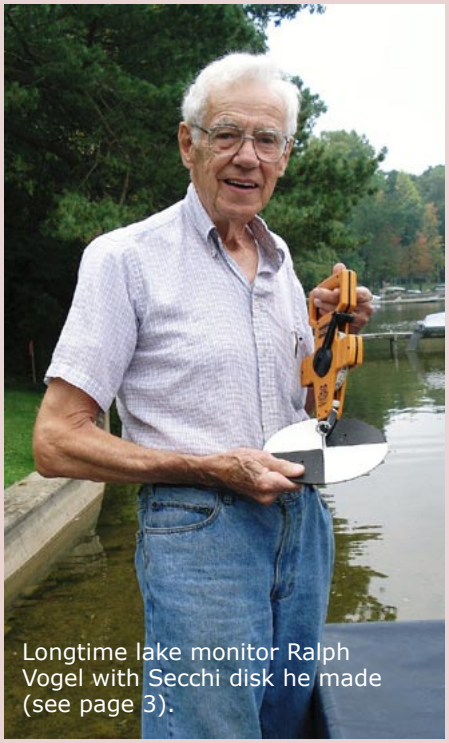
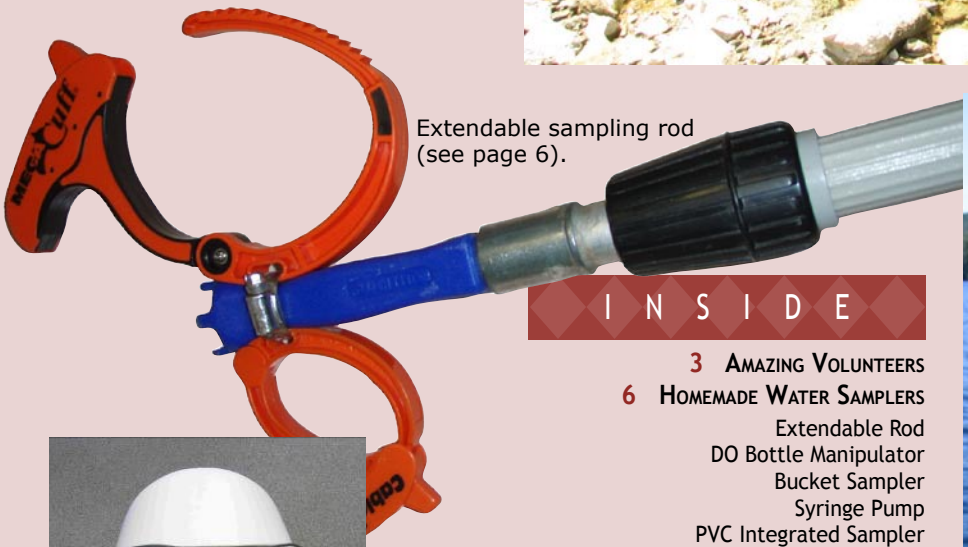
THE
Volunteer Monitor
THE NATIONAL NEWSLETTER OF VOLUNTEER WATERSHED MONITORING Volume 20, Number 2 • Fall 2009


Longtime lake monitor Ralph Vogel with Secchi disk he made (see page 3).

20th Anniversary Issue

Celebrating Volunteers & Innovation


Volunteer Richard Renth using kick net support he designed and built (see page 10).


Extendable sampling rod (see page 6).


Homemade sieve bucket (see page 11).

INSIDE


Vermont Lay Monitoring Program volunteer Sara Gluckman collecting integrated sample (see page 9).

THE Volunteer Monitor

The Volunteer Monitor is a national newsletter, published twice yearly, that facilitates the exchange of ideas, monitoring methods, and practical advice among volunteer monitoring groups.

Contacting the editor
Please send letters and article ideas to Eleanor Ely, Editor, 50 Benton Avenue, San Francisco, CA 94112; ellieely@earthlink.net; or call 415-334-2284 after 9 a.m. Pacific Time.

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***The Volunteer Monitor* online**
The newsletter website, www.epa.gov/owow/volunteer/vm_index.html, contains back issues from Spring 1993 and a comprehensive subject index of newsletter articles.

Hard copies
To order print copies of back issues, see page 15.

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Editorial Board: Bill Deutsch (Alabama Water Watch), Danielle Donkersloot (Watershed Watch Network, New Jersey), Linda Green and Elizabeth Herron (University of Rhode Island Watershed Watch), Alice Mayio (U.S. Environmental Protection Agency), Jason Pinchback (Texas Stream Team), Jeff Schloss (New Hampshire Lakes Lay Monitoring Program), Candie Wilderman (Alliance for Aquatic Resource Monitoring, Pennsylvania)
Copyeditor: Malia Schwartz
Graphic Designer: Brien Brennan
Printer: Alonzo Printing, Hayward, CA

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From the Editor

20th Anniversary Issue

In the fall of 1989, the Alliance for the Chesapeake Bay launched a new publication called "The Volunteer Monitor." In it, the editors wrote:

> We hope the *Monitor* provides a timely look at what's new in the world of citizen monitoring and that it stimulates the dynamic exchange of ideas among the many diverse monitoring programs.

Twenty years later, the newsletter still aims to capture "what's new" and to foster a "dynamic exchange of ideas," linking volunteer monitoring programs across the nation—and even around the world, thanks to the Web, something surely not foreseen by the newsletter editors in 1989.

Something else those editors may not have fully anticipated was the resourcefulness and dedication of the volunteers themselves, and the extent and scope of contributions they would make. In this issue celebrating the newsletter's 20th anniversary, the volunteers are truly the stars.

Brief history of *The Volunteer Monitor*

Only the first issue of *The Volunteer Monitor* was produced by the Alliance for the Chesapeake Bay. The second (Fall 1990) was produced by Adopt a Beach in Seattle, and subsequent issues have been produced by the current editor in conjunction with an all-volunteer editorial board.

To date, 35 issues have been published, all of them funded by grants from the U.S. Environmental Protection Agency (EPA) Office of Water.

Note: All except the first five issues are available at www.epa.gov/owow/volunteer/vm_index.html. Persons interested in obtaining issues from 1989 through 1992 should contact the editor.

Next issue

The Spring 2010 issue will continue to celebrate and honor volunteer monitoring, with articles featuring achievements, success stories, and creative ideas. Please contact the editor if you would like to contribute.

National Monitoring Conference: Denver, April 25-29

The volunteer monitoring community is cordially invited to attend the 7th National Water Quality Monitoring Council (NWQMC) conference in Denver, April 25-29, 2010. The NWQMC conference, held every two years, offers a unique opportunity for national-scale networking and sharing both among volunteer monitoring programs and with agencies, tribes, universities, and other organizations involved in water monitoring. About 90 volunteer monitoring program representatives attended the 2008 conference.

The conference will include a number of volunteer monitoring-related sessions, as well as a special dinner gathering. A limited number of scholarships, generously provided by monitoring equipment manufacturer YSI, will be available for volunteer monitoring program coordinators (watch the conference website for details).

For more information see http://acwi.gov/monitoring/conference/2010/.

Electronic Subscription Option

Did you know that you can subscribe to *The Volunteer Monitor* electronically? Advantages: (1) The electronic version is prettier—full-color! (2) You will receive your issue sooner. (3) It saves postage costs.

To sign up, just e-mail ellieely@earthlink.net. Please mention whether you have an existing hard copy subscription that should be canceled.

River Rally 2010

River Network's annual national event, River Rally, will be held May 21-24, 2010, in Snowbird, Utah. For more information see www.rivernetwork.org/rally.

