

This
Watershed Manual
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WPCAMR
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Bureau of Watershed Management
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Formed in 1982, WPCAMR brings together an alliance of 24 County Conservation Districts and local watershed groups in order to promote the reclamation of abandoned coal mines and to clean-up streams polluted by abandoned mine drainage. WPCAMR works with many people - from watershed volunteers to government experts, industry, citizens, and students to find solutions to the mine drainage problems that degrade our streams in Western Pennsylvania. Students with projects can give this watershed movement a dynamic boost, as they satisfy their educational requirements for Senior Projects, Merit Badges, College Research, and the State Environmental Standards.

So
“Catch the Vision”
Restore our Cold Water Fisheries!

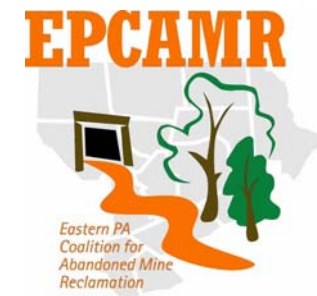


Your School's Watershed Manual

Student Projects to Help Local Watersheds

Created and compiled by:
Wells Creek Watershed Association

Edited by:
Eastern PA Coalition for Abandoned Mine Reclamation



Your School's Watershed Manual

(The many ways students can help their local watershed groups)

INTRODUCTION

Students are begging to get outdoors and do something real! Why not consider a project on your local watershed? When you perform a **service-learning** project, the watershed becomes your classroom. This manual lists a ton of potential topics for a real outdoor learning adventure! The watershed-world is a great place to satisfy the requirements of high school senior projects, Boy Scout projects, and college internships. So read on...and contact one of the **watershed groups** in the appendix for more hands-on help.

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Harrisburg, Pa. 17101
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info@pawatersheds.org

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1-215-369-1188
drn@delawareriverkeeper.org

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Endless Mountains RC&D Council
Stoll Natural Resource Center
RR#5, Box 5030C
Towanda, PA 18848
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Southeastern Pennsylvania RC&D Council
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So Alleghenies RC&D Council
702 W Pitt Street Suite 7
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Management District
HCR Box 15D
Paupack, PA 18451
E-mail: info@lwwmd.org
www.lwwmd.org

Wyoming Conservation District
1 Hollowcrest Complex
Tunkhannock, PA 18657
Phone: (570) 836-2589
E-mail: wccd@ptd.net
www.tunk.com/conservation

Bowman's Creek Watershed Association
PO Box 236
Noxen, PA 18636
www.bcwa.net

Mehoopany Creek Watershed Association
P. O. Box 73
Mehoopany, PA 18629

Tunkhannock Creek Watershed
Association
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Tunkhannock, PA 18657

GOVERNMENT AGENCIES

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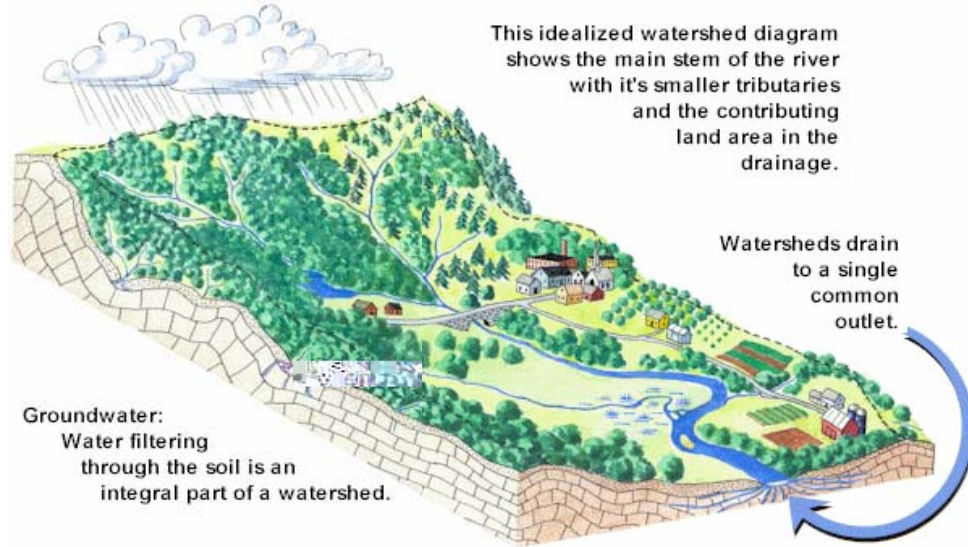
Appendix:

- List of Conservation Districts, Watershed Groups and other organizations PA that can be contacted

Watershed Primer – “Water Cycle”

A watershed is an area of land that **sheds** its rain **water** to a particular stream, via runoff and groundwater flow. What is your watershed address? Do you know? If you live in Western Pennsylvania, your watershed might be Wells Creek, which flows to the Stony Creek, via several more streams to the Ohio River, all the way to the “Big Muddy Mississippi,” and finally into the Gulf of Mexico!

The dynamics of your watershed start with the basic [water cycle](#): clouds...to rain...to surface runoff...to ground water...to stream flow, with evaporation back to the clouds.



The ecology of your stream changes from the small headwater tributaries down to the larger mouth of the stream. It is critical to remember that the **FOREST** is the natural habitat for most Pennsylvania streams. Thus a stream-side or “riparian” buffer of trees adds value to the river system. Tree canopies protect the soil from rain erosion, tree shade keeps the stream cooler, and tree roots stabilize stream-bank erosion.

Loyalsock Creek Watershed Association
P.O. Box 216
Montoursville, PA 17754

Muncy Creek Watershed Association
P.O. Box 47
Muncy, PA 17756
E-mail: mcwatershedassoc@aol.com

Susquehanna County Conservation District
31 Public Avenue
Montrose, PA 18801
Phone: (570) 278-4600 x289
www.suscondistrict.org

Choconut Creek Watershed Association
RR1 Box 1462
Friendsville, PA 18818
www.stny.com/choconut/CCWA.htm

Meshoppen Creek Task Force
RR 4 Box 4210
Meshoppen, PA 18630

Upper Susquehanna Coalition
4729 State Route 414
Burdett, NY 14818
www.u-s-c.org

Snakes Creek Watershed Association
31 Public Avenue
Montrose, PA 18801
E-mail: info@snakescreek.org
www.snakescreek.org

Tioga Conservation District
29 East Avenue
Wellsboro, PA 16901
Phone: (570) 724-1801 ext. 3
E-mail: terra-dillman@pa.nacdn.net
www.geocities.com/tccdpa/waters/tioga_river/tioga.html

Babb Creek Watershed Association
2538 Route 405 Highway
Muncy, PA 17756

Corey Creek Watershed Association
246 Pickle Hill Road
Mansfield, PA 16901

Cowanesque Valley Watershed Association
R.D. 1 Box 990
Knoxville, PA 16928

Crooked Creek Coalition
29 East Avenue
Wellsboro, PA 16933

Ellen Run Watershed Projects
413 Valley Road
Mansfield, PA 16933

Pine Creek Headwaters Protection Group
P.O. Box 445
Wellsboro, PA 16901

Seeley Creek Watershed Association
RR5, Box 5030 D
Wysox, PA 18854

Tioga River Watershed Reclamation Projects, Inc.
19 Richmond Drive
Mansfield, PA 16933

Wayne Conservation District
470 Sunrise Avenue
Honesdale, PA 18431
Phone: (570) 253-0930
E-mail: wayncd@ptd.net
www.co.wayne.pa.us/conservation/conservation.asp

Delaware Highlands Conservancy
PO Box 218
Hawley, PA 18428
www.delawarehighlands.org

Delaware Riverkeeper Network
PO Box 326
Washington Crossing, PA 18977
E-mail: drn@delawareriverkeeper.org
www.delawareriverkeeper.org

Lackawaxen River Conservancy
P.O. Box 176
Rowland, PA 18457
E-mail: info@lackawaxenriver.org
www.lackawaxenriver.org/index.htm

Lycoming Conservation District
542 County Farm Rd., Suite 202
Montoursville, PA 17754
Phone: (570) 433-3003
E-mail: c-tcorbett@state.pa.us

