



# FINGER LAKES INSTITUTE



## HOBART AND WILLIAM SMITH COLLEGES

601 S. Main St.  
Geneva, NY 14456  
Phone (315) 781-4390  
Fax (315) 781-4399  
E-mail: [fli@hws.edu](mailto:fli@hws.edu)  
<http://fli.hws.edu>

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## Funding Announcements

### Booth Ferris Foundation awards Hobart and William Smith Colleges \$150,000 for Finger Lakes Institute

The **Booth Ferris Foundation** in New York City has awarded Hobart and William Smith Colleges a grant for \$150,000 to complete capital projects necessary to advance the Finger Lakes Institute's facility and research capabilities. Specifically, the grant will support completion of a basement lab facility at the Institute, construction of trail access to the lake and a dock behind the Institute building, construction of a storage facility to house the Colleges' ancillary research vessel, *The J.B. Snow*, and acquisition of an air/water monitoring buoy to be deployed in Seneca Lake.

The Institute's laboratory construction will include installation of lab cabinets and work space, storage for research equipment and materials, sinks, a safety shower, and fume hoods. The space will be utilized for ongoing scientific water quality research and analysis, as well as for the Institute's education and outreach activities with HWS students, students at the K-12 levels, and the general public.

Construction of dock and trail access to the lake will enable the Institute to conduct lakeside monitoring and sampling programs for scientific research as well as educational outreach activities. Lake access is viewed as especially critical to the expansion of the "Science on Seneca" high school education program, and work to provide environmental education to other K-12 school groups. Dock and lake access will also coordinate the effective transition from field to lab, where expanded analysis can be performed on water samples.

Construction of a storage facility on the campus of Hobart and William Smith Colleges for *The J.B. Snow*, a 25-foot pontoon boat for ancillary research on the Finger Lakes (acquired in 2004 with funding from the J.B. Snow Foundation and the U.S. Department of Education through the courtesy of Congressman James Walsh), will also be completed as part of this capital initiative. Used almost daily during the active research schedule on the Finger Lakes, *The J.B. Snow* is fully equipped to undertake water monitoring and sediment sampling. Until now, however, when not in use, the boat was kept in the campus parking lot. The new facility will house the boat, the trailer, and other field equipment currently held or that will be acquired.



Eastern view of Seneca Lake from the FLI.

PHOTO BY SARAH MEYER

**Construction of the lab, storage facility, dock and lake access, along with acquisition and deployment of the buoy are scheduled to begin in spring 2006.**

Booth Ferris funding also will support the acquisition of an air and water monitoring buoy. The first such piece of scientific equipment for the Institute, the buoy will be deployed in Seneca Lake and used to assess lake and air interactions by an automatic data acquisitions system that collects water column profiles and meteorological conditions at the buoyed site in the lake. Scientific excursions on the lakes take a snapshot of the lake's conditions on that day. Lakes vary day-to-day, season-to-season, and year-to-year as atmospheric forces shift and drive the physical, biological, chemical, and geological interactions in the water. The buoy will be programmed to collect water column profiles that include temperature, salinity, pH, dissolved oxygen, turbidity and chlorophyll concentrations, as well as air temperature, pressure, relative humidity, solar radiation, and wind speed and direction. The Institute's research staff will be able to evaluate this critical lake data provided by the buoy; in addition, the buoy will be a valuable teaching tool that will enhance students' research experiences. Data will be sent to a central computer, archived, and made available to the public on a near real-time basis through the Institute's Web site.

Construction of the lab, storage facility, dock and lake access, along with acquisition and deployment of the buoy are scheduled to begin in spring 2006.

## Research

### Accumulated data helps assess impact of human activity on Keuka Outlet

By Sarah Meyer, FLI Community Outreach Coordinator

#### A brief history of Keuka Outlet

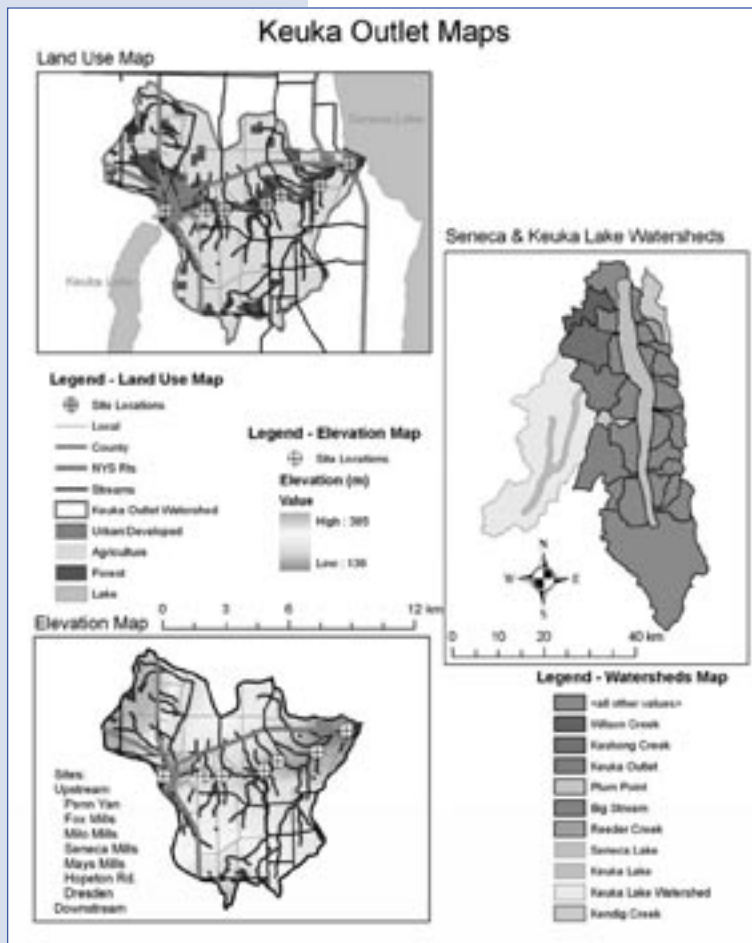
Since the late 1700s, humans have had an effect on the water quality of the Keuka Outlet, the major tributary that connects Keuka and Seneca lakes. Early settlers utilized this reliable water source and eight-mile-long transportation route to power gristmills, sawmills, distilleries, tanneries, cotton factories and paper mills from Penn Yan to Dresden, New York. Even today, after the 30-40 mills have been shut down and abandoned, people continue to interact with Keuka and Seneca lakes, and the waters that unite them, by subjecting them to a variety of point and non-point pollutant sources—organic, agricultural, and industrial.