Volunteer Monitoring Listserv

EPA's volunteer monitoring listserv is an open forum for announcements, questions, and discussion. To join, send a blank message to volmonitor-subscribe@lists.epa.gov.

amazing VOLUNTEERS

Volunteers Create "Bug Book"


SUSAN MCCORMICK

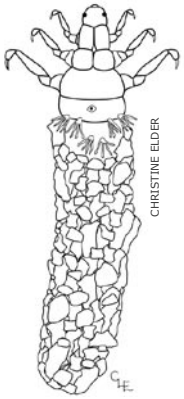
Crawling water beetle Haliplus fulvus

The Friends of Deer Creek in Nevada City, California, have just completed an ambitious undertaking—a family-level guide to stream macroinvertebrates that will run to about 200 pages, with multiple illustrations on every page. *The Bug Book* is almost entirely the work of volunteers. Three in particular stand out. Susan McCormick, who is a professional aquatic taxonomist, took more than 200 photos for the book. She and Sandy Williamson did most of the research and writing, and Christine Elder, a scientific illustrator, prepared over 75 drawings. Numerous other volunteers helped with writing, editing, and layout.

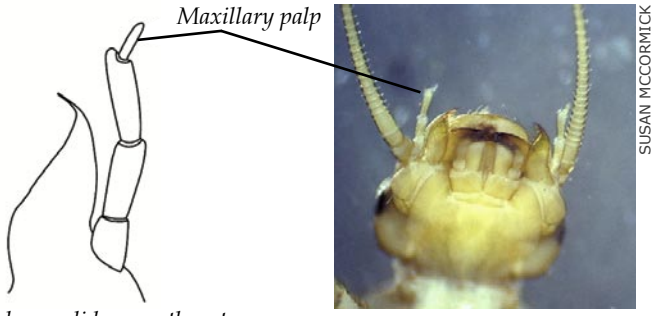
The book was created with the beginning or intermediate user in mind. "When we were first learning to identify bugs, the professional taxonomists who were helping us gave us lot of little hints not found in books," says the program's Executiv Director, Joanne Hild. "We thought, 'Other people need these hints,' so we compiled all of them in this book."

Susan's photos and Christine's drawings work together, with the drawings clarifying the anatomical details that are mos important for identification.

"When I volunteered I didn't realize it would be such a big project," says Christine. But she has no regrets. "I love the organization," she says. "It was great that they needed and wanted my skills."

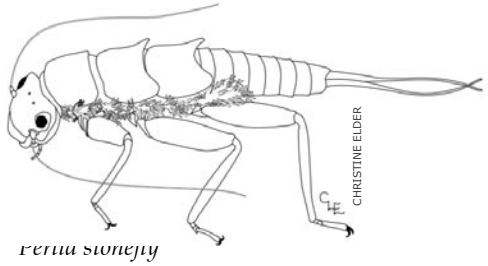

CHRISTINE ELDER

Limnephilid caddisfly



Chloroperlidae mouthparts

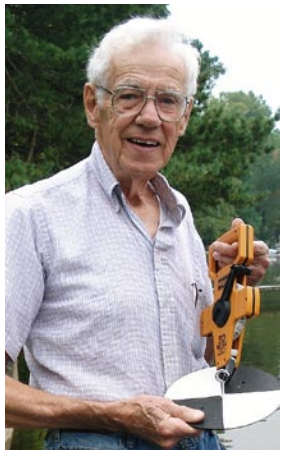
The Bug Book: A Guide to the Identification of Aquatic Benthic Macroinvertebrate Families of California is available for purchase from Friends of Deer Creek, info@friendsofdeercreek.org, 530-265-6090. More examples of Christine's artwork ca be seen at http://christineelder artnews.blogspot.com/.


CHRISTINE ELDER

Perlid stonefly

One of the Originals

by Ralph Bednarz


SARAH VOGEL

Ralph Vogel is the only original CLMP volunteer who is still actively monitoring.

It was a large outbreak of swimmer's itch on Corey Lake in the summer of 1974 that got Ralph Vogel to sign on with Michigan's brand-new statewide volunteer lake monitoring program. Even after Ralph learned that his water quality monitoring wouldn't tell him anything about the status of swimmer's itch in the lake, he remained interested in learning more about the lake's condition.

Today, 36 years later, the Michigan Department of Environmental Quality's (MDEQ) Cooperative Lakes Monitoring Program is still going strong and so is Ralph, who has consistently taken Secchi disks readings throughout every sampling season, except for a few years when he reckons he might have missed "one or two" of the 21 weekly readings. Ralph's 36-year data record also includes sampling for chlorophyll five times, and phosphorus twice, during each sampling season. This is one of the best long-term continuous data records on any inland lake in Michigan.

Ralph, a retired mechanical engineer, also volunteers his time to build Secchi disks for the program. So far he's made about 300. His innovative design uses heat-shrink tubing to permanently secure the attachment of the line to the disk.

Ralph Bednarz, MDEQ Environmental Quality Specialist/Limnologist, coordinates the Cooperative Lakes Monitoring Program, a core program of the Michigan Clean Water Corps (www. micorps.net).

Storms and Mud and Dark of Night

Early in 2009, the Streamkeepers of Clallam County in Washington State started a new activity — monitoring stormwater impacts. By luck (or lack of it), most of the storms that winter and spring occurred at night, and many came on weekends and holidays — including Christmas Eve.

Day or night, rain or snow, volunteer Steve Rankin was out sampling in every storm. Not only that, he and his wife C.J. (also a volunteer) opened up their home as a rendezvous point, and sometimes a sleepover hotel, for fellow volunteers waiting to see whether and when a predicted storm would materialize. If it did, the monitors went out in teams of two or three and collected frequent water samples until they were sure the peak was past. Then they returned to Steve and C.J.'s house where they performed turbidity testing with a turbidimeter and transferred samples to jars to be sent out for laboratory analysis for nutrients,

C.J. RANKIN

Steve Rankin installs one of the stage/crest gages he designed and built.

suspended sentiment concentration, fecal coliform bacteria, petroleum, pesticides, and metals.

Steve's involvement in the stormwater project actually began several months prior to the sampling, when he took on the critical preliminary task of reconnaissance. Steve scouted out potential sampling sites in parking lots, culverts, streams, and farm fields. Once sites were selected, Steve designed and built stage/crest gages and installed them at 12 sites. The gages are read both during storms, to determine when the storm crests, and in between storms to establish baseline stream level.

Steve devised his own method of "reading" the gages by taking a close-up high-resolution digital photo. His camera then contains all the necessary information—date, time, and gage reading. Some of the gages are located so close to the road that Steve can take a "drive-by" reading without even getting out of his car.

For his work on the stormwater project, as well as his other volunteer service with Streamkeepers since 2003, Steve was awarded a Governor's Volunteer Service Award on April 20, 2009.

A Green Teen with a Purpose

by Robin Berry

The next generation of water quality community activists is getting support from one of their own in Pflugerville, Texas. Fifteen-year-old Matthew Evans has unleashed his teen energy and enthusiasm to engage other teens in positive, empowering events like his "Teen Green Party with a Purpose."

KATE YOUNG

Matthew Evans practices dissolved oxygen testing at a training workshop.

When Gilleland Creek, which runs through Matt's neighborhood, reported consistently high bacteria counts, Matt was inspired to contribute to the preservation of the creek. He became a trained volunteer water quality monitor for the Lower Colorado River Authority's Colorado River Watch Network (CRWN).

Not content to stop with monitoring, Matthew offered to assist the Pflugerville Parks and Recreation Department's arborist, April Tomas Rose (also a CRWN volunteer), who taught him about the connection between reduced tree populations and stream health. Matt decided he was ready to share his "stuff" with his friends and made plans to celebrate his 15th birthday with a Teen Green Party with a Purpose. He chose tree planting on the shores of Lake Pflugerville for the main activity.

Matt found an online resource for funding his tree-planting party at www.DoSomething.org, and obtained grant money to buy 30 trees. Twenty friends showed up for the party. "They were inspired!" Matt says. "I was surprised, but digging holes satisfied them!"

