



# Muddy Hands

Soil and Water Information for Educators Brought to You by the Lake and Geauga County Soil and Water Conservation Districts



## What Becomes of Rain?

Henry Wadsworth Longfellow once wrote "Into each life some rain must fall / Some days must be dark and dreary." We happen to live in an area prone to rain, snow, and other precipitation events, and we deal with the water that falls around us in typically dry places. We react accordingly, to both keep ourselves dry and keep our possessions safe. This edition of Muddy Hands will look at two types of stormwater management; the ways that nature has dealt with rain water, and the systems that humans have constructed.

## Wetlands! Nature's Safety Net

In 1840, the Swamp Land Act pronounced, "...that swamps and stagnant waters are the cause of malaria and malignant fevers..." This common misconception of wetlands has resulted in a loss of over 50% of wetlands in the United States. Since then, the outlook for Ohio wetlands has changed and so has the value we place on them.

Wetlands aid in filtering out non-point source pollutants. Non-point source pollution (NPS) is caused by rainfall or melted snow moving over and through the ground. As it travels it picks up impurities, only to deposit them in our freshwater resources. These pollutants include sediment, toxic bacteria, and nutrients. Agricultural and residential runoff contains phosphorous and nitrogen compounds. Both are ingredients found in fertilizers and cause a type of water pollution known as eutrophication. Eutrophication is the overgrowth of algae and aquatic plants due to increased nutrient availability. As the algae grows and uses up the nutrients, there is a massive die-off that depletes the water of oxygen, suffocating aquatic plants and animals.

Another non-point source pollutant found near farmland and construction sites is sediment. Any soil that is uncovered is

susceptible to erosion from wind and rain and finds the easiest path downhill to the closest stream, river or lake. Once the soil enters the waterway it can clog fish gills, cloud the water blocking out natural light and fill in and change the path of a river or stream. It also can increase solar heating of the water, decreasing available oxygen. Preserving or creating wetland habitat in or near urban and agricultural area will help aid in the reduction of and act as a filter for soil debris before rainwater enters local streams and rivers.

Ohio's wetlands are extremely important to plants, animals and humans! The fauna that inhabit our wetlands are key indicator species of the health of our environment. Fish, waterfowl and especially amphibians experience the detrimental effects of synthetic hormones and other pharmaceutical compounds, microbial pathogens, and heavy metals that enter our waterways from our streets and homes. As a result of being exposed to these agents, wetland animals can develop additional appendages, birth defects, infertility and insufficient eggshell lining.

Approximately one-third of all the rare and endangered species in the United States depend on wetlands as a home, seasonal safe haven, food source or  
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Lake and Geauga SWCDs have many programs available to schools free of charge. Each of these programs corresponds with the Ohio Science Standards. For more information on how SWCD programs can compliment your curriculum, give your SWCD a call; we'd love to come visit your classroom!



## Stormwater in an Urban System

In urban areas, natural systems for managing stormwater tend to get overwhelmed, or simply removed in the interest of safe roads and aesthetically pleasing neighborhoods. Floodplains transition from wetlands to farmlands, to neighborhoods. Small vernal pools and other isolated wetlands often are filled, leveled, and built upon as well. As a city develops, there is an increase in pavement, rooftops and other impermeable surfaces. This increase also causes more rainwater to run off into surface waters, rather than slowly soaking into the soil. To deal with these combined effects, we have stormwater systems as part of our infrastructure. Each day we travel past structures that collect and direct runoff. They are all around your school and home. Take a tour of the schoolyard and see if you and your students can find some of the following elements.

**Gutters** - These usually hang below the edge of a slanted roof. They are sloped slightly in one direction to drain into a downspout. If there aren't any on your school building, look on nearby houses.

**Storm Drains and Curbs** - These are the metal grates along the curb of most roads (they can sometimes be found in the middle of a parking lot). Roads are typically built higher in the middle so that rainwater runs towards the curbs and into storm drains.

**Ditches** - In more rural areas, there may be a system of roadside ditches for collecting the rain that falls onto the road. Some urban areas also have channelized streams that act as ditches.