#### Keuka Outlet today

Today's industries that are reliant on the Outlet include municipal wastewater treatment plants, a coal-burning power plant, and chemical processing and manufacturing plant. The middle portion of Seneca Lake is a Class AA drinking water source, the highest possible ranking for drinking water quality within the New York State Department of Environmental Conservation's Priority Waterbodies List (PWL). However, the 1-mile radius surrounding the entry point of the Outlet is classified as Class B. The classification decreases upstream, where the Keuka Outlet itself is restricted to a Class C waterbody.

#### Determining pollutants that affect Keuka Outlet

In 2003, in response to public concern for the Outlet's water quality, the inherent risks to human health, and the creation of the Torrey Ad-Hoc Environmental Committee, Hobart and William Smith Colleges and the Seneca Lake Pure Waters Association conducted research on the Outlet. The result of their efforts is compiled in *Water Quality and Pollution Sources to the*



*Keuka Outlet, 2003-2005*. Written by John Halfman, Associate Professor of Geoscience and Environmental Studies at Hobart and William Smith Colleges, and many undergraduate students, the report provides members of the Town of Torrey and surrounding Seneca and Keuka Lake communities with information about Keuka Outlet water quality and the potential effects humans are having on it.

Building upon this work, the Great Lakes Aquatic Habitat and Network Fund awarded a grant in 2005 to the Seneca Lake Pure Waters Association, enabling John Halfman and his students to conduct a stream segment analysis of the Keuka Outlet. Stream segment analysis is used to identify the source of a pollutant along a stream. It includes testing water samples for common water quality indicators such as temperature, conductivity, dissolved oxygen, pH, major ions, alkalinity, nutrients, total suspended solids, total coliform and *E. coli* bacteria counts, and stream discharge.

Weekly water quality samples were collected from multiple sites along the Keuka Outlet during the summer and fall of 2003, and the summers of 2004 and 2005. Measurements up and downstream from potential point and non-point pollutant sources along the Keuka Outlet, from other tributaries in the Seneca Lake watershed, and from Seneca and Keuka Lakes, provided temporal and spatial comparison as well as correlations among precipitation and runoff events, land uses, and geologic patterns throughout the watershed.

With a focus on locating pollutants that were organic (e.g., from living and dead organisms and their by-products) and agricultural (e.g., from runoff of fertilizers, organics, sediment, herbicides and pesticides), the Keuka Outlet study analyzed total coliform and *E. coli* bacteria, dissolved nutrients, total suspended solids, and dissolved ion concentrations. Researchers tested these specific parameters because they suspected aging onsite sewage treatment systems and agricultural land use were the primary contaminants affecting water quality. What the results revealed, however, was that bacteria, nutrient, suspended sediment, and major ion concentrations were well below maximum contaminant levels (MCLs) established by the NYS Department of Environmental Conservation.

In the final Keuka Outlet water quality report, Halfman recommends reducing the input of pollutants to the Outlet by making efforts to:

- reduce the input of bacteria and nutrients entering Keuka Outlet upstream of the Penn Yan site;
- inspect, clean, and improve onsite wastewater systems within the watershed or replace them with a sewer system and adequate municipal wastewater treatment;
- reduce the runoff of pollutants from agricultural and urban landscapes.

Members of the Finger Lakes community are encouraged to review *The Water Quality and Pollution Sources to the Keuka Outlet, 2003-2005* at <http://fli.hws.edu/resources.asp>. Finger Lakes water quality study results from the 2005 field season were presented to the public on February 28 by Dr. John Halfman.

## Annual Finger Lakes Research Conference

By Sarah Meyer, FLI Community Outreach Coordinator

The second Annual Finger Lakes Research Conference is scheduled for Saturday, October 14, 2006 at Hobart and William Smith Colleges. The conference will build on the very successful first Annual Finger Lakes Research Conference for students, faculty and other scientists held on Saturday, October 8, 2005 at the Finger Lakes Institute on the campus of Hobart and William Smith Colleges.

With more than 65 attendees, the 2005 Conference hosted scientific presentations and poster exhibits from ten regional colleges and universities, as well as other organizations, such as the Upstate Freshwater Institute and the United States Geological Survey.

Both 15-minute oral and poster presentations were scheduled during the day-long conference to exhibit results of ongoing or completed research, or research plans and proposals focusing on the Finger Lakes region. Research themes included:

- Limnology and aquatic biology;
- Aquatic modeling and salts;
- Biocontaminants and pollutants; and
- Lake-effect snow, modeling and hydrology.

### Add your name to our mailing list

The Finger Lakes Institute has established a mailing list. If you would like to receive our publications, including our newsletter, sign up at <http://fli.hws.edu/MailingList.asp> or call (315) 781-4382. We offer our newsletter via e-mail to conserve resources.

### Stay up to date

with current Finger Lakes regional community outreach activities at <http://fli.hws.edu/workshops.asp>.

FLI staff and HWS faculty are also available to give presentations related to the Finger Lakes.

You may contact Sarah Meyer, the community outreach coordinator, by e-mailing [smeyer@hws.edu](mailto:smeyer@hws.edu) or calling (315) 781-4382 for further information.

### Search our Clearinghouse

Over 1,500 documents pertaining to the Finger Lakes are searchable on the Web. Search our database at <http://fli.hws.edu/flicatalog>

At the 2005 Finger Lakes Research Conference:

- Cornell University
- Hartwick College
- Hobart and William Smith Colleges
- Keuka College
- Rochester Institute of Technology
- SUNY Binghamton
- SUNY Brockport
- SUNY Buffalo
- SUNY College of Environmental Science and Forestry
- Syracuse University

With support from the Andrew W. Mellon Foundation of New York City, all conference attendees received free registration including a copy of the extended abstract volume (available at <http://fli.hws.edu/conference.asp>). In addition, a \$100 cash award honored the best undergraduate or graduate student presentation. The 2005 recipient of the Finger Lakes Research Conference Student Award was Matthew Beckwith for his presentation on "Nutrient Addition Effects on Phytoplankton Growth Rates in Keuka Lake."