Next Matt replicated the party for his sister and her friends, who planted trees and removed invasives along Gilleland Creek. Another Teen Green Party with a Purpose involved planting a demonstration garden for the City of Pflugerville's water protection program, Drop by Drop.

Matt's next party will launch his latest venture, Discover Green—Young Environmental Leaders, Inc., a nonprofit designed to support teens' environmental service projects. First-place winner of the 2009 Keep Texas Beautiful Youth Award, Matthew Evans is making a name for himself. But that's not what drives him. Matt says, "For me, it's great that when I grow up I can see the results, but I want to inspire other teens and younger kids to continue the effort."

Robin Berry is a Water Quality Coordinator for the Lower Colorado River Authority. For more information, see www.lcra.org/water/quality/crwn/index.html.

Seizing the Initiative

The members of the Central Wisconsin Chapter of Trout Unlimited are not people who sit on their hands. As participants in Wisconsin's Volunteer Stream Monitoring program, they regularly go out of their way to find new projects and partners.

"On their own, the group contacted the state Department of Natural Resources and asked whether there were sites that needed continuous temperature monitoring," says Kris Stepenuck, a coordinator for the stream monitoring program. "Then they bought their own thermistors to monitor those sites."

Under the leadership of Dick Pollock, who chaired the chapter's water monitoring program from 2005 through 2008, the group not only did extensive chemical and biological monitoring in connection with their own restoration projects but also reached out to collaborate with others working in the watershed, including the County of Fond du Lac and a private consultant, as well as the Department of Natural Resources.

The chapter used its own revenue from donations, banquets, and other fundraising to purchase chemical test kits and a microscope for macroinvertebrate identification. The monitoring group also wrote grant proposals to obtain additional funding to pay for equipment and lab analyses for special research projects.

For these accomplishments, Dick was recently named Wisconsin Volunteer Stream Monitoring program's Adult Volunteer of the Year. Dick gives credit to the whole monitoring team for their enthusiasm and commitment. "When a new project comes up," he says, "you call a few people and say, 'Hey, want to do this?'—and they say, 'Sure, I'll do that.'"

JOHN GREMMER

Dick Pollock using a flow meter.

DICK POLLOCK

Laura DeGolier, a member of the Central Wisconsin Trout Unlimited monitoring team, checks dissolved oxygen.

A Stream Scholar

JOHN HERZER

Bob Henricks on a flyfishing trip in Montana.

After a career as a professor of ancient Chinese religions at Dartmouth College, Bob Henricks retired to Virginia, where he figured on devoting himself to golf. Then he saw an article about the StreamWatch program. As a longtime flyfisherman, Bob was attracted to the idea of protecting streams, so he decided to volunteer.

"I thought I'd be doing stream cleanups, maybe some water quality testing with a kit," Bob recalls. "I never expected that entomology would be involved."

When Bob found out that StreamWatch volunteers performed macroinvertebrate monitoring, and that they identified aquatic insects to family level, he got swept up in a new vocation. "Within three weeks of joining the program, I decided I was going to learn every family, all the Latin names," he says.

Bob bought his own microscope and began compiling a personal reference collection of preserved macroinvertebrates. With the same intellectual energy he formerly applied to translating 2,000-year-old Chinese texts, he threw himself into researching entomology books and websites.

Now, less than a year after joining StreamWatch, Bob is the program's lead lab volunteer, and he has contributed two very valuable additions to the program website: an extensive collection of macroinvertebrate photos drawn from numerous sources (see http://streamwatch.org/volunteers/macroinvertebrate-pictures) and "A StreamWatcher's Reading List" (see http://streamwatch.org/volunteers/volunteer-resources). He's also working on a second macroinvertebrate reference collection, to be housed at the StreamWatch program lab for volunteers to use.

homemade water

by Eleanor Ely

Water sampling devices can be categorized into three general types, depending on which part of the water column is sampled:

1. Surface samplers
2. Discrete-depth samplers
3. Integrated samplers

Discrete-depth samplers and integrated samplers are mainly used in lakes or estuaries, which are often stratified (i.e., having different horizontal water layers with different physical and chemical characteristics). In a well-mixed water body, usually a surface sample is all that is required.

Examples of homemade equipment for all three types of sampling are presented below. Quite a few of these devices were designed by volunteers.

Special considerations for dissolved oxygen sampling

When collecting samples to be tested for dissolved oxygen, it is important to ensure that the sample does not come into contact with air, which would introduce additional dissolved oxygen. Commercial water samplers like the Kemmerer or Van Dorn samplers or the LaMotte Dissolved Oxygen Sampler are specifically designed to avoid any contamination with air.

In practice, some volunteer lake monitoring programs and the majority of stream monitoring programs use a less rigorous technique in which water for dissolved oxygen testing is collected directly into the bottle that is provided with the field test kit. Special procedures are followed, including submerging the bottle with the cap on, holding the bottle in a horizontal position, and removing the cap underwater. In spite of these precautions, there is some exposure of the water sample to the air in the bottle while the bottle is filling. Nevertheless, many volunteer stream monitor-

SURFACE SAMPLING DEVICES

Collecting a surface sample for parameters other than dissolved oxygen is easy if the sampling site can be reached by wading or by leaning over the side of a boat. The sampling container is simply held under water, preferably at about elbow depth in order to avoid surface scum. But what if volunteers are using a pontoon boat and can't reach the water surface, or if they are sampling the middle of a stream from the streambank or a bridge? The three devices described below can be used to extend the monitor's reach in various ways.

Extendable Sampling Rod

PETER MITCHELL

This extendable sampling rod is an updated version of a device featured in the Winter 2004 issue of *The Volunteer Monitor* (page 3). The original model was designed by Massachusetts Department of Environmental Protection biologist Peter Mitchell to facilitate sampling deep-water stations in the middle of a stream or river while standing safely on shore or in shallow water. Mitchell's colleagues Daniel Davis and James Meek have since made several refinements.

The sample bottles are now held by Cable Cuffs (a new product designed for holding bundles of cables, rope, etc.). Cable Cuffs come in several sizes and are easy to adjust for a snug fit around the bottle. The pole (a telescoping pole used for painting) is attached to a paint roller handle, which has a tapered shape that prevents the Cable Cuffs from slipping off.

A useful modification is to create an articulating joint by inserting a hinged attachment (also called a "handle angle adapter") between the pole and the paint roller handle. This allows the sampling bottles to be adjusted to different angles depending on whether the operator is reaching out horizontally (e.g., from a stream bank) or sampling vertically (e.g., from a bridge).

For additional details, contact Daniel.Davis@state.ma.us or James.Meek@state.ma.us.

PETER MITCHELL

ing programs find this method suitable for their purposes because (a) they are mainly trying to detect broad trends and (b) they are most often testing waters with a relatively high level of dissolved oxygen. The small amount of additional dissolved oxygen that could be introduced by this sampling method is not significant at higher dissolved oxygen levels, but could be significant at low levels (i.e., below 4 mg/liter). IOWATER Program Coordinator Mary Skopec says that low dissolved oxygen readings obtained by IOWATER volunteers are confirmed with repeat testing using a dissolved oxygen meter.

Another alternative (which only works for collecting a surface sample) is to use a bucket that is fitted with a spout and tubing at the bottom. After the bucket is filled carefully and gently with sample water, the tubing is used to fill the dissolved oxygen bottle from the bottom up. The bottle is overflowed until three full volumes of water have flushed through.

References

Carlson, R.E. and J. Simpson. 1996. *A Coordinator's Guide to Volunteer Lake Monitoring Methods.* North American Lake Management Society. Portions (with some modification) are available at http://dipin.kent.edu/index.htm (click on "Monitoring Methods").