**Basins** - If you are in a newer school, chances are there is a pond or swale nearby, characterized by having

steep sides, and maybe several pipes entering it from nearby buildings. There are two types of stormwater basins. A retention pond will always have water in it although it may be at a higher level as it slowly releases the excess stormwater. A detention pond will drain out completely over a period of time.

**Rain Garden** - Rain gardens are a newer approach to dealing with runoff. They are basically a landscaping feature that looks like any other flower bed, except that they are slightly below grade and usually have a downspout or curb cut diverted into them. A rain garden stores water for few days or so, allowing it to slowly soak into the soil.

**Splash blocks** - These are (usually) concrete blocks that are placed at the end of a downspout to spread rainwater into a lawn or landscaping, instead of connecting into a storm drain system.

There are parts of a stormwater system that you cannot see. Much of the infrastructure is buried underground. Pipes and culverts are used to convey stormwater to the nearest natural body of water. The next time you are near a stream or lake, look for outfall pipes entering it. These pipes are the end of the stormwater system. Urban stormwater can be a major source of pollution in a watershed. It is often hotter and more polluted than typical stream flow would be. There is also more runoff, due to an increased amount of impervious surface, making a river more prone to flooding. Most urban areas in Northeast Ohio are required to take steps to clean up their storm water.

## Wetlands

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nursery. Our wetlands are fabulous habitat for a wide variety of animals including bluegill, darters, trout, bullfrogs, American toads, northern water snakes, muskrats, beavers, salamanders, newts, mollusks, and macro-invertebrates, including dragonfly larvae, mayfly, and whirligig beetles. Great blue herons, red-winged blackbirds, and many species of waterfowl also depend on wetlands. These are just a few of the year-round residents. They do not include all the species that migrate through these water sanctuaries.

Wetlands are our nurseries for growing wildlife; they are sponges that aid in soaking up our

mistakes and misunderstandings, and preserve our water for times of drought, they are a bar of soap that cleanses the water of impurities, they control floodwaters and recharge groundwater. Wetlands are a grocery store full of items for plants (nutrients are provided through the soil and water), wildlife, and us! Yes, we also get food from wetlands. Have you ever eaten blueberries, cranberries, wild rice, or mint tea? These items are just a few of the many food resources that are provided to us through wetlands! Wetlands are continually changing, growing and shrinking, but they always remain, if left to their natural course in nature!

## Muddy Hands



### Wetland In A Pan

Activity modified from WOW! The Wonders of Wetlands.

Grade level: 3-12

Time: Demonstration only 30-40 min, Student involvement 90 min.

This is a hands-on activity on how wetlands work. It can either be done as a demonstration, or by allowing students to come up with their own scenarios. You'll need a 9x13 baking dish or a paint roller tray for each model you are making, modeling clay, floral oasis foam or sponges, watering can, and soil or cocoa powder as well as other food powders.

**Model construction:** Cover about half of the pan with the modeling clay, making sure to seal the clay to the sides of the container. Leave the other half empty to represent a lake or ocean. Shape the clay so that it slopes gently downward toward the water. You can also carve hills and river systems into the clay. Fit sponge to completely fill the pan from one side to the other along the land/water boundary. This represents wetland area along the lakeshore. For the model to work well, it is important that there not be space between the sponge and the sides of the container or the clay. To do side-by-side comparisons, create a second pan without the wetland area. To stress the impact of shoreline development, you might add some toy houses or small wooden blocks along the shore area in this second tray to represent that development.

**Demonstrating a functioning wetland:** Now that you have two models to work with, set up some comparisons. Introduce the scenario and ask the students to write down a prediction. Have two students add the same amount of water to the land surface in each model. Have the students observe which one runs off more quickly. Measure or observe the amount of water that ran off. Was it what they expected? Why or why not? Help them to understand that the sponge slows down the water and also absorbs some (this can be demonstrated by squeezing the sponge).

Drain the excess water out of the models. Now sprinkle soil or cocoa powder on the surface of the land. This represents disturbed soil similar to what would occur on a construction site. Again ask

the students to predict what they think will happen and why. Apply the same amount of water to each pan and have the students observe and compare the results. They should observe that the sediment gets 'strained' out by the wetland. This demonstrates the filtration function of wetlands. Non point source pollution can be demonstrated in the same way, with colored food powders like gelatin or drink mix.

