

# EROSION

by Cherie Schadler

**Water Erosion** is the process of breaking rocks and soils down into smaller particles, and the washing them away by precipitation, usually rain. Wind, water and ice break down large boulders into smaller rocks. Those rocks split into smaller pieces of rock. The tiny pieces break down into sand. Soils are made up of decaying material from rocks, plants, and animals. When the soil is unprotected where trees and plants have been stripped away, the soil has nothing to hold it or bind it together. When a heavy rain beats down upon the soil, it may be washed away by the rain water into a stream, creek, or river, which will eventually carry it all the way out to a gulf or ocean.

It's hard to imagine that soil is the number one pollutant in the state of Mississippi, yet it is! Mississippi communities are steadily growing with many new construction projects taking place. When trees are cut down from a forested area, and soil is turned up and disturbed for new construction, it doesn't take much rain water to wash the soil into the waterways. If the soil is unprotected and Best Management Practices (BMPs) are not being practiced (practical solutions that help keep pollutants from entering streams, rivers, and other waterbodies), then the soil will move with the rain water.

**Eroded** soil in waterways disturbs the natural course of wildlife. **Turbid** or cloudy creeks prevent sunlight from penetrating the water. Aquatic vegetation consequently produces less **dissolved oxygen** in the water and **aquatic** life either suffocates or moves on. Clogged gills cause fish to gasp for breath. Eventually, the food supply will be reduced for fish and other wildlife such as turtles and ducks.

Clear cutting the land (cutting away all trees and brush) and ATV traffic are other ways soil is disturbed, making a creek turbid or cloudy. Construction sites often leave large amounts of bare soil to wash away or erode at the first rain storm. ATV traffic through the creeks disturbs fish beds and stirs up the **sediment** on the bottom of the creek. It can take several days for the sediment in a creek to settle back down to the bottom after a rainstorm or ATV disturbance.

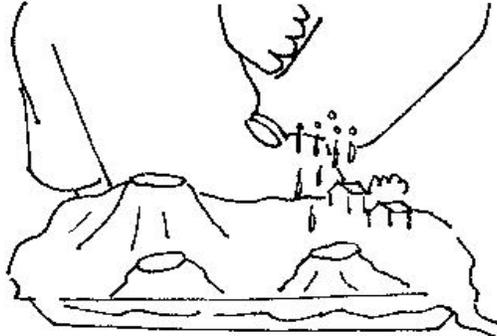
Sometimes, the eroded soil moves from one place to another further downhill. The eroded area loses its **nutrient** rich top soil and lays several layers of top soil, clay, and sand over a different area of land possibly runoff wetland. This "silting in" process changes the natural characteristics of a landscape and can even end up redirecting the water in the watershed. Cypress trees and other **wetland species** of plants and trees lose their natural **habitat** and begin to die off.

**Environmental stewardship** means taking personal responsibility for our actions concerning our **natural resources**, including soil and water, because whatever happens upstream in the watershed affects the water quality for those who live downstream.

# EROSION ACTIVITY

## BUILD A WATERSHED

Watch soil **erode** in a **watershed** when it rains.



You Will Need:	paper cups	scissors	clay	gallon of water
	a plastic water jug or milk carton		rectangular pan	
	a quart container of loose soil		aluminum foil	
Instructions:	<p>Cut the paper cups different heights. Place cups upside down in the pan to represent hills. Cut a large piece of aluminum foil and lay it over the cups, pressing the foil around cups to make rises and dips in your <b>watershed</b>. Crimp aluminum foil tightly over the pan. Mold several trees with the clay and place them near to each other in one section of the watershed to represent a forest. and place on your watershed. Press soil into the clay around the base of the trees. This will show how the roots of trees hold onto soil. SLIGHTLY dampen the soil with water, press patties of soil over the hill tops. Punch 5 small holes in the upper corner of the jug. Fill the jug with water and tilt it to make it "rain" on your watershed. Notice how the water moves through the watershed. Watch how water sticks, pulls, and dissolves the soil as it moved it through the watershed.</p>			

### Think About It!

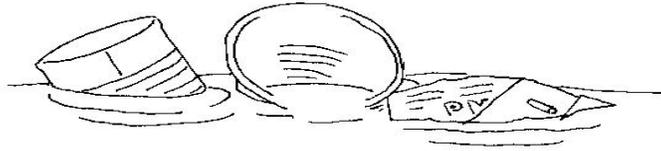
Answer these questions on a separate sheet of paper.

