants.

Advanced Preparation:

Call the local weather center or Soil Conservation Service in the county to find out the average annual rainfall for your area.

Materials Needed

1. Yardstick
2. Writing Materials
3. Graph paper
4. Ruler
5. Tape measure
6. Clipboards
7. Protractors
8. Calculators
9. Local rainfall data
10. Twine (meter and foot intervals)

Procedure:

1. Divide the class into teams of 3-5 students.
2. Draw a sketch of the parking lot on the board. Have each team select an area they wish to measure. Note: make sure students use same units of measurement.
3. Have the students go outside and take the needed measurements. Transfer measurements onto chalkboard.
4. Have students draft a sketch of the parking lot with all the measurements included.
5. Have each team determine the direction of the runoff and distance to the nearest water body. Note: A map can be used to estimate the distance to the nearest water body.
6. Have the students estimate the area of the parking lot. Add together all of the individual shapes to find the total area of the parking lot. For example:

Square:	Area = Length x Width
Triangle:	Area = ½ Base x Height

The values should be in units the students measured on the parking lot. Add together all the individual shapes' areas to find a total area of the parking lot.

7. Determine the volume of rain falling on the parking lot annually. Multiply the average rainfall (convert to feet or meters) by the area of the parking lot (square feet or meters). Volume should be recorded in cubic feet (ft^3) or cubic meter (m^3).

Evaluations:

Where does the runoff from the parking lot go?
What route does the runoff take? (Stormdrain, drainage ditch, stream, culvert)
Is the area from the parking lot to the nearest stream vegetated or paved?

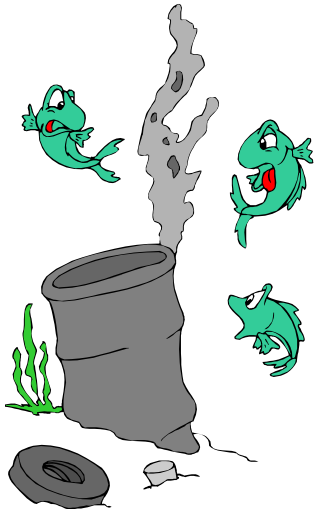
Level Three

The activities in this section have been designed to instruct students in seventh through the ninth grade.

- **The Effect of Turbidity on Light Penetration**
- **Septic Tanks**
- **Decaying Substances and Water Pollution**
- **Point vs. Nonpoint Source Pollution**

Title: The Effect of Turbidity on Light Penetration

Time: **2-3** class periods



Objectives:

- Define the term “turbidity”.
- Observe the effect solids suspended in water have on penetration of light.
- Understand the effect that turbidity has on the health of a body of water and it’s plants and animals.

Introduction:

The term use for suspended solids within the water is turbidity. These are the soil particles and other matter that are suspended in the water. The amount of turbidity is important because it affects the amount of light penetration and the color of the water.

Advanced Preparation:

Gather necessary materials to conduct experiment.

Materials Needed

1. Balance scale
2. Funnel
3. Beaker
4. Graduated cylinder
5. Water samples from various locations
6. Ring stand
7. Ring
8. Filter paper

Procedure:

1. Weigh the filter paper and place inside the funnel.
2. Take a water sample. Using the graduated cylinder, measure 1 liter of sample to filter.
3. Slowly empty 1 liter of sample through the filter paper into the beaker.
4. Remove the filter paper and allow it to dry completely.
5. Weigh the dried filter paper to the nearest milligram.
6. Calculate the difference between the new weight and the old weight of the filter paper. The difference in milligrams would be the amount of suspended solids per liter. Express your answer in parts per million (ppm). This is equal to milligrams per liter.

Evaluations:

What effect do you think water clarity may have on plant life?
What are some things that might cause turbidity?
What activities would improve water clarity?

Title: The Importance of a Properly Maintained Septic Tank

Time: 1 class period

Objectives:

- Discover how untreated wastewater can pollute a waterbody.
- Discuss how using too much fertilizer can be detrimental to aquatic life.
- Demonstrate the effects of an improperly located, maintained, or constructed septic tank on groundwater.

Introduction:

In some areas where public sewer lines are not available, families usually treat their wastewater with an on-site disposal system. The most common is a septic tank. A septic tank system also relies on the activities of microorganisms to help purify wastewater, similar to a public waste water system.

A septic tank system has two parts: septic tank and a drainfield. The septic tank takes out the large solids and the drainfield removes the fine solids and destroys the harmful bacteria.

In a septic tank, bacteria help break down the large solids by eating them. This compacts the heavier solids, causing them to settle at the bottom of the tank.

Even though the septic tank separates the large solids from the wastewater, its effluent is not yet purified. It still contains high levels of bacteria and nutrients that must be removed before releasing into the ground where it might reach the water table.

Drainfields help accomplish this last stage of purification. The effluent flows or is pumped from the septic tank into a network of porous pipes surrounded by gravel and covered with soil and turf. Here the pollutants are removed from the effluent as it moves through the drainfield.