Matthew, a resident of Dresden, NY, is a Keuka College senior majoring in environmental science with a minor in chemistry. He is studying under the guidance of Dr. Tim Sellers, assistant professor of biology and environmental science and creator of the Aquatic Research Program at Keuka College. "Besides being a smart, industrious student, Matt really seeks to understand the research objectives, not just do the work of the assigned project," Sellers said.

Matthew's scientific interests center on community and ecosystem level processes, including food web interactions and energy transfers. Under the supervision of Dr. Sellers, Matthew extended a summer internship by conducting experiments throughout the fall of 2005 as a component of his senior research project during which Dr. Sellers and he began to formulate experiments to understand the ecological functioning of phytoplankton within Keuka Lake.

"It is very exciting to be a part of a movement toward a better understanding of the Finger Lakes," Matthew explained. "This conference provided me with a great opportunity to experience how scientists share their information as well as learn what the next level

of my studies will be likely to entail." Matthew anticipates furthering his education through graduate studies in the field of limnology. He will publicly present his research findings at the FLI in May 2006.

The goal of the annual Research Conference is to highlight all aspects of Finger Lakes research and provide an opportunity to meet others interested in environmental science and scholarship. The conference brought together a diverse audience of scientists and students to present their research.

For more information about the 2006 Conference or to obtain copies of the 2005 extended abstract, visit <http://fli.hws.edu/conference.asp>.

## Introducing GIS to the Finger Lakes Region

*By Jim Hall, FLI GIS Specialist*

Jim Hall joined the FLI staff in August 2005 to facilitate the use and growth of Geographic Information Systems, a technology used to interpret scientific information through maps and geographic images, throughout the Finger Lakes region and Hobart and William Smith Colleges. The full-time position is funded by the Andrew W. Mellon Foundation of New York City.

As GIS specialist, Jim provides the technological expertise needed to help delineate environmental priorities for the Finger Lakes region. One of Jim's major projects includes developing and maintaining an online GIS research library and data depository for aerial photography, land use/land cover, demographics, property and tax data, transportation corridors, and weather maps.

Jim earned a bachelor's degree in environmental science from Alaska Pacific University and an MBA, with a GIS emphasis, from the University of Redlands in California. Before joining the FLI, Jim obtained professional GIS experience from public and private entities such as the Department of the Interior's U.S. Geological Survey (USGS) Earth Resources Observation



*Jim Hall, FLI GIS Specialist*

PHOTO BY SARAH MEYER



*Keuka College's Matthew Beckwith with Dr. Tim Sellers.*

PHOTO BY MARION BALYSZAK

Systems (EROS) Data Center, Raytheon Company, Arctic GeoScience, Inc., and most recently, Chambers Group, Inc. Throughout his career, Jim has used GIS to encourage the understanding of natural and manmade systems utilized by scientific and business studies for planning and analysis. Highlights from Jim's career include:

- determining the location of nuclear test facilities from geologic records of Kazakhstan, a republic south of Russia with its western border on the Caspian Sea;
- creating optimization models to determine the best route for roads in Kazakhstan and Northern Russia;
- modeling the sea floor of Cook Inlet, Alaska, to determine the location of electricity transmission lines; and
- analyzing alternatives along the Santa Ana River in California to determine the optimal location for the creation of a wetland area designed to naturally clean the waters of the river.

Jim's wife, Jennifer Sutton, and son, Timothy, and their two dogs, Oso and Candy, came with Jim to the Finger Lakes region. "We foresee a great deal of growth potential in the region and in ourselves" says Jim. They look forward to getting involved in the local schools with Timothy, completing the partially rebuilt carriage house on their new property, and growing berries in their garden.

The Finger Lakes Institute invites the regional community to meet with Jim to discover how GIS is a useful, valuable tool for regional planning, answering questions about the status of our environment, and tracking changes in long-term scientific data. Contact Jim at (315) 781-4385 or [jhall@hws.edu](mailto:jhall@hws.edu).

## GIS at the FLI

Geographic Information Systems (GIS) are computer programs that help translate technical information into pictures. GIS creates pictures from a wide variety of data types, such as numbers and descriptions, and from a wider variety of sources. Maps, graphs, and tables are made using GIS to create a visual communication tool set for communicators and/or educators.

By seeking information from original research data and connecting with existing data repositories, the FLI is building its own data repository to expand the quantity and quality of public information available for formulating maps of the Finger Lakes region. Both the NYS GIS Clearinghouse (<http://www.nysgis.state.ny.us/>), operated by New York State Offices of Cyber Security and Critical Infrastructure Coordination (CSCIC), and the Cornell University Geospatial Information Repository (CUGIR) (<http://cugir.mannlib.cornell.edu/>) provide a wide variety of base data about the characteristics of the state. The base data within these repositories provide common foundations for almost any spatial analysis. Base data may include electronic information on natural and political boundaries, such as hydrologic units or county boundaries. These data repositories also contain high-resolution aerial photography and images displaying topography, economic statistics, elevation data, and a variety of environmental characteristics of the state.

In California and most other states, current aerial photography is available to the public only commercially. Organizations such as the United States Geological Survey provide some free imagery of lower resolution for public usage. Unfortunately, their available imagery is often limited to major urban areas or areas of special interest. New York State is just the opposite. New York State CSCIC is far ahead of the curve. It provides high resolution imagery of the entire state and is committed to updating the image catalog every five years in a continuous update process. This resource is invaluable to the FLI, New York State, and the Finger Lakes region.

Aerial photographs provide three distinct avenues of service in GIS: for aesthetic value, as a frame of reference, and as a source of information.

Maps with images in them usually have an *aesthetic value*. Images provide a complexity of color that can be attractive to the human eye. Images can significantly enhance the successful communication of ideas in a visual presentation. The adage, "a picture is worth a thousand words" has been proven time and again in this genre of communication.



