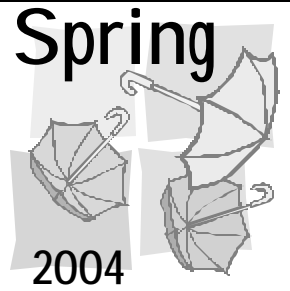


Muddy Hands

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



Watershed Awareness

Did you know that no matter where you are, you are in a watershed? A watershed is a geographic area that water flows across or under on its way to a stream, river or lake. Geauga County is home to four watersheds: the Grand River, Chagrin River, Cuyahoga River, and Mahoning River. Lake County is home to four watersheds including the Chagrin River, Grand River, Arcola Creek, and Euclid Creek watersheds. All of these watersheds, with the exception of the Mahoning River, are located within the Lake Erie watershed. This means all of these rivers and creeks eventually drain into Lake Erie. The Mahoning River flows south and east, emptying into the Ohio River. Lake and Geauga County share the Grand and Chagrin River Watersheds. Both of these rivers have unique features we would like to highlight.

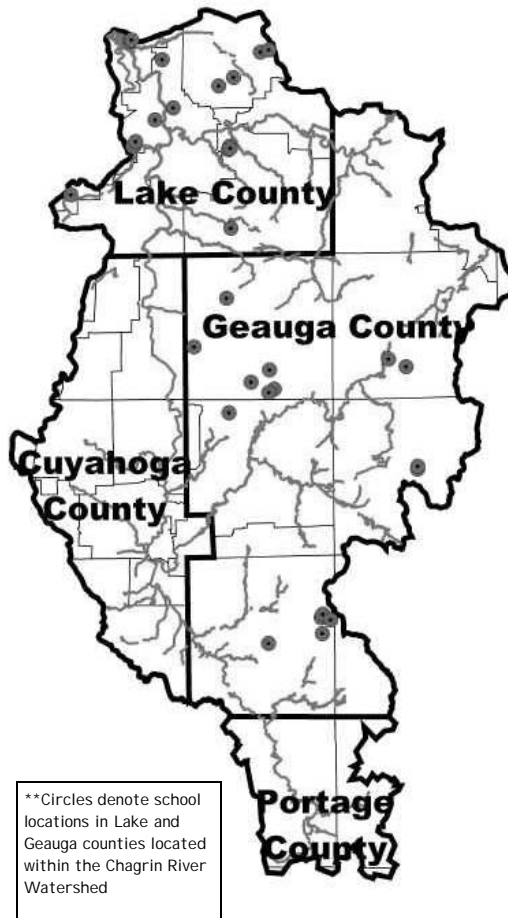
The Chagrin River Watershed

Like most of the watersheds of Northeast Ohio, the Chagrin River Watershed was formed by glacial activity thousands of years ago. The geologic history of the Chagrin River, combined with its' geologic characteristics, contribute to the overall health of the watershed. In fact, the Chagrin River probably was named for the Indian word for clear water—shagarin.

Today, the clear, clean waters of the Chagrin sustain a wide variety of plant species as well as an assortment of animal life including steelhead, river otter, blue heron, soft-shelled turtle, and muskrat. "Recent surveys of aquatic and breeding birds [conducted by the Ohio Division of Wildlife] found more than 49 species of fish and 90 bird species living in the Chagrin River Watershed". A rare species of fish, brook trout, is included in the 49 species of fish found in the Chagrin.

The overall health and diversity of the Chagrin has been maintained in areas where the riparian forest cover and adjacent lands have been protected. Unfortunately, portions of the Chagrin that flow through urbanized areas are declining in health. Heavy metals, especially lead and mercury, have left their mark on the water of the Chagrin.

In July of 1979, the first forty nine miles of the Chagrin River were designated as Scenic by the Ohio Department of Natural Resources. Now 71 miles are considered Scenic.