Black Hole Creek Watershed Association
P.O. Box 125
Montgomery, PA 17752

Blockhouse Creek Preservation Society
P.O. Box 135
Liberty, PA 16930
www.angelfire.com/pa4/BlockhouseCreek/index.html

Lawshe Run Watershed Association
PO Box 526
Jersey Shore, PA 17740

Lycoming Creek Watershed Association
P.O. Box 173
Cogan Station, PA 17728

Pine Creek Preservation Association
PO Box 11
Waterville, PA 17776

Montour Conservation District
112 Woodbine Lane, Suite 2
Danville, PA 17821
Phone: (570) 271-1140
E-mail: joshmontourccd@netzero.net

Chillisquaque/Limestone Watershed Association
1086 Whitehall Road
Danville, PA 17821

Northumberland Conservation District
RR #3, Box 238-C
Sunbury, PA 17801
Phone: (570) 286-7114 ext. 4
E-mail: seu101@sunlink.net
www.northumberlandccd.org

Limestone Run Watershed Project
700 Mahoning Street
Milton, PA 17847

Shamokin Creek Restoration Alliance
PO Box 263
Mt. Carmel, PA 17851
www.shamokincreek.org

Schuylkill Conservation District
1206 Ag Center Drive
Pottsville, PA 17901
Phone: (570) 622-3742 ext. 5
E-mail: schuylcd@co.schuylkill.pa.us
www.co.schuylkill.pa.us/Offices/Conservation/conservation.asp

Catawissa Creek Restoration Association
12 Paul Street
Ashland, PA 17921
www.columbiapa.org/ccra

Mahanoy Creek Watershed Association
420 Dutchtown Road
Ashland, PA 17921

Northern Swatara Creek Watershed Association
629 Mountain Road
Pine Grove, PA 17963
www.nscwa.homestead.com

Schuylkill Headwaters Association
51 N. 4th Street
Cressona, PA 17929

Tri-Valley Watershed Association
425 E Main Street
Hegins, PA 17938

Sullivan Conservation District
RR#2, Box 2022B
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E-mail: c-jrouse@state.pa.us
www.angelfire.com/biz/SullivanConservation

Eagles Mere Lake & Watershed Committee
2 Sullivan Avenue
Eagles Mere, PA 17731

Stream - "Food Web"



You and I experience streams by their visual appeal, the soothing sound of flowing waters, and the refreshing coolness of the water. We instinctively look for fish, but they will not be found if the

"food web" is disrupted. The food web is the cycling of energy and nutrients within a stream.

The food available in a stream comes from sources like aquatic algae and decaying leaves that fall into the stream, where it is further made available by the decomposers such as bacteria and fungi. This food web eventually produces food for the fish!

- Algae, fungi, and bacteria live on the leaf & rock surfaces.
- Macro-invertebrates graze on these leaf & rock surfaces.
- Minnows & larger fish eat macro-invertebrates.

- Fish swallow just about anything that moves!



NPS Non-Point Source Pollution

A well-balanced **water cycle** and **food cycle** produces a pristine and productive watershed. Here fish can feed upon macro-invertebrates, swim in cool waters under the shade trees, and spawn on sandy bottoms, but this fish habitat can be degraded rapidly when the natural water cycle is disrupted. Many watersheds suffer from deforestation because of logging, nutrient runoff because of farming, storm runoff because of urban areas, untreated municipal sewage, industrial pollution, and mining. This array of non-point source (NPS) water pollution is caused when accelerated runoff causes erosion and sedimentation into your stream.

Three types of NPS pollution degrade our streams:

- Sediment- irritates fish gills, kills macro invertebrates & smothers fish eggs!
- Nutrients- manure or fertilizers containing phosphorus and nitrogen create algal blooms and deplete oxygen.
- Toxins- chemicals and metals may poison waters and be caught up in the food chain.