Image 1: Aerial Photo of Hobart and William Smith Colleges, courtesy of the New York State Office of Cyber Security and Critical Infrastructure Coordination (CSCIC).

The second avenue of value that images provide to GIS is a *frame of reference*. Data points convey little information by themselves. Aerial photographs, in digital format, can be placed within a scaled coordinate system with data points to help analysts and communicators better understand their individual data sets. Not only does the scientist understand the data better, but the images help make data more relevant to the audience. It is one thing to have a map with points indicating the presence of an invasive species, such as water chestnut blooms, but it is

much more effective to place those points onto an aerial photo to help people understand the proximity of those plants to water routes, nutrient sources, flow currents, and more.

The third, and perhaps most important, value of GIS images is as a *source of information*. Images provide a comprehensive record of locations at specific times. Snapshots that record time periods can provide a greater understanding of what changes have occurred on the earth's surface, such as the development or vegetation of an area, over a certain period of time. The information gathered from one picture can be quantitatively and qualitatively compared to the information gathered from another picture taken of the same location at a different time.

Comparative analyses are some of the most accessible and powerful tools available within GIS. Analysis can provide an understanding of total change, the trends of change, as well as a qualitative understanding of the differences and similarities between the multiple time frames.

An example of comparative analysis that the Finger Lakes Institute has assisted with is a project titled, *Mapping Old Trees in the Finger Lakes National Forest*. Through the assistance of a class of seniors from the Environmental Studies Department at Hobart and William Smith Colleges, the expanse of forest has been delineated throughout a significant portion of the Finger Lakes National Forest located in Hector, NY. The Finger Lakes Institute uses current aerial photographs in conjunction with comprehensive sets of historical images, dating back in ten-year increments to 1944. Each year's forest boundary is compared to previous years to determine changes in

forest expanse over time. Information developed from determining forest expanse is valuable for classifying the age of forest stands, and will ultimately (with future ground-truthing) provide a better understanding of the forest composition and surrounding land classification for use in land management decisions.

The *Mapping Old Trees in the Finger Lakes National Forest* project has been performed with the cooperation of a number of public organizations. The Finger Lakes Institute has informally partnered with the Finger Lakes National Forest, The Finger Lakes Land Trust, The Friends of the Forest, and of course, Hobart and William Smith Colleges to improve the natural resource information of the region and to facilitate wise management of significant ecological resources, such as timber, within the region.

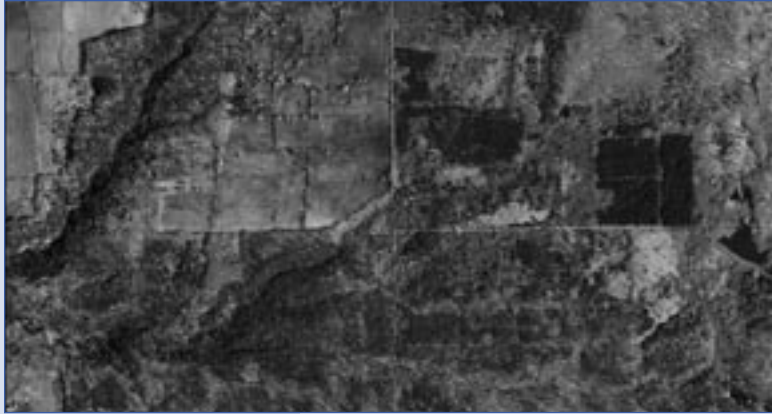


Image 2: Historical aerial photos in the area of the Finger Lakes National Forest. One of the many used to delineate the forest cover since 1944. Photo courtesy of Schuyler County.



Image 3: Cumulative Delineation of Forest Cover. Areas hatched with crossing lines have been continuously forested since 1944. Areas hatched with parallel lines were forested for part of the time since 1944. Areas identified by dots have been fields since 1944. Background photo courtesy of Schuyler County.

## Educational Outreach

### Reflecting back and looking forward

By Marc Edwards, FLI Educational Outreach Coordinator

Educational Outreach developed and delivered education programming and teacher training workshops in 2005, reaching more than 1,700 schoolchildren throughout the Finger Lakes region. We will continue these efforts in 2006 and look forward to more than doubling the number of K-12 students reached through programming. FLI Educational Outreach is continuing to pursue funding opportunities to increase the number of programs offered to regional schools. We will continue to offer professional development opportunities for educators throughout the region in 2006 with training programs such as Projects WET and WILD, and other science-based workshops to give educators the tools they need to incorporate Finger Lakes-related environmental issues into existing curriculums. The FLI can provide both on- and off-site environmental educational programming throughout the region for grades K-12. For more information, please contact Educational Outreach Coordinator Marc Edwards at [edwards@hws.edu](mailto:edwards@hws.edu) or (315)781-4380.

### Outreach with clubs and schools

Outreach efforts over the past year included environmental education programming with the Geneva Boys and Girls Clubs and West Street School focusing on the Finger Lakes region as part of the 21st Century After School Program. William Smith student Nicole Belliveau '06 completed an independent study project as part of her FLI Student Program during the fall 2005 semester to develop four thematic and interactive programs around the topics of Water Quality, Geology, Alternative Energy, and Recycling and Composting which she then provided to the Boys and Girls Clubs and West Street School. She also produced a presenter's resource guide designed for second through fifth grades for use by volunteers and FLI staff. FLI staff will present the programs in the classroom or at the FLI facility in Geneva upon request.

The FLI hosted 20 students in summer 2005 from Wayne-Finger Lakes BOCES for a program on the lake ecology of the Finger Lakes. The students ended their visit with an outdoor activity in which they created their own food web to discover the complex interactions of the natural world and their important role in maintaining these vital interactions.

The FLI was also invited to provide programming for fourth and fifth graders as part of North Street School's summer science program, a joint project between North Street School and the New York State Agricultural Experiment Station. Students used the planting, cultivating, and harvesting of a garden as a vehicle for learning about the natural world through science. Students visiting the FLI learned about the importance of water quality. They took water and plankton samples at Hobart and William Smith Colleges' Bozzuto Boat House dock for analysis back at the FLI, noting how clear the water was and surprise at the number of zooplankton moving about on slides observed through microscopes, some of which were feasting on phytoplankton and other zooplankton.