If a septic tank is properly located, constructed and maintained, it will purify the effluent enough so that the effluent will not cause any harm as it moves out of system and into the ground.

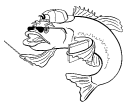
Periodically, septic tanks must be cleaned out to remove the solids. Fortunately for the homeowner, it only has to be done once every 3-5 years.

Advanced Preparation:

Gather necessary materials to conduct experiment.

Materials Needed

1. One large rectangular pan, 3-4 inches deep
2. Coarse sand, enough to fill one third of the pan
3. One flexible drinking straw
4. Dropper
5. One paper cup
6. Scissors
7. 1 cup of room temperature liquid coffee
8. Water



Procedure:

1. Pile sand at one end of the pan, sloping it down the center to form a shoreline and shallow zone. To make waterbody, fill the bare end of the pan with water.
2. Bend the straw into an "L" shape. Inset it into the sand with the short end sticking out of the sand on the shore. The straw represents the wastewater pipe draining toilet water into a lake. The long end of the straw leads out into the water body.
3. To make a "house", cut out the bottom of a paper cup. Place the top part of the cup over the short end of the straw on the shore. You may draw windows and doors on the side of the cup.
4. Fill a dropper with coffee and put a few drops in the straw. The coffee represents untreated wastewater. Observe what happens as drops are added to straw representing a toilet being flushed.

Evaluations:

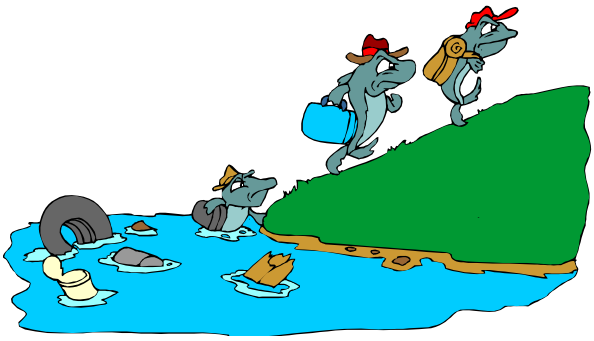
Describe how untreated sewage might affect a lake. Are these effects good or bad? What might happen to various lake life zones?

What if every home on the lake had wastewater pipe that drained into the lake for many years? Can you predict what might happen?

You've learned that fertilizers and pesticides can pollute surface and ground water. If homeowners on the lake fertilized their yards heavily and it rained where would the fertilizer go?

Title: Decaying Substances and Water Pollution

Time: 5 class periods



Objectives:

- Observe oxygen consumption caused by natural pollutants.
- Understand the use of a control when conducting experiments.

Introduction:

Wastes such as fertilizers and detergents that are carried into a waterbody can cause rapid growth of algae. The algae flourish for a short time and then die. But then decomposers cause the dead algae to decay. The decay process uses up oxygen in the water. After a while, fish living in the water die due to lack of oxygen. The change in the water as the oxygen is used up may be detected by using a chemical called bromothymol blue. Bromothymol blue that is added to the water will become yellow as the oxygen is depleted.

Advanced Preparation:

Fill test tube racks with four test tubes for each student or each group to do experiment. Gather pollutants (dead grass, dead leaves, mud, etc.) for each student or group.

Materials Needed

1. 4 corks
2. dead grass
3. 4 test tubes
4. medicine dropper
5. glass-marking pencil
6. water
7. dead leaves
8. test tube rack
9. mud from a puddle
10. bromothymol-blue solution

Procedure:

The procedure can be done in pairs but each student must record their own results.

1. Fill four test tubes about half full of water. Add four drops of bromothymol-blue solution to the water in each test tube. Place the four test tubes in the test tube rack.
2. Fill each tube with the designated pollutant:

Test Tube	Pollutant
1	Dead grass
2	Broken-up dead leaves
3	Mud
4 Control	No materials

3. Use the glass-marking pencil to label each test tube, describing the substance added. Label the 4th tube Control. Fill all 4 test tubes with water leaving just enough room to cork the top. Put a cork in each test tube.
4. Observe the test tubes for 5 days. Record any color changes that take place.

Evaluations:

Discuss the results of the experiment.
Remind students that pollutants can be a variety of materials including mud, grass, and leaves.
Have students brainstorm ways to prevent this type of pollution.

Point vs. Nonpoint Source Pollution

Classify the following as either point or nonpoint source pollution.

