DECEMBER 2005 • Vol. 26, Number 2

CUR Focus

Mel Zimmerman, Director, Clean Water Institute
Lycoming College

The Clean Water Institute at Lycoming College

Founded in 1812, Lycoming College is a private, liberal arts college of approximately 1400 undergraduate students located in Williamsport, Pennsylvania. Biology has consistently been one of the largest majors at the College. Eight full-time faculty members deliver the biology program to Lycoming students. Dr. Mel Zimmerman, professor of biology, created the Clean Water Institute (CWI) in 1999 to provide a forum for the "natural resources heritage" of North Central Pennsylvania and the West Branch of the Susquehanna River Watershed. The Susquehanna River is one of the primary sources of fresh water into the Chesapeake Bay (providing over 44%). Water is one of Pennsylvania's more precious resources. There are over 83,000 miles of streams and 4,000 lakes. The state of Pennsylvania has identified water quality as a main agenda for the 21st century and recognizes the importance and participation of local watershed groups for the improvement and maintenance of this resource. The Institute is housed within the Environmental Science track of the Biology Department. The specific goals of the Clean Water Institute are to provide:

- **SERVICE** to local watershed and environmental groups by developing and coordinating internships and independent study projects where Lycoming College students can assist in data collection and analysis of watershed projects.
- **EDUCATION** and training programs, seminars and workshop on environmental issues, stream restoration, habitat improvement and water quality will be offered to watershed groups, schools and other public forums. An archive of historical water quality data will be assembled and updated with information from ongoing projects and made available to the public.
- **ANALYSIS** by the water-testing laboratory will provide watershed groups with technical assistance in design, collection and interpretation of water chemistry, macroinvertebrate, plankton and fish data.

A documentation of the goals of CWI, as well as summary projects, can be found at its website: http://www.lycoming.edu/biology/cwi.

Students in the Clean Water Institute are provided with a number of intentional and invaluable learning opportunities. As part of a capstone experience requirement, the Biology Department requires all seniors to complete a supervised practicum experience, a colloquium presentation and an exit examination. In preparation for these academic milestones, the Clean Water Institute introduces Lycoming students (who are largely Biology majors or Environmental Science minors) to "real world" skills related to environmental science. In particular, students master and then teach each other skills such as quality assurance, quality control, lab protocols, run standards, split samples and follow chain of command with 3rd party labs for verification. Students also gain significant practice in scientific report writing and communication skills through oral and poster presentations to local watershed groups and state associations.

CWI interns collecting length and weight data on fish as part of a stream-monitoring project.

The concept behind the Clean Water Institute is to create collaboration between Lycoming College faculty members and students and local watershed groups with the goal of addressing environmental problems related to the abundant water sources in the region. Through the Institute, Lycoming students have established 17 permanent monitoring sites along the West Branch of the Susquehanna and directly support projects with 12 local watershed groups (such as Pine, Loyalsock and Muncy Creeks). One of the Muncy Creek Projects identified 122 high, medium and low potential erosion sites (following Natural Resource Conservation Service protocols) and provided a GPS map along 48 miles of stream. Via the Clean Water Institute, Lycoming students provided the field analysis, which resulted in a funded proj-

ect to restore a section of stream through what is known as the Natural Stream Channel Design, for which Lycoming students will provide pre- and post-water chemistry and biological monitoring. In addition to the assessment of potential erosion sites, other projects have used EPA Rapid Bioassessment protocols for fish and macroinvertebrates to support water chemistry data collected by the institute or community volunteer watershed monitors. The data collected, analyzed and presented by Lycoming Clean Water Institute students are used by the local watershed groups for management of the watersheds and to create environmental improvements.

Since 1999, several trends illustrate the positive impact the Clean Water Institute has had for Lycoming students, the College and regional partners. The number of students who have pursued honors projects as part of the Biology major have increased since 1999. The Clean Water Institute enables students to participate in a one semester independent study or complete a year-round honors project. In these honors projects, students conduct research on local rivers or creeks and report their findings to watershed associations. The honors projects are modeled after a thesis project in which students construct a committee of five faculty, two of whom must teach in a department other than Biology. Students present their results in a research thesis not only to their peers and faculty on campus, but also provide a professional report to the local watershed group sponsoring the project. In the past five years, 5 CWI students have completed honors project, 13 students have presented papers at state or regional associations and students have provided over 27 presentations to local watershed groups on research specific to those sites.