### Summer intern

Summer 2005 was a busy one for William Smith intern Brittany Holler '08. Brittany worked with Educational Outreach during the summer to develop educational programs and lesson plans for younger students in grades K-2. To assist in developing her thematic programs, Brittany attended a two-day interpretive training workshop at the Women's Rights National Historic Park in Seneca Falls. She also developed a database of regional elementary and middle schools, an aquatic plant guide for use on *The William Scandling*, and updated the contact list for the Science on Seneca Program, which was no small task.



Wayne Finger Lakes BOCES students learn about the food web with FLI's Educational Outreach Coordinator, Marc Edwards.

PHOTO BY SARAH MEYER

**...developed and delivered education programming and teacher training workshops in 2005, reaching more than 1,700 schoolchildren throughout the Finger Lakes region.**



PHOTO BY SARAH MEYER



Brittany Holler '08, teaching kindergartners from Geneva's Lakefront Childcare Center about the Finger Lakes.

PHOTO BY SARAH MEYER

**There were a total of thirty-nine SOS cruises in 2005 with 489 participants. SOS is a research vessel based program that enables regional high school science teachers to use Seneca Lake as an outdoor classroom.**

### **Conservation Field Days**

The FLI had a strong presence at the Ontario County Soil and Water Conservation District's Conservation Field Days in September 2005 held at the 4-H Bristol Hills Camp. Both Sarah Meyer (FLI Community Outreach Coordinator) and Marc Edwards (FLI Educational Outreach Coordinator) were on hand to provide fun, educational, and interactive programming for nearly 600 sixth graders over a two-day period. Sarah presented a program on alternative energy, using a solar oven to bake chocolate chip cookies, while Marc used PLAY-DOH to help explain the geologic processes that formed the Finger Lakes. These programs were followed by FLI participation in the Onondaga County Soil and Water Conservation District's Conservation Field Days in October, where the geology program was presented to more than 500 sixth graders during the two-day event.

### **Science on Seneca**

Science on Seneca (SOS) continues to be a very successful program for the Colleges and the FLI. There were a total of thirty-nine SOS cruises in 2005 with 489 participants. SOS is a research vessel based program that enables regional high school science teachers to use Seneca Lake as an outdoor classroom. To participate, science teachers undergo a free training session where they experience the full range of scientific tests and equipment available to them aboard *The William Scandling*, such as plankton tows, sediment samples and water chemistry. Teachers then return with their students and conduct research on Seneca Lake aboard *The William Scandling*, which acts as a floating classroom.

The FLI assists teachers bringing students on the SOS program by offering pre-cruise visits to their classrooms to better prepare the students for their shipboard experience and help them understand the context within which their research will be performed. The FLI also assists in delivering the HWS campus tour portion of the program.

### **Science on Seneca – Looking Ahead**

The FLI is working on preliminary planning for an expansion of the existing Science on Seneca Program to a full-day intensive program. The Colleges have offered Science on Seneca to area high schools since 1986. The program currently consists of a half-day training workshop that helps teachers prepare their students for a three-hour scientific cruise aboard *The William Scandling*, the Colleges' 65-foot research vessel. Once trained, teachers accompany their students on the excursion, guiding them through simple water sampling techniques. Recent discussions between participating teachers and staff at the Finger Lakes Institute have revealed a desire for a more in-depth program for both teachers and students—specifically, to provide a broader context for monitoring and to better connect this work to the school's curriculum.

The intention is to continue offering the existing half-day data gathering field trip and to make available a more rigorous problem-solving and critical thinking experience for both teachers and students in a full-day program. This expanded program will focus on water quality and environmental issues affecting the Finger Lakes region and will build environmental stewardship through three strategies:

1. A one-day teacher training workshop to improve environmental education teaching skills.
2. A full-day SOS program to more effectively engage high school students in hands-on, inquiry-based scientific research that includes classroom sessions, laboratory experience, and a two-hour field cruise aboard *The William Scandling*.
3. The creation of relevant web-based educational resources.

### **Teacher Training Opportunities**



The FLI provided a number of professional development opportunities for area educators during 2005. Educational Outreach coordinated two teacher training workshops in September with the New York State Department of Environmental Conservation. These workshops included Project WET and Project WILD Aquatic. The goal of Project WET is “to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom-ready teaching aids and through the establishment of state and internationally sponsored Project WET programs.”

The goals of Project WILD Aquatic are similar, with an emphasis on the aquatic habitats and

the wildlife they support. The two workshops engaged 23 educators from the Finger Lakes region, with some educators coming from as far as Syracuse, Sodus and Ithaca. The FLI also supported four area educators — FLI staff Marc Edwards and Sarah Meyer, HWS faculty Jim MaKinster and John Halfman — and Cornell University faculty Nancy Trautman and Linda Tompkins, to attend a week-long conference on Remote Sensing Education and Geospatial Information Technology (GIT) In the Classroom held in June 2005 at the Institute for the Application of Geospatial Technology (IAGT) in Auburn, New York. The Conference focused on incorporation of GIT in the classroom in support of service learning projects, with an emphasis on writing lesson plans.

### **Bio-Diesel Traveling Trunk**

In addition to intern Brittany Holler and independent study student Nicole Belliveau, FLI Educational Outreach also benefited from the independent study project of William Smith student Lisa Rasbach ('06). Lisa worked on the development of an educational “traveling trunk” focusing on alternative fuels, with an emphasis on bio-diesel. The trunk, when completed, will contain hands-on, interactive components and lesson plans designed to promote an awareness of local and regional energy issues and the role of alternative energy sources as a response to some of those issues. The trunk is a work in progress and should be available for loan to regional educators and community groups in the coming months.

## **Community Outreach and Public Service**

### **Clearinghouse Feature Document**

The Finger Lakes Institute Clearinghouse contains more than 1,500 documents pertaining to the environment and the Finger Lakes region. “Biodiesel: Growing a New Energy Economy” is one of the newest additions to the Clearinghouse and provides valuable information on the production and use of renewable alternative fuel.