**Getting more mileage:** Once the students have the basic concepts, challenge them with more difficult tasks. Try making models of your community and use them to identify places where wetlands would be useful for water quality reasons. Experiment with different shapes and locations of wetlands. In real life they occur along rivers and streams, as well as in isolated upland areas. Sometimes people deliberately construct wetland areas to treat polluted runoff.

If you are learning about human impacts on resources, have groups of students all start with the same basic model, including some wetlands. Give them a list of characteristics that they should have in their community. For instance, require that they have houses, schools, retail stores, manufacturing, a way of getting around, and a park. Also give them permission to add features and create or fill wetland if they think it is necessary. Many of these features could just be lightly carved in the clay. Ask them to identify common sources of pollution (fertilizer from lawns, oil from roadways, animal waste from the zoo, etc.) and place items representing those pollutants. Have each group test their community by seeing how much pollution runs into the lake and how much is absorbed by the wetlands.

### New Educational Tool at Lake SWCD

Lake SWCD would like to announce the addition of a groundwater flow model to our school program line-up. This tabletop model demonstrates how groundwater moves through aquifers and bedrock, and also ways in which it can be polluted. The groundwater flow model relates strongly to Ohio Science Standards for 7th and 11th grades. Now all Geauga and Lake County teachers can schedule a groundwater program by contacting their local SWCD.

# Muddy Hands

## Congratulations to Chardon High School Envirothon Teams

This year, the state Envirothon was held at the Hiram College in Hiram, Ohio, June 12-14th. Twenty teams from throughout Ohio competed at the state level for a chance to attend the Canon Envirothon in Missouri.

Congratulations to Envirothon Advisor Marilyn Rohr and her two teams from Chardon High School. Her Chardon Red Team placed 1<sup>st</sup> and moved on to the international competition in Missouri, and the Black Team placed 4th at the state level.

The first place team was comprised of Michael Lewis, Kerry O'Donnell, Todd Zolka, Deanna Lentz, and Robert Knox. Fourth place was taken by Stephanie Rischar, Richard Hederstrom, David Rischar, Matthew O'Donnell, and Richard Stehlík.

Chardon Red placed 7<sup>th</sup> at the Canon



Envirothon in Springfield, Missouri July 18 - 24, 2005. Way to go Chardon!

## **New Education Specialist at Geauga SWCD!**

Help welcome Katie Nainiger to Geauga SWCD—she started as the new Education Specialist in May 2005.

Katie was the Wildlife Education Coordinator at Lake Metroparks Wildlife Center before she decided to join the soil and water world. Congratulations to Katie and welcome aboard!



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## 'Clean Water Starts With You' Photography Contest



Northeast Ohio Public Involvement, Public Education (NEO PIPE) Committee is holding a photography contest. We hope to bring awareness to the importance of clean water in daily life. This year's theme is "Clean Water Starts With You" and entry is open to any Lake or Geauga County resident.

Photographs should depict people involved with improving the water quality of their watershed. We are looking for striking images that focus on the important role we all play in helping keep our streams and lakes pollution free and safe. The winning photograph from each county will be judged against winning entries from other NEO PIPE counties and a regional winner chosen.

For more information, complete rules and entry forms, contact your county's SWCD office.

## "Celebrate Conservation" Poster Contest 2005 Results



This year, Geauga SWCD received numerous entries for the annual Conservation Poster Contest. After much consideration, the following winners were chosen.

### Geauga County

Grade K-1

#### First Place

Jonathan Wiegand - St. Anselm School

#### Second Place

Taylor Wiegand - St. Anselm School

Grade 2-3

#### First Place-

Mathew Stefancin - Newbury Elementary

#### Second Place-

Amanda Smerglia - Newbury Elementary

Grade 4-6

#### First Place-

Aimee Venot - West Geauga Middle School

#### Second Place-

Whitney Hopkins - Burton Elementary

Taylor Wiegand from St. Anselm School was victorious at the State Level, and will continue on to the National Competition! Way to go, and congratulations on phenomenal posters by all the winners!