How many watersheds are there in your model? Where is the dividing line between watersheds? Observe how the draining water affects the soil. Can you see how draining water can form streams? Has the soil moved? If so, where has it moved to? How has the **eroding** soil changed your watershed?

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# WHAT IS NON-POINT SOURCE POLLUTION?

by Cherie Schadler



Although we often see **pollution** in various forms, it is classified into two groups - **point source pollution** and **non-point source pollution**. Point source pollution is a direct form of pollution that can be traced to its point of **origin** (where it started) such as a hot water discharge into a creek from a manufacturing plant, or an oil spill in the Gulf of Mexico from a ship. These pollutants can be traced back to their points of origin by following the pollution trail. The pollution often enters the water body at a distinct location and is a continuous source of the same kind of pollution. Because of these traits, point source pollution is easier to identify and control.

However, unlike point source pollution, non-point source pollution cannot be traced to its point of origin, as it has diverse origins. Rainwater washes soil, fertilizer, and pesticides from farm fields as well as urban areas. Litter is a universal problem. It is nearly impossible to trace the origins of all the litter we see beside the road.

Ninety-five percent of the pollution that is thrown or dumped onto the ground ends up in the waterways. People often don't realize that many of us get our drinking water from the very rivers, lakes, and underground **aquifers** that we are polluting. It's amazing to realize that some of the items we throw out of the window can take up to six hundred years to break down in the **environment**, yet we continue to litter anyway. Can you imagine how much gum, candy wrappers, cigarette butts, soda cans, plastic bottles, and dirty diapers are floating in our rivers?

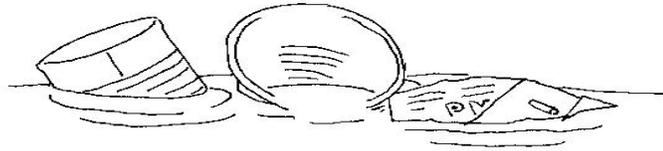
It is everyone's responsibility to help keep the water clean and healthy. The best way to help stop non-point source pollution is to not throw or dump anything on the ground and to pick up litter that you see. It's just as easy to throw your gum paper into a litter bag in the car than it is to throw it out of the window. Then, when you go to the filling station or when you get home, you can empty the trash from your litter bag. Remember, whatever happens upstream, affects the water quality for every living thing downstream. If we all work together we can have clean waterways where we fish and swim.

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# HOW DID IT GET THERE?

by Cherie Schadler

Demonstrate that **non-point source pollution** cannot be traced.



Play a game to determine how difficult it is to trace non-point source pollution.

- You Will Need:**
- 7 signs made from poster board to hang around the neck. Write "Factory" on 1 of the signs, "Citizen" on 3 of them, and "Investigator" on the last 3.
  - Waste basket with sign that reads "creek".
  - 12 wads of black construction paper in a paper lunch sack. Write "chemical discharge" on each piece of black paper.
  - 4 wads of one of these colors of construction paper in a paper lunch sack: red, blue, or yellow. Make 3 sacks total (12 wads total). Write types of litter on each piece, such as plastic bottle, soil, fertilizer, car shampoo, animal waste, food, beverage, paper, batteries, motor oil, cigarette butt, aluminum can, and gum.
- Instructions:**
- Choose a student to be the "Factory". Student wears "Factory" sign and stands facing the waste basket "creek". Student holds sack with black wads of construction paper without "Investigators" knowing what's in the sack.
  - Choose 3 students to be the "Citizens". Students wear "Citizen" signs and stand facing the waste basket from the same direction as the "Factory" student. Students each hold a sack with 4 wads of the same colored paper without the "Investigators" seeing what is in the sacks.
  - Choose 3 students to be the "Investigators". Students wear "Investigator" signs and stand facing the "Factory" and "Citizens" with the "creek" between them.
  - Investigators close their eyes. Teacher directs the Factory and Citizens to "Pollute!" The Factory and Citizens each throw a wad of paper at the creek. Teacher then directs the Investigators to "Investigate!" Investigators open their eyes and try to determine who threw which wad. After a few turns, it will become evident that the black wads are coming from the factory and the colored wads are difficult to trace.
  - After all wads are thrown, open up each wad and read aloud the items written on each paper. Discuss: Were the investigators able to identify the sources of each form of pollution? Why not? What can citizens do to help keep the community clean?