Lackawanna Conservation District
1300 Old Plank Road
Mayfield, PA 18433
Phone: (570) 281-9495
E-mail: clune@lccd.net
www.lccd.net

Countryside Conservancy
P.O. Box 55
La Plume, PA 18440
cconserv@epix.net

Lackawanna River Corridor Association
P.O. Box 368
Scranton, PA 18501
www.lrca.org

Lebanon Conservation District
Lebanon Valley Ag. Center
2120 Cornwall Rd.
Lebanon, PA 17042-9788
Phone: (717) 272-3908 ext. 4
E-mail: stephanie-harmon@pa.nacdnet.org
www.lccd.org

Hammer Creek Watershed Association
21 Buch Mill Rd.
Lititz, PA 17543
www.dep.state.pa.us/growgreen/hosting/?ID=132

Little Swatara Creek Watershed Association
132 Deck Road
Myerstown, PA 17067

Furnace / Segloch Run Watershed Alliance
110 Yummerdall Road
Lititz, PA 17073

Stony Creek Anglers Association
P.O. Box 1855
Norristown, PA 19404
www.stonycreekanglers.org

Swatara Creek Watershed Association
2501 Cumberland Street, Suite 2
Lebanon, PA 17042

Tri-County Conewago Creek Association
P.O. Box 107
Elizabethtown, PA 17022
conewagocreek@yahoo.com

Trout Unlimited - Tulpehocken
P.O. Box 91
Shillington, PA 19607

Quittapahilla Watershed Association
610 E Walnut Street
Annville, PA 17003
www.community.pennlive.com/cc/quittiewatershed

Luzerne Conservation District
485 Smith Pond Road
Shavertown, PA 18708
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E-mail: luzerncd@ptdprolog.net

Friends of the Nescopeck
P.O. Box 912
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www.friendsofthenescopeck.org

Hicks Creek Watershed Association
P.O. BOX 91
West Pittston, PA 18643
E-mail: info@hickscreek.org
www.hickscreek.org

Huber Breaker Preservation Society
101 South Main Street
Ashley, PA 18706
www.huberbreaker.org

Wyoming Valley Watershed Coalition
175 Main Street
Luzerne, PA 18709
E-mail: info@wvwc.org
www.wvwc.org

Conservation Districts and Watershed Associations

Bradford Conservation District

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RR#5, Box 5030C
Towanda, PA 18848
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Lanning Creek Watershed Association
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Towanda, PA 18848

Penn-York Bentley Creek Watershed Association
RR 5, Box 5030C
Towanda, PA 18848

Satterlee Creek Watershed Association
184 Herrick Ave
Sayre, PA 18840

Schrader Creek Watershed Association
RR #2, Box 292
Towanda, PA 18848

Towanda Creek Watershed Association
RR#5, Box 5030C
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Wyalusing Creek Watershed Association
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Wysox Creek Watershed Association
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Rome, PA 18837

Carbon Conservation District

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Tobyhanna / Tunkhannock Creek Watershed Association
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Pocono Lake, PA 18347
www.tctcwa.org

Wildlands Conservancy
3701 Orchid Place
Emmaus, PA 18049
www.wildlandspa.org

Columbia Conservation District

702 Sawmill Rd., Suite 204
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Fishing Creek Watershed Association
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Bloomsburg, PA 17815

Dauphin Conservation District

1451 Peters Mountain Rd.
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Paxton Creek Watershed Association
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Powell/Armstrong Creek Watershed Association
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Halifax, PA 17032

Wiconisco Creek Restoration Association
1021 East Market St.
Williamstown, PA 17098

AMD Abandoned Mine Drainage

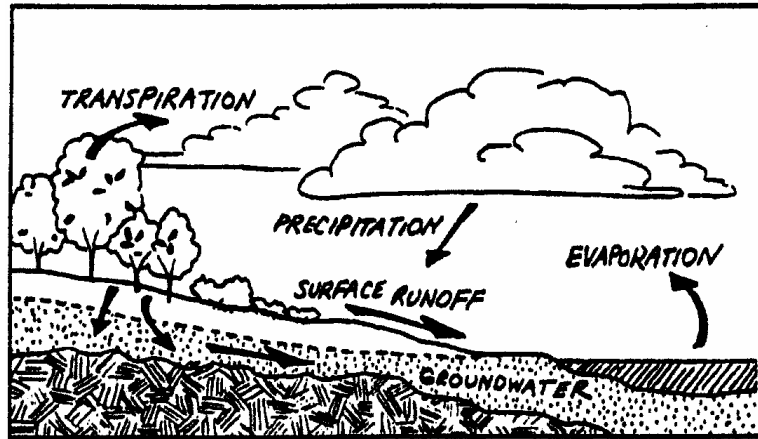
In Appalachia alone, more than 7,500 stream miles are degraded by abandoned mine drainage (AMD) from coal mines. In Pennsylvania, where the Brook Trout is the state fish:

- over 4,500 stream miles are impaired by NPS pollution
- over 2,500 stream miles are degraded by AMD.