Surface Water Ambient Monitoring Program (SWAMP). 2004. *Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment.* California State Water Resources Control Board, Division of Water Quality. www.swrcb.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml.

U.S. EPA. 1997. *Volunteer Stream Monitoring: A Methods Manual.* EPA 841-B-97-003. www.epa.gov/volunteer/stream/.

"Hands-out-of-Water" Dissolved Oxygen Bottle Manipulator

Jonathan Allen, a volunteer water monitor with the Stony Brook-Millstone Watershed Association in New Jersey, designed this equipment so volunteer stream monitors could collect dissolved oxygen samples in the winter without putting their hands into the frigid water. Basically, the device takes the place of the operator's hands, allowing manipulations such as changing the bottle from a horizontal to vertical orientation and removing and replacing the cap underwater.

JONATHAN ALLEN

The device consists of two parts, a bottle holder and a cap manipulator. The bottle holder is made from a wooden slat, an aluminum strip bent to a 45° angle, and a clip (such as a broom clip) to hold the bottle. The cap manipulator consists of a handmade clamp that fits over the bottle cap, attached to a wooden dowel with latex rubber tubing. The cap clamp is made from 0.020- inch brass shim stock. The tubing forms a flexible joint, allowing the cap to be twisted off when the bottle is horizontal. A cord attached to the cap clamp allows the operator to tip the cap upward to release any air bubbles.

Detailed instructions for making and using the manipulator can be found at the Stony Brook-Millstone Watershed Association website, www.thewatershed.org/.

Perforated Bucket Sampler

Sampling from a bridge using a bucket on a rope can be awkward. Erick Burres, statewide Citizen Monitoring Coordinator for California's Clean Water Team (a project of the State Water Resources Control Board), says volunteer monitors usually have three complaints. #1: "The bucket won't sink—it floats." #2: "It's heavy to pull up." #3: "If the current is fast it'll pull your arms out of their sockets."

The sampling bucket pictured at right, which is weighted and has large drain holes, solves all three problems. Also, because it can hold up to three different sample bottles, it eliminates the need for pouring water from the bucket into the sample bottles.

The bucket can be weighted by attaching a weight to the bottom using cable ties or wire, or by pouring a layer of epoxy into the bottom (in this case, the drain holes are cut in the sides of the bucket, just above the epoxy layer).

A short video illustrating the use of the bucket can be seen at http://water101.waterboards.ca.gov/swamp/qapp_advisor/FieldMethods/start.html.

For detailed instructions, contact Erick Burres, CWT@waterboards.ca.gov, 213-576-6788.

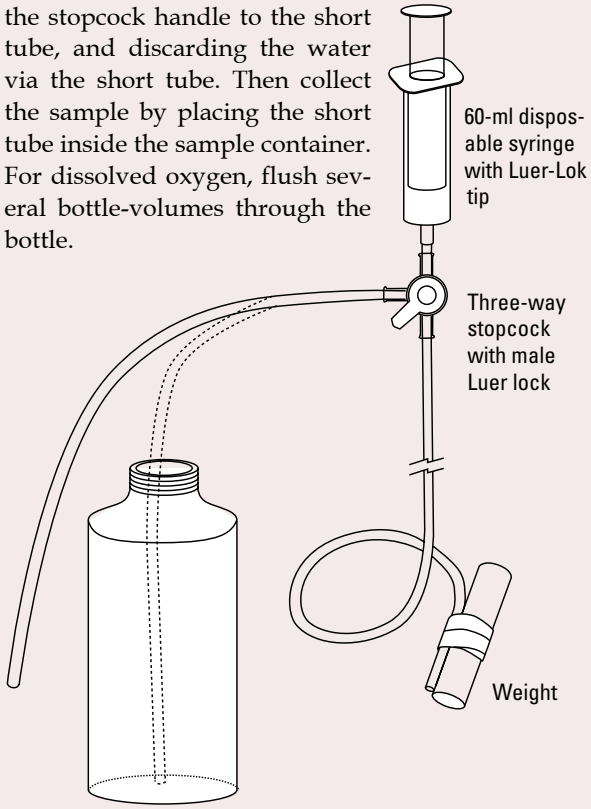
ERICK BURRES

DISCRETE-DEPTH SAMPLING DEVICES

Lake or estuary monitors are often interested in measuring such parameters as temperature, chlorophyll, salinity, nutrients, or dissolved oxygen at different specific depths. Commercial samplers for discrete-depth sampling (such as the Kemmerer bottle or Van Dorn sampler) are relatively pricey, although there is a less expensive model (sometimes called a "student" version) that sells for about $70. Volunteer monitoring programs are also using a variety of low-cost homemade alternatives. *Important note:* Unlike the commercial samplers, some homemade devices are not suitable for testing dissolved oxygen.

Syringe Pump

This syringe pump for discrete-depth sampling was designed by Revital Katzelson and Arleen Feng at California's State Water Resources Control Board. To use, lower the long tube with weight attached to the desired water depth. Flush the system several times by drawing up a syringeful of water, turning the stopcock handle to the short tube, and discarding the water via the short tube. Then collect the sample by placing the short tube inside the sample container. For dissolved oxygen, flush several bottle-volumes through the bottle.



Additional construction details may be found in *The Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment;* see www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/2113sop.pdf.

Discrete-depth samplers from the archives

The following devices are described in detail in previous issues of this newsletter, which are available at www.epa.gov/owow/volunteer/vm_index.html.

• Shallow Water Sampler

(from Fall 1997; Vol. 9, No. 2; page 22)

This sampler, designed by a volunteer monitor with the University of Rhode Island Watershed Watch program, uses a gasoline primer bulb as a suction device to pull water up into PVC tubing. The model shown in the Fall 1997 newsletter collects a sample from a depth of 1 meter, but it could easily be modified for sampling at other depths.

• Homemade Van Dorn-type Sampler

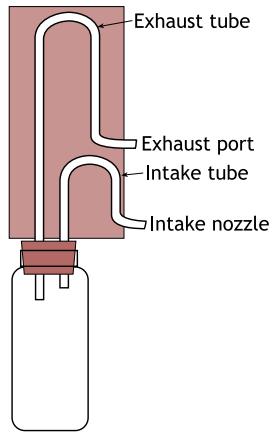
(from Fall 1994; Vol. 6, No. 2; page 23)

Larry Caton at Oregon Department of Environmental Quality devised a homemade version of a Van Dorn sampler made from PVC tubing and black rubber plungers, and using a sportsfishing down-rigger clip as the messenger. *Note new contact information:* Caton.Larry@deq.state.or.us; 503-693-5726.

• Siphon Sampler for Storm Event Monitoring

(from Summer 2004; Vol. 16, No. 2; page 11)

This "single-stage siphon sampler" for storm event monitoring automatically collects a sample when the stream reaches a specific predetermined height. The designer, Dick Stephens at University of Wisconsin-Stevens Point, says the samplers are no longer available for purchase but he is happy to speak to anyone interested in making one.



INTEGRATED SAMPLERS

Integrated or "composite" samplers are sometimes used for sampling lakes or estuaries, in which the analyte of interest may be unevenly distributed due to layering or patchiness. Integrated samplers consist of a rigid or flexible tube that is lowered vertically into the water column. The resulting sample is like a "core" of water from the surface to the sampling depth. The whole sample is transferred to the collection vessel, creating a mixed or integrated sample.

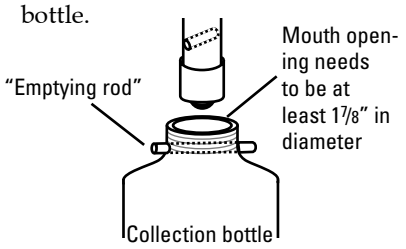
Two homemade designs are shown below. The hose-style sampler can be lowered to a variety of different depths; for example, New Hampshire Lakes Lay Monitoring Program volunteers use it to collect samples for chlorophyll testing from as deep as 30 or 40 feet.