# RECYCLING

**Recycling** is very important for many very good reasons: 1) it conserves **natural resources**; 2) it conserves energy; 3) it conserves landfill space; and 4) it creates jobs. We turn our trash into a **resource** to make something useful. Recycling can also reduce our need to import such large amounts of oil, gas, and minerals.

Many people think that our trash can be sent somewhere - "Out of sight, out of mind." But it is not that easy. Others think it is all right to just dump their trash on the side of the road in remote areas. However, trash should be sent to a **landfill** if it can't be recycled. In its most simple terms, a landfill is nothing more than a big hole dug in the ground and lined with plastic to keep it from leaking. When it gets full, it will be covered with more plastic, soil, and then grass. When this landfill is full, the same process will start again with another hole being dug. Before we know it, we will run out of landfill space. The landfills will get closer and closer to our homes, restaurants, schools, and shopping centers. Remember, the average person in Mississippi throws away about 4 pounds of garbage every day. This amounts to over 3 million tons of garbage each year in Mississippi alone. That is enough trash to fill 550 football fields, 6 feet deep, compacted! Recycling will help us conserve landfill space.

On average, a person or family is able to recycle and **compost** about 1/3 to 1/2 of their trash. As you will see, just about anything can be recycled if there is a market for it.

## PAPER

Office paper, newspaper, and cardboard are the 3 most recycled forms of paper. They will all be recycled into other paper products. We all know that paper comes from trees. We want to **conserve** our trees. The more paper products we need, the more trees we must cut down. Instead, we can recycle old newspapers into new newspapers, egg cartons, cereal boxes, and even ceiling tiles. We can recycle old office paper into more office paper. It can also be incorporated into other paper products like wallboard, ceiling tiles, and insulation used in construction projects. Cardboard can be recycled into new cardboard products. Nearly all paper towels are made from recycled paper. In addition, phone books are printed on recycled paper. If they were not, imagine the amount of paper that would be needed to print new phone books. Phone books can also be recycled. Consider this: A phone book from Jackson, Mississippi, is over 3" inch thick, and several thousand are printed every year. A large quantity of landfill space is taken up when phone books are not recycled. Now imagine the amount of space that phone books would consume from large cities such as Chicago, Phoenix, Dallas, Orlando, Atlanta, Miami, Washington, D.C., Los Angeles, and New York. Millions of new phone books are printed and millions of phone books are disposed of every year in each of these cities. Phone books in these cities are all about 10-15 inches thick!

## ALUMINUM AND STEEL CANS

Did you know that you can earn money recycling aluminum and steel cans? Aluminum comes from a rock in the ground called bauxite. Steel comes from a combination of minerals. But into what can they be recycled? Aluminum is recycled into other aluminum products. A piece of steel could have many recycled uses: it could originally be used to make part of a car; after the car ends up in a junk yard, it can be recycled into steel office furniture; when that steel office furniture is worn out and discarded, it could be recycled into steel soup cans; those cans can be recycled into paper clips. We keep some of our trash out of the landfill, and we turn our trash into something useful. But remember, before you recycle these cans, rinse them out with water so they won't smell bad and attract mice, roaches, ants, and flies. School classes can recycle the aluminum and steel cans all year and have enough money to pay for a field trip, class party, or make a charitable donation.

## GLASS

Glass is made from sand, limestone, and soda ash. It is also made from **cullet**, which is glass broken into smaller pieces. Recycled glass can be ground up, essentially back into sand, and be used as an additive to products like paint and asphalt. Glass is used in the paint for road signs to help the signs shine and sparkle when headlights hit them. Have you ever noticed how certain streets look as if someone has spread silver glitter all over them if the sun hits them just right? That's recycled glass used as an additive and filler in the asphalt.

## USED MOTOR OIL

If you or someone you know changes their own motor oil, what do you do with the old oil? Do you pour it down the sink, down a storm drain, or on the ground? Remember that most people in Mississippi get their drinking water from wells in the ground. The more oil poured on the ground - the better chance that our drinking water will get **contaminated**. Storm drains and rainwater will carry oil to our streams, rivers, and lakes and make them unfit for fish and other wildlife. Instead, collect the used motor oil in an old gallon milk jug, put the cap on, and take it to your nearest full-service gas station, or auto parts store. The oil will be recycled by re-refining it into lubricating oils or be used as an industrial boiler fuel. It can even be used in manufacturing tires. Just don't pour it on the ground or down the drain.

