

# **Biological Monitoring - Technical Training for Citizen Volunteers**

**Kristen S. Travers**

Kristen Travers has been an education specialist at the Stroud Water Research Center since 1994. Combining a background in environmental science and education, Travers designs and conducts programs, workshops, and curriculum for students, teachers, and the general public designed to educate about water resources and issues. She has also provided extensive training to watershed organizations and teaching strategies and techniques to educators and water quality professionals.

**ABSTRACT:** Biological monitoring is increasingly being used by grassroots organizations to assess nonpoint source pollution. Adequate training opportunities are key to the success and sustainability of volunteer based monitoring programs. In 1990, the Stroud Water Research Center and the White Clay Watershed Association initiated a technically based, volunteer driven biological monitoring program. The collective experiences and methodologies gained from through this pilot program were refined to produce Stream School which provides training in biological monitoring, stream ecology, and watershed processes for volunteer monitors.

**KEY TERMS:** Volunteer monitoring; streamwatch; education

## **Introduction**

Despite increasing usage of our water resources, shrinking budgets and cutbacks have limited State and Federal regulatory agencies ability to initiate and sustain watershed monitoring programs. Grassroots organizations have become increasingly active in filling this void. Although numerous volunteer programs exist, a lack of adequate training has hampered the ability of many volunteer programs to produce meaningful results. This paper will detail the development of several programs and partnerships formed by the Stroud Water Research Center to assist citizen volunteers in designing and implementing monitoring programs.

The Stroud Water Research Center (SWRC), founded in 1967 in Avondale PA, is dedicated to advancing knowledge of stream and river ecosystems through research and education. Research at SWRC has focused on microbial ecology, organic chemistry, ecosystem modeling, population genetics, insect ecology, and hydrology. SWRC and its 1,800 acre experimental watershed along White Clay Creek, were designated an Experimental Ecological Reserve in 1981 by the National Science Foundation.

### **White Clay Watershed Streamwatch: Development of a technical, volunteer-based biomonitoring program**

The White Clay Creek (WCC) drains approximately 69,000 acres in southeastern Pennsylvania and northwestern Delaware. Most of the watershed lies within the Piedmont region with a small southern portion in the Coastal Plain. The WCC watershed is habitat for a diverse community of plant and animal species and is a significant source of water for local communities. For the past two decades the watershed has been in transition, the rural nature of the area diminishing as suburbanization becomes the dominant force.

Concerns caused by the rapid development taking place in the watershed led to the formation of the White Clay Creek Streamwatch in 1990. The streamwatch evolved as a collaborative effort of the White Clay Watershed Association (WCWA), a volunteer not-for-profit organization working to preserve and protect the quality and quantity of water in the watershed since 1965, and Stroud Water Research Center. WCWA's goal was to establish a rigorous monitoring program to produce credible and meaningful data to be used for local planning, decision making, and community awareness.

Watershed volunteers initially participated in approximately 20 hours of field and laboratory training by Stroud Center staff. Training materials such as macroinvertebrate keys and sorting aids were developed to assist the group. At this time the watershed committed \$1,000 for the purchase of equipment and for the development of the program and the Stroud Center contributed in kind support primarily through staff time.

The initial responsibilities for organizing the project were as follows:

#### **SWRC Staff**

- Selecting monitoring stations with WCWA
- Overseeing data collection and quality control measures
- Recommending collection techniques and quality control measures
- Supervising macroinvertebrate identification
- Archiving macroinvertebrates and data at the SWRC
- Analyzing data and reporting

#### **WCWA Volunteers**

- Selecting monitoring sites with SWRC
- Organizing volunteers
- Collecting data
- Sorting, counting, and identifying macroinvertebrates
- Community awareness

Permanent sampling stations were initially located only in the Pennsylvania portion of the watershed. Partnership with the Delaware Nature Society later allowed for the expansion of 3 new sites in the Delaware portion of the watershed to provide a comprehensive watershed assessment.

Macroinvertebrates are collected annually. For consistency the first Saturday in April is the collection date for the WCC program. Collecting at the same time each year provides continuity for the volunteers. Also it is self-scheduling and allows the streamwatchers to become familiar with a given set of macroinvertebrates. April was chosen for three main reasons: (1) macroinvertebrates (especially the insects) are fairly large and mature and easier for volunteers to identify; (2) most overwintering larva have not emerged and laid eggs so there is less chance of confounded data; and (3) macroinvertebrates collected in April have generally been active as larvae since September and thus the relative abundance of the various taxonomic groups reflects at least several months of environmental variability.

Surber nets were selected for sampling rather than the kick-net technique commonly used in volunteer monitoring. Samples, collected from comparable woodland riffles, are preserved in the field and later sorted and identified to the family level by volunteers. All samples are archived if future examination is ever warranted.

As WCWA became comfortable with the protocols and identification, volunteers increasingly took responsibility and leadership of the Streamwatch program. Although the group struggled with maintaining the level of rigor they originally set to achieve, the dedication of a small, highly motivated group of volunteers proved capable of compiling high quality data. This information can now be used for local decision making, planning, and education and will provide an important record of present conditions and reference for the future.

## **Stream School**

The collective experiences and methodologies gained through the White Clay Creek Streamwatch were refined to produce Stream School. Stream School provides training in biological monitoring, stream ecology, and watershed processes for volunteer monitors. Inherent to the program is the belief that citizens are crucial stakeholders in watershed protection. Watershed protection, planning, and restoration efforts are often most effective when initiated at the local grassroots level by those with a direct stake and interest in the long-term sustainability and success of such endeavors. Participants are not told how they should monitor but instead are provided with monitoring options. By providing the necessary background to begin assessing and understanding watersheds, these groups can select monitoring strategies best suited to their specific needs.

## **Merging Science, Volunteer Monitoring, and Education**

Located within the heart of Pennsylvania's anthracite coal mining region, the Schuylkill River Watershed is significant historically, economically, as well as ecologically. Past as well as present activities have resulted in severely degraded water quality throughout large sections of the watershed. In 1995, SWRC began the Schuylkill Watershed Initiative to enhance public understanding and appreciation of the watershed. Supported by the William Penn and Wyomissing Foundations, the project will enable citizens to protect and improve water quality through information provided through research and education.

Strategically located sites within the watershed are monitored annually by SWRC as part of a water quality study. Information gained from this study will serve as a reference for organizations working to protect and improve water resources within the basin. A partnership with the Schuylkill Riverkeeper was established to recruit volunteers to eventually take ownership of the monitoring project. Training for these volunteers is provided through Stream School workshops. Educational opportunities specifically geared toward teachers and students are also provided by SWRC staff throughout the Schuylkill Watershed. Stimulating an interest and appreciation for streams and watersheds among students as well as adults through effective communication and education is paramount in achieving water quality goals.