_____ **Boats in a lake.**

_____ Oil dumped in a swale.

_____ Pipe discharge from a wastewater treatment plant into the river.

_____ An animal owner neglecting to clean up their pet's waste.

_____ Homeowner washing driveway with a hose.

_____ Automobile leaking brake fluid.

_____ Construction site erosion.

_____ Pouring lawn clippings into canal.

_____ Factory illegally dumping waste into local waterbody.

_____ Effluent from failing septic tank.

_____ Pouring antifreeze down the storm drain.

_____ Spraying garden to eliminate bugs.

_____ Over fertilizing a yard.

_____ Runoff from a parking lot.

True/ False

_____ Stormwater runoff carries sediments, nutrients, and bacteria into waterbodies.

_____ A septic tank requires little or no maintenance once installed.

_____ Excess fertilizing has no effect on aquatic plants and animals.

_____ Dumping household hazardous waste down the storm drain is acceptable.

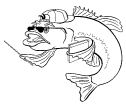
_____ Soil erosion increases the turbidity of water.

_____ It is important to repair automobile gas or oil leaks promptly.

Water Pollution ABC's

Fill each blank with a pollution source beginning with each letter of the alphabet.

A	_____	**N**	_____
B	_____	**O**	_____
C	_____	**P**	_____
D	_____	**Q**	_____
E	_____	**R**	_____
F	_____	**S**	_____
G	_____	**T**	_____
H	_____	**U**	_____
I	_____	**V**	_____
J	_____	**W**	_____
K	_____	**X**	_____
L	_____	**Y**	_____
M	_____	**Z**	_____



Resources

In addition to "Protecting Our Water Resources: Student Activities for the Classroom" there are many additional resources for teachers to use in the classroom. Listed below is only a sampling of the information found on the Internet and available through local, state and federal agencies.

Florida Department of Environmental Protection
http://www.dep.state.fl.us

Southwest Florida Water Management District
http: //www.dep.state.fl.us/swfwmd/menu.html
The site maintained by the Southwest Florida Water Management District provides a broad range of water related information specific to west central Florida. Areas of interest include the *Water Web* newsletter, District maps, recreational lands, Xeriscape information, issue papers, etc.

Northwest Florida Water Management District
http://www.state.fl.us/nwfwmd
The Northwest Florida Water Management District web site provides a variety of information relating to the water in Florida. The Northwest Florida Water Management District stretches from the St. Marks River Basin in Jefferson County to the Perdido River in Escambia County. The District is one of five water management districts in Florida created by the Water Resources Act of 1972.

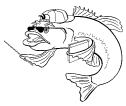
St. Johns River Water Management District
http;//www.sjr.state.fl.us
The St. Johns River Water Management District is responsible for managing ground and surface water supplies in all or part of 19 counties in northeast and east-central Florida.

South Florida Water Management District
http://www.sfwmd.gov/
SFWMD's goal is to restore and manage ecosystems and protect water quality -- from central Florida's Kissimmee River to Lake Okeechobee, and from coast to coast, spanning the peninsula from Fort Myers to Fort Pierce, south through the sprawling Everglades to Florida Bay.

Suwannee River Water Management District
http://www.srwmd.state.fl.us/
SRWMD manages water and related natural resources in north-central Florida by providing water quality and quantity monitoring, research, regulation, land acquisition and management, and flood protection.

Educating Young People About Water
http: //www.uwex.edu/erc/ywc
An excellent resource for teachers wishing to expand their library and see what others are point in water education, this Web site provides links to new water-themed curricula from all over the country, reviews and order information for 100 water resource curricula.

USGS Water Resources of the United States
http: //www.usgs.gov
The U.S. Geological Survey Web site provides access to water statistics and historical data, as well as much information for ordering several water related cartoon posters designed for students K-12.



The Environmental Protection Agency
http: //www.epa.gov/kids
The EPA provides a kids' page chock full of activities that relate to drinking water and water quality. The latest water news and the most recent of the EPA's reports are also featured here.

Surf Your Watershed
http: //www.epa.gov/surf
The EPA also provides this service to help people locate, use and share environmental information about their watershed or community.

National Wetlands Inventory
http: //www.nwi.fws.gov
This Web site maintained by the U.S. Fish and Wildlife Service provides information about wetlands including data, status, ecology and special section for educators. Also included is a Geographic Information System (GIS) view of the country's wetland inventory.

Water Wiser
http: //www.waterwiser.org
This site provides links to several water efficiency and conservation Web sites.

Activity Sources

What is a Watershed?
Source: WaterDrops Volume 1 Issue 2 SWFWMD and Project Wet

Create your own Water Cycle
Source: Adapted from Southwest Florida Water Management District and Suwannee River Water Management District

Get the Dirt Out!
Source: Adapted from Air and Waste Management Association

Too Many Nutrients
Source: Air & Waste Management Association

Surface Water and Groundwater Pollution
Source: U.S. Geological Survey

From Streets to Streams
Source: Air & Waste Management Association

How Much Water Falls Here?
Source: Georgia Department of Natural Resources

The Effect of Turbidity on Light Penetration
Source: NWFWMD WaterWays

The Importance of a Properly Maintained Septic Tank
Source: Suwannee River Water Management District WaterWays and NWFWMD WaterWays

Decaying Substances and Water Pollution
Source: Northwest Florida Water Management District WaterWays