## PLASTICS

Plastics, to put it simply, are made from chemicals. These chemicals are made from oil and natural gas. So when we recycle plastics, we are **conserving** a vital, natural resource, and we are turning our trash into some interesting things. Number 1 plastics, like soft drink bottles and water bottles, and number 2 plastic, like milk jugs, are the most common plastics products recycled at this time. To recycle a plastic bottle, you first throw the caps away. The caps are a different type of plastic that is difficult to recycle. If it mixes with the other plastic in the molding process it will create weak spots and blemishes in the final plastic bottle. After you throw the caps away, rinse the bottle and then stomp it flat or crush it.

That way it won't take up quite so much room in your recycling bin. A plastic bottle starts out as a small plastic tube. These tubes are much easier to ship to the bottler than a full sized bottle that we would recognize. The bottler takes these tubes and heats them up, then blows them up like a balloon into a mold of a bottle that we recognize. These bottles are then filled with substances such as Coke, water, Lysol, and then sold to **consumers** - us. We use the contents of the bottles and then recycle the bottles. The recycler will send the bottles to a manufacturer who will grind the bottles into flakes that look like crumbled potato chips. These flakes will be melted into pellets that will in turn be melted and formed into other plastic products, maybe even the small plastic tubes. Then the whole process starts again. Our trash is being turned into something useful and we are conserving landfill space because the plastic bottle doesn't go to the landfill. Plastic bags like Wal-Mart bags and grocery bags can be recycled and made into plastic lumber. This plastic lumber is being used in many cases for park furniture and patio decks. It is weather resistant, which means it won't rot, and it doesn't have to be painted. Our recycled soft drink bottles can be used to make textiles like denim fabric, shirts, and athletic bags. Every soft drink bottle and water bottle (number 1 plastic) that is recycled in Mississippi eventually ends up in Summerville, Georgia, and is made into carpet.

### OLD TIRES

Tires can also be recycled. They are typically shredded and chipped. They are then used in some instances as a boiler fuel in combination with, or as an alternative to, coal or natural gas. The steel belts are removed using large magnets and recycled as scrap steel. The crumb rubber remaining is used as an additive to asphalt. It is also used to manufacture other products made with rubber and plastics. It can be used as a playground surface or as a subsurface in soccer fields, running tracks, and horse arenas.

### COMPOST

**Compost** is nothing more than **organic** material made from food waste, leaves, grass clippings, and small branches. Composting is simply allowing natural materials from your yard break down by a natural process using air, water, and sunlight. The only items to keep out of the compost pile are bones, meats, dairy products, grease, large pieces of wood, and dog and cat waste and litter. All that you do is simply to keep the composted material slightly moist, and to turn it with a pitch fork every 2 weeks. After sitting in the sun and "cooking", the compost eventually turns into soil that is used as a **fertilizer** instead of the chemical fertilizer that is normally bought at the store. You can also use earthworms to compost your food waste into a **nutrient-rich** fertilizer. One pound of earthworms will eat one pound of food waste a day.

### SIX-PACK RINGS

Six-pack rings can be recycled by sending them back to the manufacturer to be reprocessed and reused. If you throw them in the trash, be sure to cut them up first, so that small animals and fish won't get tangled in them and die.

## **HOUSEHOLD HAZARDOUS WASTE**

Other household **hazardous waste** includes such items as antifreeze, **pesticides**, paints, and thinners, automotive batteries, bug spray, drain opener, and similar products. Try to use all of the product for its intended purpose, give it to someone who will use it, or bring it to a household hazardous waste collection day held at different locations around the state at various times each year.

Remember the R's: Reduce, Reuse, Recycle, Recharge, Repair, and Refuse, and always buy products made from recycled materials. Just about anything can be recycled, as crazy as that sounds. Old money is eventually taken out of circulation at the banks and replaced with brand new money. The old, worn out, used money must be destroyed. It is usually shredded and burned, but that creates a lot of smoke that neither looks nor smells good. Sometimes it is sold as a novelty in the gift shop of the U.S. Mint. Like blue jeans, it is also made into pencils. (No, you can't spend the pencils.)

Please don't litter, regardless of the circumstances. Put a small bag in your car for collection of trash and put this in a trash container at your next stop. Use the free litter bags provided by Keep Mississippi Beautiful and the Mississippi Department of Transportation.

Recycling questions can be directed to the Mississippi Department of Environmental Quality by calling (601) 961-5171 or consult our website at [www.deq.state.ms.us](http://www.deq.state.ms.us).