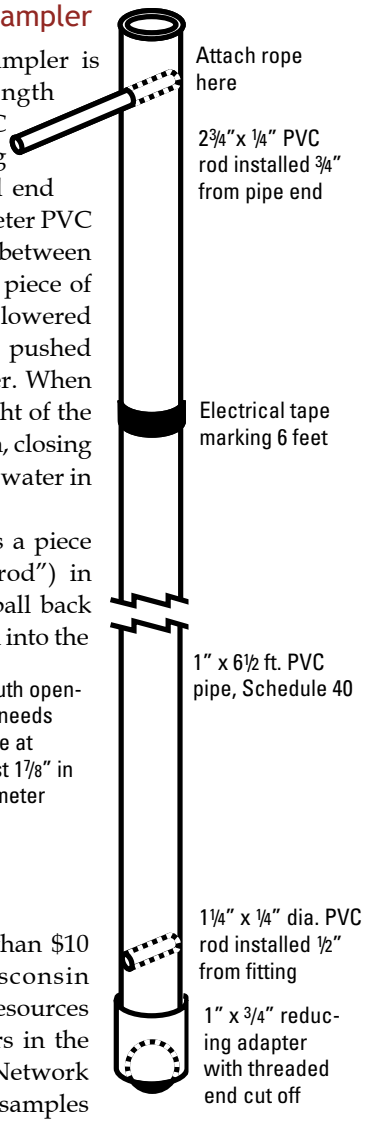
Integrated samplers are not suitable for collecting samples for temperature or dissolved oxygen testing, because these measurements need to be made at discrete depths.

Wisconsin Integrated Sampler

Wisconsin's integrated sampler is made from a 6½-foot length of 1-inch diameter PVC pipe attached to a reducing adapter with the threaded end sawed off. A ¾-inch-diameter PVC ball is trapped in the space between the bottom opening and a piece of PVC rod. As the tube is lowered into the water, the ball is pushed up, allowing water to enter. When the tube is raised, the weight of the water pushes the ball down, closing the bottom and sealing the water in the tube.

The collection bottle has a piece of PVC rod ("emptying rod") in the neck that pushes the ball back up, allowing water to drain into the bottle.





The sampler costs less than $10 for materials. Both Wisconsin Department of Natural Resources (DNR) staff and volunteers in the Citizen Lake Monitoring Network use it to collect integrated samples for nutrients and chlorophyll.

DNR had previously tried using a hose-type integrated sampler made with a flexible plastic tube,

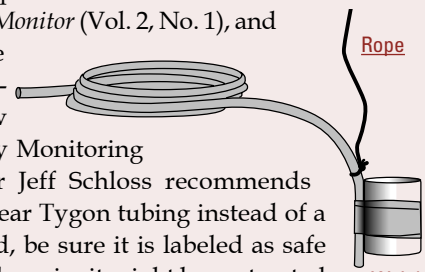
continued on page 11, bottom right

Reducing adapter before the end is cut off.

Bottom end of sampler showing the ball in the "closed" position.

Hose-style Vertical Sampler

This simple hose sampler was featured back in the Fall 1990 issue of *The Volunteer Monitor* (Vol. 2, No. 1), and it's still used by some volunteer lake monitoring programs. New Hampshire Lakes Lay Monitoring Program coordinator Jeff Schloss recommends using ½- to ¾-inch clear Tygon tubing instead of a hose. If a hose is used, be sure it is labeled as safe for drinking water; otherwise it might be pretreated with pesticides.



For weighting the hose, the New Hampshire program uses a can filled with gravel and Quikcrete while the Vermont Lay Monitoring Program uses a 2-pound dive weight.

AMY PICOTTE

Vermont Lay Monitoring Program volunteer Bob Wood (front) pulls up the weighted end of the hose while partner Chris Demeritt holds the crimp higher than the hose end.

To collect a sample, the weighted end of the tube is lowered to the desired depth. The monitor makes a double (M-shaped) crimp in the tube at water level and grips it firmly. The crimp is held high as the bottom end of the tube is pulled in with the rope and placed into the sampling container. Then the crimp is carefully released to allow the water to flow into the container. The procedure is much easier with two people, but with practice one person can do it.

More detailed instructions can be found in the Vermont Lay Monitoring Program Manual; see www.anr.state.vt.us/DEC/waterq/lakes/docs/lp_lmp-manual.pdf.

Homemade Equipment for

Kick Net Supports for Solo Sampling

by Eleanor Ely

Missouri's Stream Team Program has some very creative volunteer monitors. Two different volunteers independently came up with designs for frames to support a kick net when sampling alone. Richard Renth, a mechanical and electrical designer by profession, designed the rigid PVC frame. The flexible frame was designed by Larry Magliola.

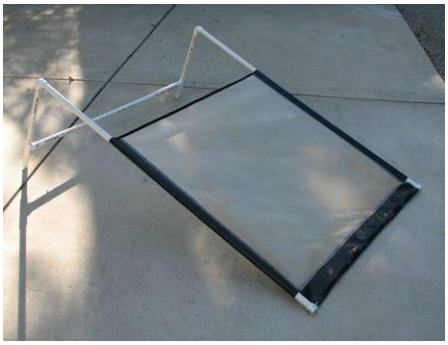
Both frames are inexpensive and simple to make. Priscilla Stotts, one of the Stream Team Program's coordinators, says that the PVC frame is sturdier and less likely to fall over in the wind, while the flexible frame's adjustable legs make it easier to form the net into a pocket.

Missouri Stream Team kick nets are custom-designed with a deep bottom hem that can accommodate a length of chain to weight the net down. This is especially useful in mountainous areas where the water moves fast.

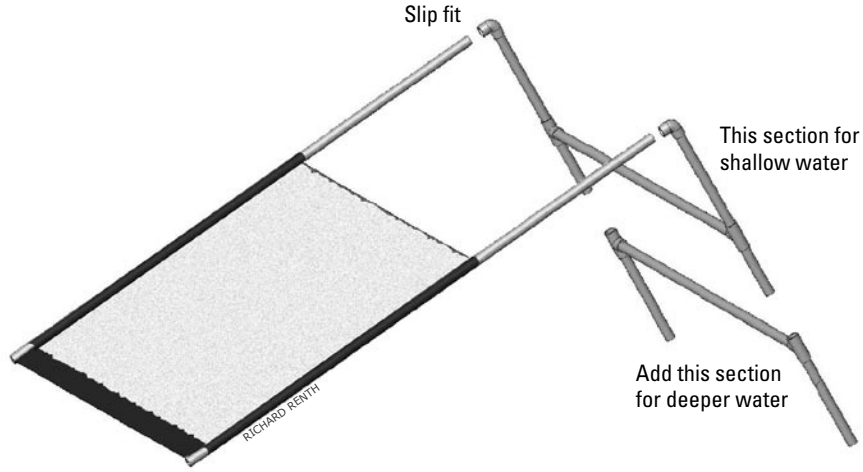
Instructions for building both standalone kick net supports are posted on the Stream Team website at www.mostreamteam.org/howto.asp.

Rigid PVC frame

The photo on the cover shows Richard Renth using the kick net stand he designed. A heavy chain inside the bottom hem holds the net down. One or two rocks can be placed on the bottom edge of the net for extra insurance.