Gregory Bell has been active in environmental, conservation, and smart growth issues for many years. He has an MS in urban and environmental studies from Rensselaer Polytechnic Institute, was an active member of the Town of Ithaca Planning Board, and now is the Executive Director of the New York Association of Conservation Districts.

### **Biodiesel: Growing a New Energy Economy by Greg Pahl**

*Book review by Gregory Bell*

Biodiesel is a fuel derived from oil seed crops. It can be produced in New York state, supporting local farmers instead of supporting foreign nations and transatlantic oil tankers. When used in diesel vehicles and heavy equipment, biodiesel fuel greatly reduces particulate emissions, carbon monoxide, sulphur dioxide, and the other pollutants associated with petrodiesel.

First proposed in 1912 by the inventor of diesel technology, Rudolf Diesel, biodiesel has been slow to catch on. This has been due largely to the lower cost of petroleum. However, today, with increasing environmental concerns and with increasing prices, increasing demand, and reduced supplies of petroleum, biodiesel is coming into the mainstream. A solid new book, “Biodiesel: Growing a New Energy Economy,” by Greg Pahl, gives a thorough overview of the topic.

Covering the invention of diesel engines, the development of biodiesel in Europe, early biodiesel research in Idaho, technical details of how biodiesel is produced, the current status of the biodiesel industry in several nations, and the future of biodiesel, the book presents a full understanding of biodiesel. It includes an evaluation of the best source crops for biodiesel.

As part of that evaluation, it explains why soy is often regarded in the U.S. as the prime feedstock crop, even though it is only ninth in the list of best source crops and even though it is the source of only 1% of worldwide biodiesel production. While it is not biodiesel, and while it is often confused with biodiesel, the use of unmodified, used restaurant cooking oil in diesel cars is also discussed. One topic he does not



deal with adequately is methanol and ethanol. They are also agriculturally-derived fuels, but are substitutes for gasoline instead of petrodiesel fuel.

As an advocate for biodiesel, the author explains the economic, environmental and global political reasons why the U.S. should undertake a serious effort to expand biodiesel production. For the past couple of years, New York State's Governor and Commissioner of Agriculture and Markets have both been promoting the expansion of biofuel production within our state. I recommend this book for all who want a better background on this important aspect of how these goals can be implemented.

The book, *Biodiesel: Growing a New Energy Economy*, is published by Chelsea Green Publishing Co. in Vermont.

## Finger Lakes Institute Upcoming Events

### March

#### March 28, 7 p.m., Finger Lakes Institute Classroom

*Tara Curtin, Assistant Professor of Geoscience at Hobart and William Smith Colleges*

#### **The Geology of Wine in the Finger Lakes, NY**

Understanding the geomorphology and deglacial history of our landscape has a direct impact on the agricultural community of the Finger Lakes region. The history of our landscape offers good explanations as to why the Finger Lakes region offers prime land for growing grapes. By studying the thickness, textures, and color of each layer of sediment present in several local vineyards, Tara Curtin and many Hobart and William Smith Colleges students have learned much about the area's geological history. Tara will discuss some of the physical factors such as the position of ancient shorelines and deltas that influence the character and quality of wine. This evening presentation will demonstrate the importance of understanding the physical environment as one essential element of the terroir of the Finger Lakes region. This event is free and open to the public. Registration is required; call (315)781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

#### March 29, 6:30 p.m., Finger Lakes Institute Classroom

*Students, Hobart and William Smith Colleges*

#### **Finger Lakes Institute Spring 2006 Student Research Presentations**

Throughout each academic semester the FLI

has interns and independent study students conduct research on the Finger Lakes region. Topics of research pertain to the Institute's four core initiatives: educational outreach, research, community outreach and public service, and economic development. Six Hobart and William Smith College students will present research on Finger Lakes Smart Growth Policy, Public Access to Waterfront, Sustainability of the Wine Industry, Invasive Species, Energy, and Green Building Incentive Programs. These presentations are a record of each student's progress; they will be finalized with a concluding report in May. This event is free and open to the public. Registration is required; call (315)781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

### April

#### April 8, 2006 8 a.m., Finger Lakes Institute Classroom

*Barbara Halfman, SOS Coordinator*

#### **Science on Seneca Teacher Training Day**

Science on Seneca enables regional high school science teachers to use Seneca Lake as an outdoor classroom. To participate in Science on Seneca, science teachers must take part in this free training session. During the training, teachers experience the full range of scientific tests and equipment available to them aboard *The William Scandling* research vessel, including plankton tows, sediment samples and water chemistry, to name a few. For a nominal fee (\$15 per class), teachers may then return with their students and conduct research on Seneca Lake aboard *The William Scandling*, and use all the resources of this floating classroom. Teacher training is free. Contact Barbara Halfman at (315) 781-3606 or e-mail [bhalfman@hws.edu](mailto:bhalfman@hws.edu) to register.

#### April 19, 5-8 p.m., Finger Lakes Institute Water Quality Volunteers and Coordinators from the Finger Lakes Region

*Open House and Panel Discussion: Water Quality Activism*

On a regular basis, in watersheds all across the Finger Lakes Region, volunteers sample and test the water quality of nearby streams and lakes. Though their efforts are largely unseen, the results from their tests are instrumental in tracking and ensuring that the water quality remains environmentally healthy. Come find out what motivates the volunteers and their coordinators. Participants in this event will learn how the data gathered is used to keep the Finger Lakes watersheds healthy and



PHOTO BY SARAH MEYER

how members of the Finger Lakes community can become active volunteers. This event is free and open to the public. Registration is required - call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

**April 27, 6:30 p.m., Finger Lakes Institute Classroom**

*Mark Deutschlander, Associate Professor of Biology at Hobart and William Smith Colleges*