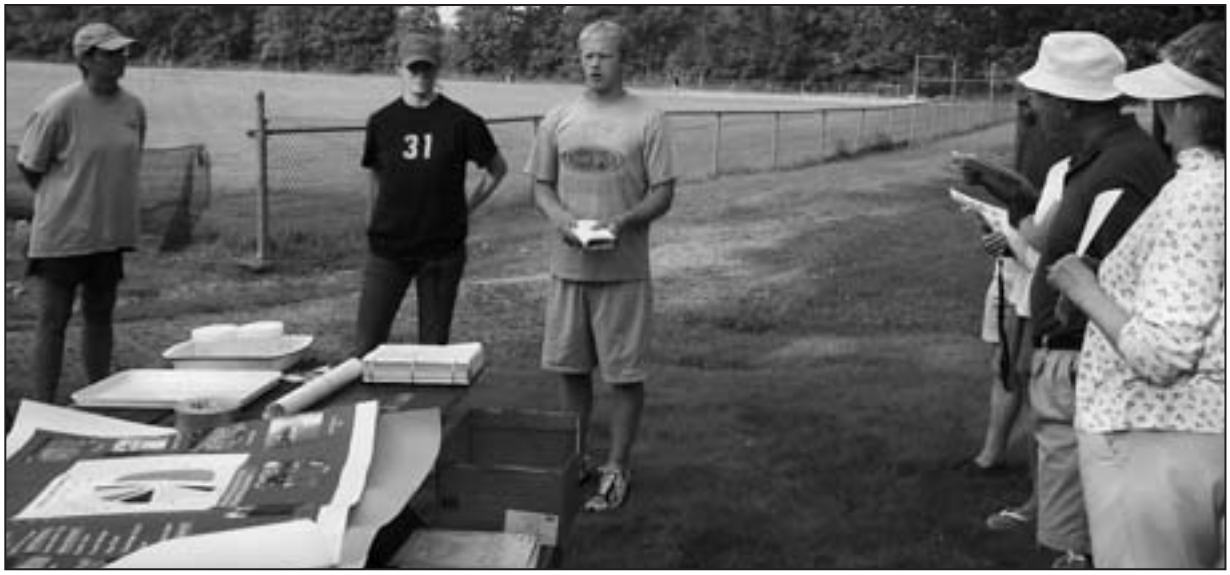
Clean Water Institute students receive an enhanced liberal arts education complimented by direct hands-on experience that provides them with a competitive edge as candidates for graduate school or a career in environmental science. Clean Water Institute students have consistently been accepted into their top choice for graduate school or been hired in competitive Environmental Science positions. Several Clean Water Institute graduates are doctoral candidates, one of whom was one of 52 recipients of the Phi Kappa Phi scholarship for graduate work. Many others have secured jobs in significant environmental science roles. A senior in the Class of 2005 exemplifies the enhanced learning opportunities for Lycoming students through the Clean Water Institute: during the summers after her freshmen and sophomore years, she completed two separate CWI research internships with local watershed groups; the summer after her junior year, she participated in

CWI intern Katie Swanson with a prize brook trout collected during a fish population study.

the Research Experiences for Undergraduates program at Clarkson University, now during her senior year is completing an honors project year, and recently was accepted into three graduate programs in Environmental Science.

The data collected, analyzed and presented by Clean Water Institute students are used by the local watershed groups for management of the watersheds and to create environmental improvements. For example, this past summer, student interns established a number of protocols related to their watershed work that they teach to their peers in the freshmen and sophomore classes, present to local watershed groups and post on the Clean Water Institute website for others to use. These protocols range from assessment of water quality and erosion to benthic macroinvertebrate sampling and analysis.

Each year, Lycoming Clean Water Institute students also conduct workshops for local high school students. For example, this past October, Lycoming students directed a Milton Senior High School's Outdoor Education and Environmental Studies class in completing a fish survey along Limestone Creek. Macroinvertebrate and water chemistry samples were also collected as part of the monitoring sys-



CWI interns Laura Lockard and Brad Musser present their research at a Buffalo Creek watershed meeting.

tem. With the Lycoming students' help, the high school students were able to practice sampling of fish using an electroshocker as well as identification and assessment of habitat. This kind of event has been replicated with at least two high schools each year, spreading the knowledge of Lycoming students to aspiring scientists in the county.

Most significantly for the realization of this program, the achievements of the Clean Water Institute have yielded a number of grants and external recognition. The Institute has received over $225,000 in grant funding from organizations such as the Pennsylvania Department of Environmental Protection, Merck/AAAS, the Chesapeake Bay Foundation and Trout Unlimited. Each of these grants contains support for students during summer research, mileage to and from watershed sites, or equipment and supplies for projects. The Clean Water Institute was initially funded with a $20,500 Pennsylvania Department of Environmental Protection Growing Greener Grant in 1999. Building on this success, other grants from local organizational/foundations or sportsmen's clubs, along with state and federal sources have been secured ranging in size from $2,000 to over $100,000. While the Institute has been fortunate in securing funding directly to the college, funds for six other projects have been secured by grants written by local watershed groups where they have included CWI as consultant/partner. Many of these projects require "in-kind" match. This may be as much as 30-80 hours of service. This is generally provided by students and staff during the academic year while they are enrolled in Environmental Practica, Internship or Independent Study courses. A significant amount of community outreach and service learning occurs during this phase.

The Clean Water Institute at Lycoming College has afforded our Biology students and Environmental Science minors with concrete skills that have not only enhanced their individual educational experiences, but have contributed in meaningful ways to regional watershed groups and the State of Pennsylvania with research on Environmental Science. In November 2001, the Secretary of the Pennsylvania Department of Environmental Protection recognized the Clean Water Institute with an award and stated, "The real data we get from your work will be invaluable. This is exactly the kind of project partnerships that Growing Greener was created to support." The Clean Water Institute at Lycoming College reflects the unique opportunities available to undergraduate students at a liberal arts college through collaborations between faculty, students and the community.

Mel Zimmerman
Professor of Biology
Director, Clean Water Institute
Lycoming College
700 College Place
Williamsport, PA 17701
EM: ZIMMER@lycoming.edu
CWI website: http://www.lycoming.edu/biology/cwi/index.htm

Mel Zimmerman has been teaching for 26 years and is the Lowry Professor of Biology at Lycoming College. He is an aquatic ecologist and director of the college's Clean Water Institute. In October 2005, he was recognized at a state dinner by Pennsylvania Governor Ed Rendell for "Lighting our way through positive impact on the Commonwealth's environment."