

Saturday Stream Snapshot Captures Stream Quality

By

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Citizen Monitoring is growing in popularity throughout the United States as a way to collect baseline information on small streams and tributaries that agencies do not have the time and resources to monitor and as an inexpensive way to identify potential problems for water resource professionals. Monitoring allows local residents to learn first hand what condition their local streams are in and allows them to take actions to improve them if needed. As communities struggle to implement storm water management programs under the new Phase II Requirements or participate a Total Maximum Daily Load (TMDL) Study to reduce nonpoint source water pollution, (both mandated by the Clean Water Act), citizen monitoring programs can provide an avenue for them to educate local residents and secure the needed community buy-in to implement new resource protection programs.

One of the challenges faced by Citizen Monitoring Programs is generating high quality accurate information. Concerns center mainly around volunteer training, ability of widely available kits to detect pollution, sporadic sampling, not enough data points to establish trends, and lack of quality assurance and quality control (QA/QC). Given these challenges, Greenacres Foundation (GAF) decided to enlist partners to pilot a high-end citizen lab that would address those concerns. GAF enlisted the help of the Little Miami Inc., Cincinnati Chapter of Izaak Walton League, Warren County Water and Sewer, Metropolitan Sewer District (MSD), Hamilton County Wet Weather Initiative, Southwest District of Ohio Scenic Rivers, and the Little Miami River Partnership to help develop the program and co-sponsor a grant application to fund the program. GAF decided to take the lead and apply for grant funding. GAF received a Supplemental Environmental Project (SEP) Grant from the Ohio Environmental Protection Agency settlement with Rumpke and other in-kind donations to start the program.

Partners decided to model this program after a successful one-time, summer Citizen Monitoring Program Anne Lyon headed up when she worked for the Tennessee Valley Authority (TVA) in 1996. Instead of providing volunteers with their own water monitoring kits, partners decided to outfit an entire lab with high-end equipment found in certified labs and to have certified lab analysts train and supervise volunteers. This addressed several key issues: generating accurate data, using equipment sensitive enough to generate meaningful data, and providing for quality assurance/quality control (QA/QC). Partners decided to recruit many volunteers to collect samples for us on a regular basis, rain or shine, from March through November to assure data would not be sporadic and that sufficient data would be collected to begin to evaluate sites. Efforts were concentrated on training and collecting representative samples to process. A regular routine was established to make it easy for volunteers to get accustomed to the schedule and reliable about providing samples. To make sampling even easier, coolers were placed in convenient locations and established a 4- hour window for dropping them off. Volunteers that missed getting their samples into the coolers were asked to bring them

directly to the lab before noon. Certified lab analysts are used to train a small, dedicated group of volunteers to serve as volunteer lab analysts. To assure they are performing the procedures correctly, they are tested by the lab analysts with known samples. A draft QA/QC plan was developed with the assistance of Warren County Water and Sewer and MSD that is still being refined as logistics are worked out in the lab.

The Partners decided to call the new program the “Saturday Stream Snapshot” because on the Second Saturday of every month from March through November trained citizens collect water samples from their neighborhood streams. This creates a “snapshot” or picture of water quality conditions in local streams based on water quality conditions that day. Six or more samples or “snapshots” per year are needed to begin looking at water quality trends at a single location. The program’s overall purpose is to gather baseline data on urban streams that have never been monitored before and to educate local residents about water quality conditions in their local streams.

We chose six tests – pH, conductivity, turbidity, nitrate-nitrogen, total phosphorus, and fecal coliforms - because previous data from the Lower Little Miami River Watershed indicate these parameters would help us look at primary water quality issues. This was also a reasonable number of measurements for our volunteers to process. We chose pH because most organisms have adapted to a pH between 6.5 – 8.0 and even slight changes in pH can cause stress, inhibit reproduction, and even kill organisms. Significant changes in pH can indicate chemical spills, acid rain, or loss of riparian cover. Conductivity is a very basic measurement used by many water quality professionals because it measures the impurities in water, such as dissolved salts. High conductivity measurements (greater than 500 microsiemens/cm) can indicate the water is polluted with wastewater discharges, factory wastes, or pollutant-laden urban runoff. Turbidity is a very important measurement because erosion from construction and flooding events can coat stream bottoms and reduce the streams ability to support aquatic life. Less than 20 NTUs is desirable. (NTUs are a measure of how much light can pass through water.) High nutrients are another major issue in this sub-basin. High nitrates (greater 1 mg/L) and phosphates (greater than 0.1 mg/L) can cause algae to grow out of control in freshwater streams. Algal blooms can tie up oxygen and cause fish kills, especially in late summer when waters are warmer. Fecal coliforms are an important measure because the Little Miami River is used for recreation and fishing. There are a number of wastewater treatment plants that discharge into the Little Miami River and there have been numerous problems with sanitary sewer overflows and failing septic systems. Sanitary sewers overflows occur after rain events and result in raw sewage being discharged into area streams. For body contact recreation like swimming a mean value of less 200 colonies per 100 mL is required.

The program works like this - between 6:00 – 10:00 am, trained volunteers collect water samples and place them into coolers for runners to pick up. These samples are transported to our new Little Miami River Lab where volunteers under the supervision of trained lab analysts process the samples between 10:30 a.m. and 4:30 p.m. These data are entered into the Little Miami Volunteer Database so they can be used in watershed planning and protection activities and to identify water quality problems. Every Saturday

at 10:00 a.m. we train new water samplers. On selected Saturday's at 11:00 a.m. we conduct other training such as macroinvertebrate sampling or habitat surveys.

In the lab, Standard Methods are followed for all parameters. Volunteers fill two pre-sterilized bottles. One bottle is used exclusively for the fecal test and the other sample is used to perform all the other measures. All samples must be labeled properly and be accompanied by a completed field data sheet that contains volunteer identification information, site information, weather data, and some habitat data. GPS is used to record longitude/latitude in decimal degrees for each sample site. Prior to each lab session, all equipment is calibrated following the manufacturers recommendations and all expiration dates checked on reagents and media. Each lab analyst volunteer is assigned to one station only during the lab work, although we do permit volunteers to rotate to a new station the following month. The lab is outfitted with a DR2400 Spectrophotometer to measure total phosphorus and nitrate-nitrogen. A Hanna Portable Turbidimeter is used to measure turbidity, an Orion meter to measure conductivity, and a Hach Pocket Pal to measure pH. Fecal coliform bacteria are cultured by filtering the samples through a membrane filter and then incubating them in a water bath. Fecal plates are read 22-24 hours after they enter the water bath.

The doors of our new high-end Citizen Lab opened May 3, 2003 at the Izaak Walton League Lodge at 544 Branch Hill-Loveland Rd. near Loveland, OH. This pilot project is taking place in the Lower Little Miami Watershed that extends from where Todd's Fork enters the main stem of the Little Miami River and extends to where the Little Miami enters the Ohio River excluding the East Fork sub-watershed. In three short months 18 volunteers have been trained and 28 sampling sites have been monitored. During the first sampling event, a monitor located two failing septic systems that were reported to the health department and have now been repaired. Shortly after our 3rd sampling event a volunteer discovered their stream was covered with white foam and we successfully traced the origin of the spill with the help of Ohio EPA to a local fire department who had discharged fire fighting foam into the creek. As word of the program spreads, the partners hope to develop a dedicated groups of monitors that can help develop the baseline information we need to assess water quality in the Lower Little Miami Sub-basin. If you would like more information, contact Anne Lyon at (513) 891-4227 at alyon@green-acres.org.

PHOTO: Volunteer James Belzer preparing total phosphate samples.