Although this environmental problem is large, the clean-up efforts of students, watershed groups, and government agencies are making a difference. In Pennsylvania, the **Growing Greener** grant program has empowered watershed groups to clean up hundreds of stream miles! As students you can become a dynamic force to energize the watershed movement. Look through this manual and find some topics you are interested in. Then, call a watershed group in the appendix of this manual, and tell them you are interested in doing a project on their stream. Watershed work will make your senior projects, merit badges, and college credits an experience to remember!

1. Water Cycle Projects: The water cycle of rainfall to runoff to evaporation and back to rain clouds is well known because it affects the streams we live by with bank erosion, floods, and stream flow. This cycle offers students many topics for projects that would benefit their local watershed.



Ground Water Protection:

- Forested recharge areas
- Public water supplies
- Homeowner wells
- Urban runoff



Field Trip with Class:

- Survey the stream macro-invertebrates.
- Tour passive treatment system ponds.
- Catch some fish and trap minnows.

Summer Intern on a Stream:

- Formulate a fisheries plan.
- Complete a stream assessment.
- Create a display board for watershed conferences.
- Write your own grant application – it's easy.

Fulfill Educational Requirements:

- Senior project
- Science fair project
- College Internship
- Boy Scout – merit badge/ eagle scout project
- 4 – H Club activity

Educational Center:

- Build field-trip pavilion.
- Design a wetland trail.
- Install an interpretive trail along a stream.



5. Educational Opportunities: Every cause and effect within the watershed can be a learning moment. The goal is to learn through doing, to transform the field trip into a work experience, to perfect learning by service. Through the helping hands of students, real ENERGY is added to the watershed enabling the stream to do more WORK....

- More trees, cleaner water
- more macro-invertebrates
- more minnows trout and fish
- more diversity / creates greater use
- more recreation / land values go up
- quality stream resource !!!

So go to it! Get a project! Have some outdoor “watershed fun”



Partner with a Watershed Group:

- Look at the last eight pages!
- See the Appendix for a listing of hands-on groups.
- Post watershed signs at stream crossings.
- Publish a monthly newsletter for the watershed group.

Drinking Water Cycle:

- Community water supplies
- Municipal sewage system
- Ground water protection
- NPDES Regulated discharges



Non-point Source Pollution (NPS) :

- Agricultural sources
- Mining sources-abandoned mine drainage (AMD)
- Small business pollution
- Runoff and sedimentation
- Sewage
- Timber and logging roads

2. Public Awareness Projects: Progress doesn't happen until two or more people get together. So getting yourself and others involved is vital. If you partner with your local Watershed group or start your own, there are several proven ways to mobilize the community:



Partner with Watershed Groups:

- Look into local, regional, and statewide watershed groups.
- Adopt a stream and form your own informal group.
- Participate in watershed conferences, Earth Day, youth field trips!



Put up Signs:

- Highway signs - "You are Entering - ... Watershed".
- Stream crossing signs - use eye catching logo.
- Project signs - at stream improvement construction sites.

Fishery Plan:

- Develop a fisheries management plan.
- Construct trout habitat improvements.
- Stock fish in streams.
- Develop public access to streams.



Pollution Clean-up:

- Apply for watershed grants.
- Research stream bank stabilization methods.
- Add alkalinity to the streams to mitigate AMD and acid rain impacts.
- Construct passive treatment systems.
- Maintain AMD treatment systems.