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Special Points of Interest:

- ? *Watersheds of Northeast Ohio*
- ? *Stream Monitoring Activity*
- ? *Summer Opportunities for Teachers and Students*

"Must we always teach our children with books? Let them look at the mountain and the stars above. Let them look at the beauty of the waters and the trees and flowers on earth. They will then begin to think, and to think is the beginning of a real education."

David Polis



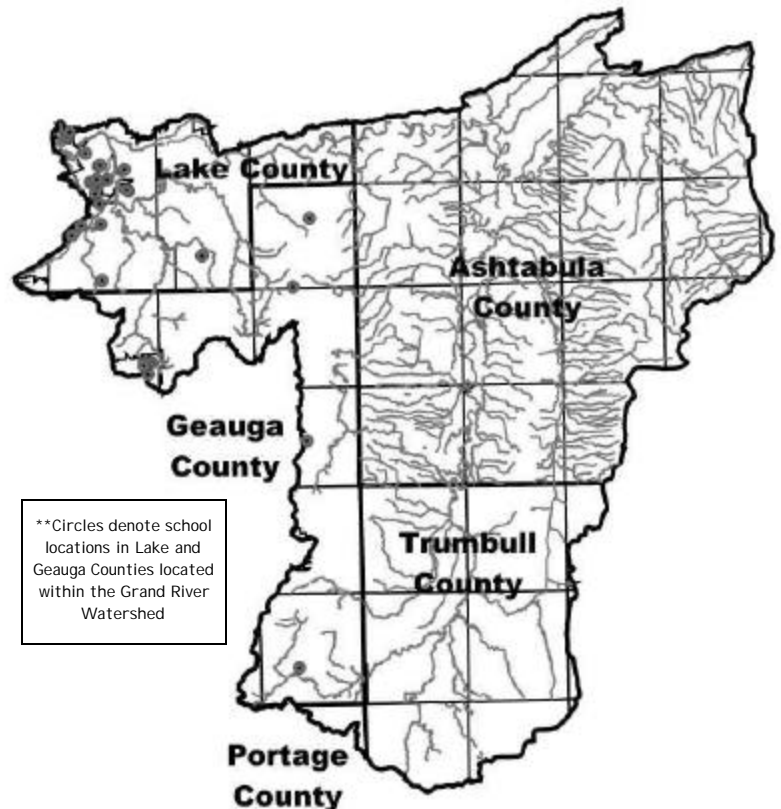
The Grand River

The Grand River drains 705 square miles of land on its 98 mile trip from source to Lake Erie. Along the way it slips through Geauga, Trumbull, Ashtabula and Lake counties. Thirty-three miles of the Grand River are designated scenic by the Ohio Department of Natural Resources (ODNR) and an additional 23 miles are designated wild.

For most of its course, the Grand flows steadily northward through glacial deposits. In northern Ashtabula County, the topography forces the river into a sharply westward direction and the river slices through shale gorges on its way through Painesville and Fairport and into the lake.

The slow upstream reaches are home to many wetland animals, including beavers and river otters. The ODNR releases steelhead trout into the Grand, creating one of the top ten steelhead runs in the nation.

The Grand River is also the parent to Mentor Marsh. In prehistoric times, the Grand made one more westward run before emptying into Lake Erie near what is now Mentor Lagoons. Over time, bank erosion created the current mouth of the Grand River and left a low-lying, empty river channel to develop into a marsh.



**Circles denote school locations in Lake and Geauga Counties located within the Grand River Watershed

Stream Quality Monitoring

Water quality monitoring is an interesting way of presenting species diversity, animal adaptations, and how humans affect living systems. Middle and high school students in both counties use chemical test kits and macroinvertebrate sampling techniques to determine water quality at locations on the Grand and the Chagrin Rivers. These students work in small groups with SWCD employees to collect aquatic organisms living in the rivers. The animals are then identified and counted. Calculating the diversity of species indicates the overall health of the watershed. The students' findings are reported to ODNR's Scenic Rivers program and become part of the monitoring data for these wild and scenic rivers. Each year, participants in these programs are recognized in ODNR's report on water quality.