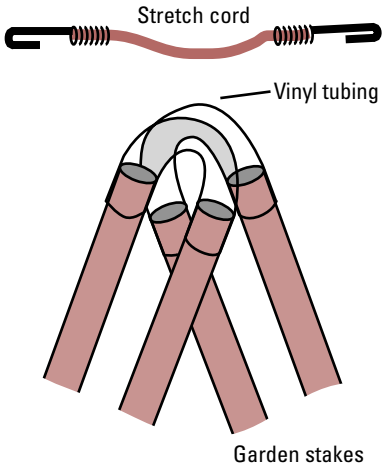
RICHARD RENTH



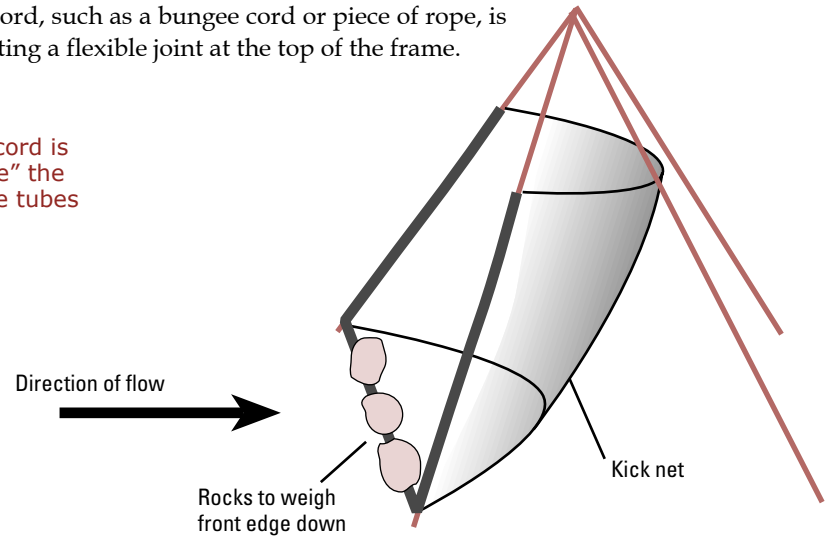
The PVC frame is adjustable to two different heights for use in deep and shallow water.

Flexible frame

The flexible kick net frame is made from four steel-core plastic-coated garden stakes, 4 feet long and 3/8 inch in diameter, and two pieces (approximately 6 inches long) of clear soft vinyl tubing, 7/16 inch outside diameter and 5/16 inch inside diameter. A cord, such as a bungee cord or piece of rope, is used to tie the pieces of vinyl tubing together, creating a flexible joint at the top of the frame.



A bungee cord is used to "tie" the two flexible tubes together.



Macroinvertebrate Monitoring

Net Spoon

by David Wilson

Sorting benthic macroinvertebrates from the tray with forceps is a pain, and often results in rather badly mauled specimens. With a net spoon, it's much easier to catch the critters and they are virtually never damaged.

To make a net spoon, use an electric grinder to grind off the bottom of a plastic picnic spoon, leaving only the rim. Be sure to wear safety glasses while grinding. Use waterproof cement to glue a small piece of fine mesh netting to the back of the rim. After the cement has dried, trim excess netting with small sharp scissors.

DAVID WILSON

David Wilson is a volunteer monitor with the Huron River Watershed Council in Ann Arbor, Michigan.

Homemade Sieve Bucket

by Dan Boward

Did you know that you can make your own handy-dandy macroinvertebrate sieve bucket at a fraction of the cost of a "store-bought" one? You'll need a 5-gallon plastic spackle bucket (we got ours free from a pickle producer), a drill, some stainless steel mesh screen (with a mesh opening appropriate for your sampling protocols), some tinsnips, and waterproof adhesive. Here are the basic construction steps:

1. Cut the bottom out of the bucket. Cut the inside out of the top, but leave the edge (the part that snaps the lid on) intact.
2. Remove the handle, drill holes in the new top and fasten the handle.
3. Cut a disk of the metal mesh, press it into the groove that will snap over the new bottom, snap the new bottom on (a hammer helps), and place a bead of waterproof permanent adhesive all the way around the inside of the bucket where the mesh meets the bucket wall.

Dan Boward is a natural resources manager with the Maryland Department of Natural Resources and helps manage the Maryland Stream Waders statewide volunteer monitoring program. For more information: dboward@dnr.state.md.us; 410-260-8605.

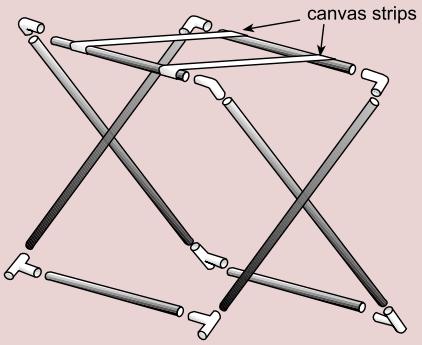
DAN BOWARD

Bug Rack

Missouri Stream Team volunteers have created two bug rack designs, one made from PVC pipe and one from wood. After macroinvertebrates are collected in the kick net, the net is draped over the rack for sorting and identification. Detailed instructions for both types of bug rack are available at the Missouri Stream Team website.

An alternative is to buy a lightweight roll-up camping table.

Homemade PVC-pipe bug rack.



WISCONSIN SAMPLER, continued

but staff found it hard to use and they often got wet. "I decided there must be an easier way," says Jim Klosiewski, a Water Resources Biologist for DNR and the inventor of the PVC-pipe sampler. Klosiewski also designed a version of the sampler that can be extended with additional pieces of pipe, allowing collection of an integrated sample down to a greater depth.

For complete instructions see the Citizen Lake Monitoring Network website, http://dnr.wi.gov/lakes/CLMN/. For questions contact Laura Herman, Citizen Lake Monitoring Network Educator, University of Wisconsin-Extension; 715-365-8998; Laura.Herman@uwsp.edu.

Monitoring Lessons from INTERNATIONAL Projects

by Bill Deutsch

The 20th anniversary of *The Volunteer Monitor* newsletter gives us a chance to look back on the origins and development of the volunteer water monitoring movement and reflect on what we've learned. Alabama Water Watch (AWW) was one of many programs that began in the "golden era" of the early 1990s when state and federal government financial support for volunteer monitoring was strong.

A unique and profound influence on AWW's development was its close association with international activities in community-based water monitoring and watershed stewardship. As the environmental movement has continued to spread globally, development agencies, university programs, and many private organizations have invested in volunteer water monitoring in other countries, much as the Environmental Protection Agency has done in the United States.

VOLUNTEER WATER MONITORS ARE NOW ACTIVE IN REGIONS OF THE WORLD WHERE PER CAPITA HOUSEHOLD INCOME IS LESS THAN $400 PER YEAR AND OBTAINING ADEQUATE AMOUNTS OF CLEAN WATER IS A MATTER OF LIFE OR DEATH.

Through Auburn University's International Center for Aquaculture and Aquatic Environments, AWW personnel have had opportunities to help establish volunteer water monitoring programs in the Philippines, Ecuador, Brazil, China, Thailand, Mexico, Argentina, and Peru. These rewarding efforts have been going on almost as long as the AWW program has existed, and they evolved to create a worldwide network of water monitors called Global Water Watch (GWW).

Similarities and differences

The cross-cultural work exposed AWW to different ways of thinking about water monitoring programs. On the one hand, there was a great similarity among the various GWW country programs in terms of the excitement and energy of workshop participants, the types of water pollution issues, the monitoring protocols, and the basic desire that people have to make positive changes for the benefit of their community. On the other hand, differences in culture, language, worldviews, environmental characteristics, and governmental policies required adaptations and modifications that gave each country's monitoring program unique features.

One example of program differences became evident during our initial monitoring workshops in Brazil. Whereas monitors in the United States typically want efficient workshops that provide the maximum amount of technical information in the least amount of time, rural Brazilians put a premium on social interaction and multi-day extravaganzas in the classroom and at the river. No workshop was complete without hours of monitoring practice, along with poetry, dancing, and lots of good food!