4. Stream Restoration Projects: Once the stream assessment is done you can use your findings to develop a clean-up strategy and apply for grants. This is where the potential for success motivates hard work. Watershed groups can use a lot of helping hands at this stage:



Riparian Plantings:

- Plant trees for shade and bank stabilization.
- Raise wildlife plantings, duck boxes and feeders.
- Get ambitious - Create a wetland!
- Fence off a stream bank to livestock.

Municipal Participation:

- Improve dirt & gravel roads.
- Control Sewage.
- Learn how storm water is collected .
- Eliminate garbage dumping.
- Develop storm water management plans.



Public Events:

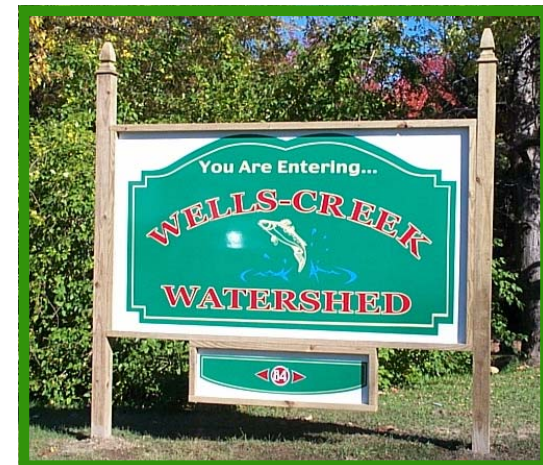
- Organize a streamside cleanup day.
- Schedule a bus tour of your watershed.
- Host a watershed picnic and canoe event.
- Participate in your county Envirothon.

Connect with Public, Press, and Government Officials:

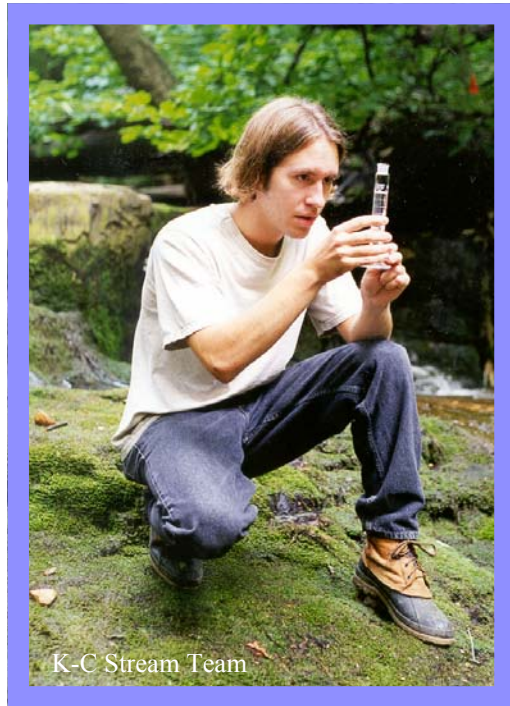
- Publish a watershed newsletter or create a website.
- Operate a phone bank or press release for watershed activities.
- Visit your Supervisor, Commissioner, and lawmakers.

Connect Locally:

- Canvass streamside landowners with NPS brochures.
- Encourage historic preservation/industrial heritage.
- Create a display board for local events like firemen's jubilee, fairs, craft days.



3. Stream Assessment Projects: Once you get students moving on watershed issues, the first task is to map the watershed and assess the stream's condition. Students can help their local Association compile this background information. An assessment will qualify your watershed for many stream improvement grants!



Water Sampling:

- Schedule a field trip to test water quality parameters such as pH, acidity, metals, and other pollutants.
- Collect water samples on your stream
- Sample the pollution discharges such as:
 - abandoned mine drainage
 - industrial pollution sources and sewage (with caution)
- Measure flows and calculate pollution loads.



In-Stream Biotic Assessment of :

- Identify algae, diatoms, & other aquatic plants / animals.
- Locate macro-invertebrates such as stoneflies and mayflies.
- Set minnow traps and electro-fish.
- Assess habitat for fish.



Stream Side Inventory:

- Assess riparian plants and animals
- Check for stream bank erosion
- Review and find developmental pressures:
 - urbanization
 - housing projects
 - loss of agricultural lands
 - mining, industry, malls, highways, etc.