Millennium Youth Conservation (MYC) is a conservation club comprised of students of all ages and their parents who monitor streams in Geauga County throughout the summer. It is offered by the Geauga SWCD.

Watershed Watch is a program of the Lake SWCD. Each September and May, over 500 students from 12 different schools take field trips to participate in water quality monitoring in Lake County rivers and streams.

Contact the SWCD in your county to sign up for Watershed Watch or MYC.



Scenic Rivers Act

Ohio pioneered the river preservation movement in 1968 with the passage of the nation's first Scenic Rivers Act. This legislation created a state program to protect Ohio's remaining high quality streams for future generations.

Scenic rivers are classified and designated according to the outstanding qualities a stream possesses including the stream's length, adjacent forest cover, biological characteristics, water quality, present use and natural conditions.

Information provided by ODNR

Looking for a way to liven up your science or social studies curriculum? Lake and Geauga SWCDs both offer an array of programs that meet many of the Ohio Science Standards. Call your SWCD office for more details.

Benthic Bugs and Bioassessment

Grades 6-12

Activity from Healthy Water, Healthy People Water Quality Educator's Guide**Objectives**

Students will:

- ? Investigate the role that aquatic macroinvertebrates play in determining water quality.
- ? Simulate the process of rapid bioassessment of aquatic macroinvertebrates.
- ? Collect, sort, classify, identify, analyze, and evaluate a sample of materials representing aquatic macroinvertebrates.
- ? Determine a stream's water quality using a pollution tolerance index based on a sample of aquatic macroinvertebrates.

Materials

1. Macroinvertebrate Identification Chart **
2. Macroinvertebrate Data Sheets I, II, and III **
3. Plastic Tubs or storage bins for holding sample
4. Smaller plastic tubs
5. Hand held aquarium nets
6. Ice cube trays, petri dishes, or other sorting devices
7. Calculators
8. Small paper clip (100)
9. Large paper clips (50)
10. Six different sizes, shapes, or colors of beads (50 of each size/color/shape)
11. Pennies or other coins (50)
12. Thin rubber bands (50)
13. Thick rubber bands (50)
14. Optional: Water (enough to fill samples in all three tubs with four inches of water)
Coloring for the water so students cannot see the objects

Activity

1. Inform students that they will be simulating a bioassessment of a stream using ordinary objects as macroinvertebrates.
2. Set up three sets of collecting stations with the following items at each: collection bucket, dip net, Data sheets I, II, and III.
3. Place objects representing macroinvertebrates in the three tubs according to the following chart:

Macro Invertebrate	Represented by:	Number of Items per Sample			Total Items
		sample 1	sample 2	sample 3	
Mayflies	yellow beads	35	15	0	50
Stone flies	small clips	65	35	0	100
Dobsonflies	large clips	30	20	0	50
Caddisflies	red beads	30	20	0	50
Craneflies	white beads	25	13	12	50
Dragonflies	green beads	20	20	10	50
Scuds	black beads	5	15	30	50
Midges	blue beads	0	20	30	50
Leeches	thick rubber bands	0	15	35	50
Pouch snails	pennies	0	15	35	50
Tubiflex worms	thin rubber bands	0	15	35	50

4. Divide students into three groups. Assign students within each group one of the following five tasks: stream sampling, sorting at the collection bucket, counting/ recording macroinvertebrates on data sheet I, and calculating/evaluating at macroinvertebrate data sheets II and III.
5. Instruct students to simulate a rapid bioassessment at their stream sampling sites as follows:
 - A. Using an aquarium net, the students at the site have twenty seconds to collect as many macroinvertebrates from their stream as possible. They should place the macroinvertebrates in the collection bucket.
 - B. Students at the collection bucket then sort the collected macroinvertebrates into like categories based on the Macroinvertebrate Identification Sheet and place them in the ice cube tray or cups. For example, they should place all of the mayflies in one cube, caddisflies into another, etc.
 - C. The students using Macroinvertebrate Data Sheet I tabulate the sorting results onto the data sheet and calculate the percent composition of each macroinvertebrate in the stream site.
 - D. The students using Macroinvertebrate Data Sheet II take the data from Sheet I to calculate the EPT/ Midge ratio.
 - E. The students with Macroinvertebrate Data Sheet III use the data from Data Sheet I to complete the Pollution Tolerance Index to determine their water quality assessment score for their stream sample.
6. Have students compare their results with the other groups. What were the similarities and differences between the three sites. Which stream