**Spring Bird Migration in the Finger Lakes**

Each fall and spring, the Finger Lakes Region becomes a host to migratory birds on their way toward wintering or breeding grounds. Mark Deutschlander, assistant professor of biology at Hobart and William Smith Colleges, will give a presentation on migration and specifically the activities of the Braddock Bay Bird Observatory, a non-profit organization for which he serves as president and where he conducts much of his research. Mark will briefly describe his research efforts at the observatory, which focus on the sensory and physiological aspects of navigation, as well as his more recent activities at the Colleges' Hanley Biological Field Preserve, where he participates in a national effort to monitor the health of breeding bird populations. Participants in the presentation will gain an understanding of the role that observatories and the public can play in monitoring bird migration and opportunities that exist in the Finger Lakes Region. This presentation is free and open to the public. Registration is required; call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

**May**

**May 11, 6:30 p.m., Finger Lakes Institute Classroom**

*Matt Beckwith, Senior Environmental Science Student at Keuka College's Center for Aquatic Research*

**Nutrient Addition Effects on Phytoplankton Growth Rates in Keuka Lake**

Recipient of the 2005 Finger Lakes Research Conference Student Award for Best Student Presentation, Matthew Beckwith, a student at Keuka College near Penn Yan, NY, will present his scientific research on Keuka Lake to the Finger Lakes community. Beckwith's research includes investigations into the ecosystem-level dynamics by identifying limiting nutrients and quantifying phytoplankton population growth rates in response to elevated nutrient inputs (e.g., nitrogen and phosphorus). Results from phytoplankton grazing experiments (both zooplankton and benthic mussels) and light-production dynamics studies will also be discussed. This presentation is free and open to the public. Registration is required; call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu)

**May 17, 6:30 p.m., Finger Lakes Institute Classroom**

*John Hassett, Professor of Chemistry at SUNY College of Environmental Science and Forestry in Syracuse, NY*

**Gasoline from Motorboats in New York Lakes**

John Hassett has measured gasoline levels in selected New York State lakes at different times and locations, including Canandaigua Lake, to determine if the lakes were contaminated with gasoline and if motorboats were a significant source of that pollution. Results suggest that NY water quality standards may be exceeded at some locations and



PHOTO BY SARAH MEYER

*Volunteers at the Seneca Lake Beach Cleanup in 2005*

times in popular recreational lakes. Participants in this event will learn how scientific research can be used to indicate correlations between motorboat use and risks to water quality. This presentation is free and open to the public. Registration is required; call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

**June**

**June 23, Holiday Inn, Auburn, NY  
1st Finger Lakes Economic Development and the Environment Conference**

The Finger Lakes Institute and Finger Lakes-Lake Ontario Watershed Protection Alliance (FL-LOWPA) are currently co-planning a conference in June 2006 that will bring together an audience of business and industrial leaders, community planners, elected officials, and water quality affiliates to focus on: 1) the role of water in the region's economy; and 2) examples of new economic models that engender green initiatives, technology, and sustainability and economic development to protect a very high quality asset for this region. Further details pending.

**June 14, 6:30 p.m., Finger Lakes Institute Classroom**

*Paul McKeown, Region 9 Fisheries Manager for New York State Department of Environmental Conservation - Bureau of Fisheries*

**Massive Carp Die-off in Chautauqua Lake; Finger Lakes Next?!**

In June 2005, approximately 30,000 common carp (*Cyprinus carpio*) cumulatively weighing more than 75 tons washed onto the shores of Chautauqua Lake after an outbreak of the Koi Herpes Virus (KHV), a viral disease highly contagious to koi carp (a strain of common carp) and common carp. Although the origin(s) of KHV in Chautauqua Lake have not been conclusively determined,

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Lakes Institute Classroom  
Massive Carp Die-off in  
Chautauqua Lake; Finger  
Lakes Next?!**

**September 16, 10 a.m. -  
1 p.m., Seneca Lake State  
Park Pavilion #3, Geneva,  
NY  
Seneca Lake State Park  
Beach Cleanup**

**September 30, 10 a.m. -  
1 p.m., Keuka Lake State  
Park (lower level picnic  
shelter), Bluff Point, NY  
Keuka Lake State Park  
Beach Cleanup**

**October 14, Hobart and  
William Smith Colleges  
Warren Hunting Smith  
Library/Melly Academic  
Center, Geneva, NY  
Second Annual Finger  
Lakes Research  
Conference**

outbreaks of KHV within the watershed in 2003 and 2004 indicated that KHV was likely introduced through the ornamental fish industry. If the Finger Lakes support abundant carp populations, what is the potential risk that one of the 11 lakes could be infected by the Koi Herpes Virus? Paul McKeown, Fisheries Manager from the Region 9 NYS-DEC Office in Allegany, will discuss what the Finger Lakes region can learn from Chautauqua's experience with KHV. Participants will learn about the path of outbreak that occurred in Chautauqua Lake, what impacts the virus may have on fisheries, tourism and those vacationing in the Finger Lakes region, and what precautions communities may take to prevent an outbreak from occurring. This presentation is free and open to the public. Registration is required; call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

## September

**September 16, 10 a.m. - 1 p.m., Seneca Lake State Park Pavilion #3, Geneva, NY**

### Seneca Lake State Park Beach Cleanup

Collect and record the litter found around Seneca Lake! In observance of the International Coastal Cleanup, the Finger Lakes Institute is holding a community coastal cleanup event in Geneva, NY. All registered participants will be provided with trash bags and data sheets to record the specific types and quantities of lake debris found. The data collected will be used to better identify sources of pollution and help find solutions for preventing it. Bring a bag lunch, closed toed shoes, and work gloves. Free and open to the public. Registration required. Call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

**September 30, 10 a.m. – 1 p.m., Keuka Lake State Park (lower level picnic shelter), Bluff Point, NY**

### Keuka Lake State Park Beach Cleanup

Collect and record the litter found around Keuka Lake! In observance of the International Coastal Cleanup, the Finger Lakes Institute is holding a community coastal cleanup event in Bluff Point, NY. All registered participants will be provided with trash bags and data sheets to record the specific types and quantities of lake debris found. The data collected will be used to better identify sources of pollution and help find solutions for preventing it. Bring a bag lunch, closed toed shoes, and work gloves. Free and open to the public. Registration required. Call (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

## October

**October 14, Hobart and William Smith Colleges Warren Hunting Smith Library/Melly Academic Center, Geneva, NY**

### Second Annual Finger Lakes Research Conference

The Second Annual Finger Lakes Research Conference will highlight Finger Lakes scientific research and provide opportunities for students, faculty and scientists to meet others interested in environmental science and scholarship. The goal of this annual conference is to highlight all aspects of Finger Lakes research, particularly as it applies to problems related to the Finger Lakes of western and central New York State. Both 15-minute oral presentations and poster displays are scheduled during the day-long conference. Presentations and posters are either: 1) results of ongoing or completed research, or 2) research plans and proposals. If you are interested in participating in the 2nd Annual Finger Lakes Research Conference, contact Sarah Meyer at (315) 781-4382 or e-mail [fli@hws.edu](mailto:fli@hws.edu).