Learning the lingo

Development organizations working internationally are guided by principles, theories, and approaches that don't get talked about much in the United States among "water watch" types. Development theory is a complex set of ideas that pertain to cross-cultural interactions, globalization, root causes of poverty, and linking environmental protection to livelihoods. The concepts of "sustainability" and "sustainable development" that are the stuff of international Earth Summits encompass ways of doing things that are "economically viable, ecologically sound, socially just, and culturally acceptable."

We in GWW were compelled to think about these things. We also saw the disconnection between what was discussed at volunteer water monitoring gatherings in the United States and the way people thought and talked about water and monitoring overseas. Such musings become more relevant when the water monitor in front of you is a tribal Filipino who gives a rice offering to a water spirit after taking a stream pH reading, or when peasant farmers in Ecuador sample for *E. coli* bacteria in drinking water after a cholera outbreak in their village. Volunteer water monitors are now active in regions of the world where per capita household income is less than $400 per year, where government services related to wastewater treatment and stream protection are nonexistent or minimal, and where obtaining adequate amounts of clean water is a matter of life or death.

SERGIO RUIZ-CÓRDOVA

Do the stark realities of life in developing countries have anything to do with U.S.-based volunteer water monitoring? There are many approaches that overseas monitoring programs take that have strengthened AWW, and that could benefit other U.S.-based programs. People in developing countries often have a clear understanding about how their waterbodies have changed over a generation or two, from being drinkable to dangerous, or from having steady flows to having a series of droughts and floods. In contrast, many Americans are lulled into thinking that their waterbodies are in fine shape and the water from their faucets is always pure. Though U.S. waterbodies may not be undergoing dramatic changes, subtle degradation in water quality and ecosystem function leads to serious problems. Our lakes, streams,

and coasts still need vigilant citizens to understand, watch, and protect them, and linking livelihoods and quality of life to watershed health can help the cause of volunteer monitoring.

A practical model

After years of trying to synthesize our experiences and lessons learned from different countries, we have come up with a simple and practical model that spans the wide range of motivations, applications, and accomplishments of water monitoring. This community-based water monitoring (CBWM) model has proven useful in designing new programs, performing adaptive management and midstream corrections of existing programs, and conducting evaluations of monitoring groups and programs that have ceased functioning or are entering a new stage of development.

BILL DEUTSCH

On opposite sides of the world, an Alabama man and a woman from the Akha indigenous group in Thailand use identical protocols for testing dissolved oxygen.

Many parts of the model will be familiar to established monitoring programs in the United States. The model begins with the importance of knowing the volunteers' motivations and capabilities and matching these with the appropriate monitoring equipment, protocols, and approach. The Credible Data element of the model pertains to the level of quality assurance and data management needed to validate the water information that is collected. The next component relates to how the monitors, their group, and the community as a whole understand what the information means, and how they apply the information for public education, waterbody protection or restoration, and advocacy and policy change.

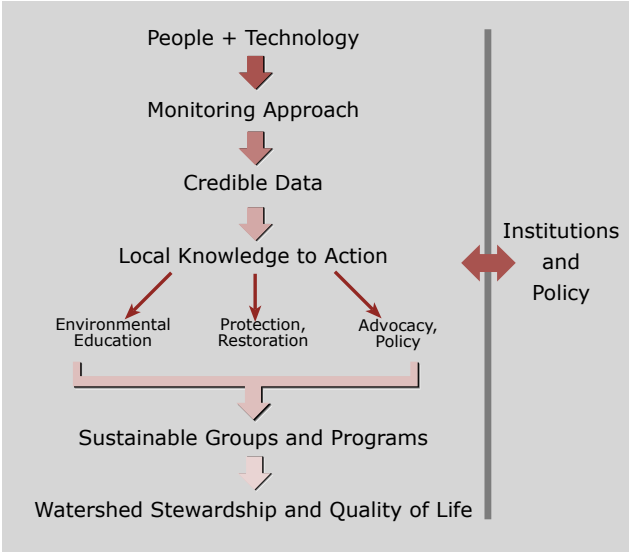
The two elements of the model that may be the least familiar to U.S.-based monitoring programs, especially those that are relatively new, are the next-to-last one (Sustainable Groups and Programs) and the one that appears on the right side of the model (Institutions and Policy). Sustainable Groups and Programs deals with how the monitoring program's reputation, leadership, and vision translate to steady funding sources, recruitment of new monitors and trainers, and ever-increasing political clout.

All the events and processes that make a water monitoring group or program sustainable occur in the context of existing institutions and policies. The Institutions and Policy element is positioned on the side of the model to indicate that every stage of the model, from forming a group to using the information in schools to advocating for improved water policy, can potentially be either helped or hindered by a governmental agency or other organization. The ability to negotiate and establish strategic partnerships can make or break the fledgling water monitoring group. We in the United States are sometimes oblivious to this reality, but it usually becomes very apparent in an international setting.

Institutionalization

If a water monitoring program survives the stresses and strains of budget shortfalls, leadership vacuums, and resistance from outside organizations, it can find itself becoming "institutionalized." This bit of development theory lingo is not a reference to going to the "crazy house" (though many a group coordinator may feel like they're going crazy!), but rather means that the program has matured to the point of being recognized as a viable player among other established institutions. These other institutions can be categorized as belonging to one of the "big three" sectors of society: government, market (business and industry), and civil society. Each country and each watershed has a special mix of these societal sectors that interact to determine the condition and trends of water quality and quantity. The process of institutionalization may take a decade or more, so new water monitoring programs need to be patient and pace themselves.

Community-Based Water Monitoring Model



The model shows a double-headed arrow linking Institutions and Policy to the other elements. This reflects a two-way relationship: not only do existing institutions and policies affect community-based monitoring programs, but those monitoring programs in turn can potentially influence, or even transform, established institutions and policies. AWW and GWW have experienced both sides of this relationship. As AWW approaches its 20th anniversary, we can see how the program has become institutionalized within Auburn University and around the state. People and

continued on back page

Cooperative Extension Project Serves Monitors Nationwide

by Linda Green

In 1988, when it came time for me to write the dreaded annual Cooperative Extension report, I was puzzled as to what category our new volunteer water monitoring program fit into. The University of Rhode Island (URI) Watershed Watch program had started earlier that year under the auspices of URI Cooperative Extension. But the Cooperative Extension reporting forms I was staring at had no water monitoring category, not even a water category. This was surprising, because I was aware of a number of other Cooperative Extension-affiliated volunteer monitoring programs. Apparently we were all operating "under the radar." In my annual report, I ended up checking the box for "other educational research."

Fast-forward 20 years. Cooperative Extension is now a national leader in providing support and coordination to volunteer monitoring.

What changed? Fundamentally, change came from the bottom up. The activities of individual Extension programs ultimately transformed some of the approaches used to achieve the mission and priorities of Cooperative Extension's parent organization, the Cooperative State Research Education and Extension Service (CSREES). Thanks in large part to the efforts of URI Watershed Watch's founder, Professor Arthur Gold, the CSREES national leadership learned about the many impressive Extension-affiliated volunteer water monitoring efforts around the country, and to their credit they decided to embrace these activities.

The first important step toward national-level Cooperative Extension support for volunteer monitoring came in 1995, when CSREES provided funding to URI Watershed Watch to seek out Extension-affiliated monitoring programs and find out what they were up to. We discovered about 30 programs in 19 states, involving about 8,600 volunteers, and running the gamut from education and awareness-building to comprehensive monitoring programs, complete with research-quality labs.

Building a national support system

In 2000, grant funding for national projects ("national facilitation grants") became available through the National Integrated Water Quality Program, a new CSREES initiative. The Extension programs of URI and the University of Wisconsin, both of which ran large, well-established volunteer monitoring programs, jointly applied for funding to build a support system for Extension volunteer monitoring programs across the country. Activities we proposed included collecting and compiling information about existing programs, creating training materials, providing training, and working to increase the visibility, vitality, and viability of programs.