** Macroinvertebrate Identification Charts and Data Sheets I, II and III are available at www.geaugaswcd.com

Summer Education Workshop

Once again, Lake and Geauga SWCD's will be offering a week-long summer workshop titled *Wonders of Watersheds*. This summer's workshop will be held June 21-25, 2004.

Throughout the week, teachers will be exposed to issues within the major watersheds of Lake and Geauga Counties (the Grand, Chagrin, Cuyahoga, and Mahoning Rivers and Arcola Creek). The impacts of nonpoint source pollution and the steps that can be taken to reduce pollution at its point of origin will also be a primary focus of the workshop. Field trips and hands-on activities will be incorporated throughout the week to give teachers a well-rounded educational experience.

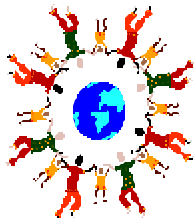
Teachers will also be trained in and receive the Project WET, Project Learning Tree, and Project WILD/Aquatic WILD curriculum and activity guides, as well as learn the art of storytelling! (Wow! All of that in one week!) The curriculum guides that will be provided offer hundreds of hands-on lessons, which are guaranteed to keep your students interested and excited about science and the environment while still meeting the requirements of the new curriculum standards.

Two graduate credits will be offered through Ashland University to interested teachers. A **stipend** will be awarded to each participant to help offset expenses for childcare and/or graduate credit. Register early- workshop size will be limited to 30 participants (15 from each county). Please call Geauga or Lake SWCD for more information. Keep your eyes open for an informational brochure in the near future!

Your SWCD Contacts:

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Farmer For A Day

A series of one-day agriculture education workshops for children ages 7-12 is planned for Summer 2004. These day camps, held at Spring Hill Farm in Geneva, were a big hit last year, and the sessions filled quickly. This year's camp will be held on June 30, July 8, and July 20 and pre-registration is required. For more information and registration forms, contact your SWCD, or go to the 'Teachers and Students' section of the Lake SWCD web site. Farmer For A Day is a project of Western Reserve RC&D and Project Food, Land, People.



Thank you to the Western Reserve Federation of Conservationists for funding this issue of Muddy Hands and supporting environmental education!

National Geographic Society Grants

Application Deadline: June 10, 2004

The National Geographic Society Foundation is providing grants to educators to facilitate their work in the classroom, school, district, and community. This year, projects will be funded in either of two broad categories: Promoting Stewardship of Cultural and Natural Resources, and Promoting Geographic Knowledge Through Education.

The foundation plans to make approximately \$100,000 available, in grants of up to \$5,000 each. Applications may be submitted by a single teacher or by a project team leader on behalf of a group.

For more information about this grant opportunity go to www.nationalgeographic.com/education/teacher_community/get_grant.html.

DSWC August Education Workshop

ODNR Division of Soil and Water Conservation is offering a summer workshop entitled **Forest, Farm and Field...**

Growing Your Education Program on August 10-12 at Mohican State Park. Renowned storyteller Rick Sowash will be the keynote speaker, and many exciting sessions are scheduled. Graduate credits will be available. Classroom teachers and non-formal educators are invited. Check out <http://www.dnr.state.oh.us/soilandwater> or contact your SWCD for sessions, and registration information.

*Lake SWCD is offering a scholarship for one Lake County teacher; contact Beth for more information. Deadline: May 24.