That June we were ecstatic to learn we had received one of only two national facilitation grants awarded that year.

Off we go . . .

Our first step was to track down all Extension-affiliated monitoring programs and learn what they were doing, how they operated, what their needs were, and what was exemplary about their programs. We wrote about some of our findings in *The Volunteer Monitor* Winter 2003 issue (available at www.epa.gov/owow/volunteer/vm_index.html; see page 18, "Cooperative Extension/Volunteer Monitoring Partnerships").

We then built a website (www.usawaterquality.org/volunteer/) as the virtual home for our project and began to fill it with information. We posted the results of our nationwide inquiry, including contact information for all Extension programs, and started creating the centerpiece of our website: the *Guide to Growing Programs*, a series of factsheet learning modules for volunteer monitoring program coordinators. Soon we began offering training workshops based on the *Guide* modules and posting the accompanying PowerPoint presentations on the website.

We also established a listserv where anyone interested in volunteer monitoring could post announcements, ask questions, and share information. (To join the listserv, go to https://lists.uwex.edu/mailman/listinfo/csreesvolmon.)

Over the past nine years, the website has continued to grow and to expand its scope beyond Extension. Everything on the site is pertinent to all volunteer monitoring programs, whether Extension-related or not.

Don't reinvent the wheel

So, how do we know what folks need? To start with, the three main project leaders—Elizabeth Herron and I at URI Watershed Watch, and Kris Stepenuck at Wisconsin's Water Action Volunteers—are all longtime veteran coordinators of volunteer monitoring programs. We know what we ourselves needed, both when we first started our programs and later as our programs grew and technology changed.

In designing the website, factsheets, and other products, we thought about the issues that volunteer monitoring program coordinators face, from how to get a program started to study design, effective training, communication with volunteers, data management, and of course data quality assurance. Fortunately we had an abundance of resources to draw on. All of these topics have been explored over the years in *The Volunteer Monitor* newsletter and were frequently discussed at the six EPA-supported national volunteer monitoring conferences held between 1988 and 2000. The postings on both our own listserv and the EPA's volunteer monitoring listserv provide great fodder and inspiration for our *Guide to Growing Programs*.

The guide's factsheet modules became a perfect vehicle for us to discover and

organize what's out there for each topic. Elizabeth Herron and Kris Stepenuck mined the numerous excellent volunteer monitoring program websites and became Google experts in our search for other information sources. The modules themselves are peppered with links which are checked and updated at least annually.

Sometimes annoyance can foster change. I found that I was holding onto a great number of listserv postings that I found valuable. This was cluttering up my inbox, and then of course I lost everything when my computer crashed. That experience led to a new section on the website, "Select Archives of Volunteer Monitoring Listserv Discussions," which currently houses over 80 listserv discussions.

The perennial question: Are volunteer data good enough?

Will there ever be a time when volunteer monitoring data are viewed as being on par with data collected by agencies, academics, or consultants? Just recently I listened to someone from a state agency say (on a conference call) how unfortunate it is that most volunteer data just cannot be trusted. It seems that just when we have one generation of managers convinced, a new set comes along who need to be convinced anew. To help program managers facing this challenge make the case for the quality of their data, we created a website section called "Researching Volunteer Monitoring" that contains links to data comparability studies, many published in peer-reviewed journals. Although not an exhaustive bibliography, it has proven extremely useful—and we are always looking for additions to supplement that section.

Where to next?

We are now embarking on our third and final round of four-year funding from CSREES. We will be creating *Guide* modules on several new topics, including tiered approaches to volunteer monitoring. Frank Finley from Salish-Kootenai College on Montana's Flathead Reservation has joined our team and is leading our efforts to strengthen volunteer monitoring within tribal communities. It has been very rewarding to see how our national facilitation project has been able to help new volunteer monitoring programs get started and longtime stalwarts expand and evolve.

Linda Green is Program Director of URI Watershed Watch and coordinates the CSREES Volunteer Water Quality Monitoring National Facilitation Project. For more information see www.usawaterquality.org/volunteer or contact Linda at lgreen@uri.edu; 401-874-2905.

ELIZABETH HERRON

Representatives from tribal colleges at a workshop sponsored by the volunteer monitoring national facilitation project.

Subscriptions

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Summer 2005 - Macroinvertebrate Monitoring
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Spring 2009 - Aquatic Invasive Species
Fall 2009 - Celebrating Volunteers & Innovation

Back issues online

Issues from spring 1993 onward are posted at www.epa.gov/owow/volunteer/vm_index.html. (Note that for issues before 2002 the posted version is different from the original layout.)

A subject index for Spring 1993 through the current issue is also available at the website.

Hard copy back issues

Single copies of back issues are available for a shipping and handling charge of $2 apiece. Send requests and payment to The Volunteer Monitor, 50 Benton Ave., San Francisco, CA 94112.

Some recent issues are available in quantity at a greatly reduced price for distribution at workshops and events.

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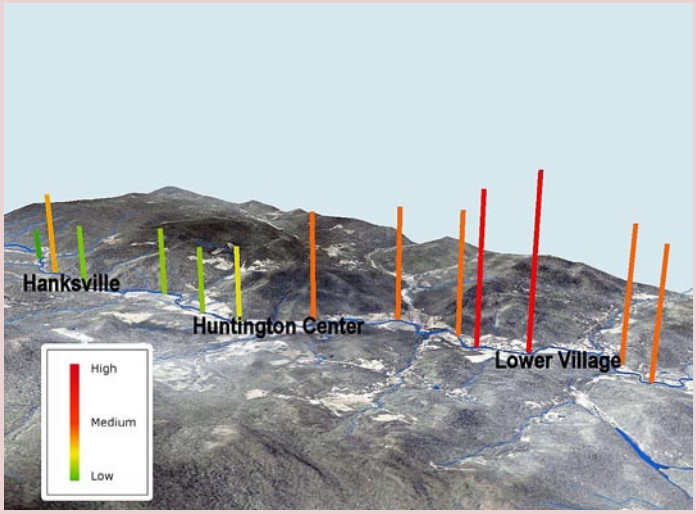
INTERNATIONAL, continued from page 13

organizations relate to us as if we're going to stick around for a while, and as if we have something important to contribute! In turn, we have been a catalyst for institutional transformations of the university, particularly the International Center in which we work. The Center has changed its outlook and policies to be more receptive to what volunteer monitors can do as watershed stewards, and how a university like Auburn should support these dedicated citizens.

It's so easy for water monitoring program coordinators to get caught up in the day-to-day operations and "brush fires" of keeping things going. There is always a workshop to plan and conduct, water data to evaluate and present, a proposal or report to write, a new polluter who has just moved into the neighborhood, or the "problem monitor" to deal with. But it's essential that we occasionally step back and consider the track we're on and what level of influence we are achieving. Seeing our programs in the big picture, even as being one part of a much larger worldwide citizen movement, can energize us and clarify our long-term vision of what citizen monitoring can become in the next 20 years.

Bill Deutsch directs the Alabama Water Watch and Global Water Watch programs, and is a Research Fellow in the Department of Fisheries and Allied Aquacultures at Auburn University (deutswg@auburn.edu; 334-844-9119).



An Eye-Catching Way to Show Data

Aaron Worthley, a volunteer monitor with the Huntington River Conservation Partnership in Vermont, created this striking image to visually convey the pattern of *E. coli* results across the watershed. The graphic is especially easy to interpret because the bars indicate *E. coli* counts in two ways: height and color.

Worthley, a professional GIS mapper, says he used specialized commercial software to create the graphic but similar results could be obtained using Google Earth.

The model presented in this article is the basis for a new book titled *Community-Based Water Monitoring, A Practical Model for Global Watershed Stewardship*, co-edited by Bill Deutsch and others, and scheduled to be published in 2010. It will be available through the Global Water Watch office; toll-free number 888-844-4785.