## FLI Student Program

The Finger Lakes Institute welcomes undergraduate students to enroll in one of its Student Programs. Each academic term and summer, the Finger Lakes Institute accepts undergraduate students to complete an internship, independent study, or volunteer position. Students are required to apply for each position, participate in a public student symposium and write a final comprehensive report about their project topic. Proposed project topics are accepted by the Finger Lakes Institute as they relate to:

- Land use planning and development
- Sustainable or low-impact development
- K-12 science education
- Water quality monitoring
- Green industrial practices and incentives
- Limnology and aquatic biology
- Community environmental management
- Drinking water quality studies
- Energy generation, utilization and environmental impact

Seven students will research a variety of topics pertaining to the Finger Lakes region during the spring 2006 semester, including:

- **Clair Catillaz '06**, Sustainability of the Finger Lakes Wine Industry and Policy;
- **Emily Corcione '06**, Public Access to Waterfront in the Finger Lakes Region;

- **Christine Moskell '08**, FLI Volunteer
- **Matt Murphy '06**, An Analysis of Exotic Species and the Public Policy Trying to Control Them;
- **Jennifer (Quinn) Schweizer '06**, Local Energy Policy and the Potential for Smart Growth in the Finger Lakes Region;
- **Nicole Vance '06**, A Comparison of Green Buildings and Homeowner Incentives Programs in the Finger Lakes Region; and
- **Ryan Williams '07**, Using GIS to Analyze Alternative Energies for Seneca County

A student symposium, which will include presentations by each of these students, is planned for March 29, 2006 at the FLI. To learn more about FLI Student Programs, visit: <http://fli.hws.edu/internships.asp> or call Sarah Meyer, FLI Community Outreach Coordinator, at (315) 781-4382.

## Economic Development and Regional Planning

### Focusing on the protection of the Finger Lakes and the role of water in the region's economic viability

By Marion Balyszak, FLI Director

You only have to look at any one of the eleven Finger Lakes, surrounded by a beautiful and predominantly rural landscape and communities bearing the history of up to two hundred years or more, to capture an immediate sense of why these beautiful lakes appeal to nearly 1.2 million residents, as well as more than 22 million people who visit the region annually.

The Finger Lakes Institute's and Colleges' research activities on the lakes and their surrounding watersheds provide an up front and personal look at their current health. The 2005 research program, enabled by the Colleges' ancillary research vessel the *J.B. Snow*, monitored selected sites on seven of the eleven lakes to define key water quality parameters (e.g., nutrients, pH, chlorides) as indicators of pollution sources that could detract from existing water quality. Scientific research, the Institute's premier program, is providing a clearer understanding of the interactions between watershed land use and the water quality of the lakes, while also making the case that preserving a quality of life and strong, economically viable communities is critically dependent on ensuring the continued supply of quality water.

Next to research, the Institute provides data that enables informed decision-making throughout the region; this role will gain increasing importance as the Institute continues to meet its mission to foster continued protection of the Finger Lakes within a sustainable region. While we all appreciate the visual beauty and the benefits the lakes provide, such as high quality drinking water and recreational opportunities, it is easy to forget that not protecting the quality and supply of these fresh water resources—at all community levels—could have the potential to sorely impede economic growth. Water is critical for drinking, for production of goods and materials, and for making communities habitable. Protecting water resources assures the ability of communities to establish residential and business sectors, support a sound tax base and commerce activities, and employ thousands of residents. In turn, this allows for continued maintenance and upkeep of roads, facilities, infrastructure, and services, thereby reducing the need for remedial measures to correct environmental problems.

The Institute's programmatic areas (Research, Community and Educational Outreach, Economic Development and Regional Planning) explore the unique role of water in building economic viability; they accomplish this through a series of initiatives that also foster



Skaneateles Lake shoreline.

PHOTO BY SARAH MEYER

collaborative partnerships and resource sharing. The Finger Lakes Institute and Finger Lakes-Lake Ontario Watershed Protection Alliance (FL-LOWPA) are co-planning a conference for June 2006 that will gather business and industrial leaders, community planners, elected officials, and water quality affiliates to focus on the role of water in the region's economy and examples of new economic models that engender green initiatives, technology, sustainability and economic development. Recent meetings with representatives of the wine and grape industry also reiterate how this premier industry and the region's economic growth are intertwined with high quality water resources, and the need for a vision to ensure both continue to thrive.

Attendance by Institute staff at numerous community meetings throughout the region demonstrates that all these concerns are on the minds of many; they also serve as opportunities to reinforce the Institute's role in researching data, sharing resources, and providing educational and collaborative approaches to foster and collectively strengthen the ability of our communities to remain viable while ensuring the quality of our water resources.

## A short primer on ecotourism

By Marc Edwards, FLI Educational Outreach Coordinator

Ecotourism is emerging as one of the fastest growing segments in the global tourism industry. Its growing popularity, especially in developing countries, holds many promises for sustainable tourism and economic development. With the growth of tourism in the Finger Lakes Region, it is reasonable to ask whether a more sustainable form of tourism, such as ecotourism, would help

minimize impacts while providing continued and important economic benefits. Therefore, a short primer on ecotourism poses the question of whether ecotourism development can be realized in the Finger Lakes Region by exploring what ecotourism is, the promises it holds, and some of the challenges to realizing those promises.

### Defining Ecotourism

So, what is ecotourism? There are many definitions, but most center on two main concerns: sustaining the natural and cultural resources on which ecotourism depends, and sustaining the local host population's cultural and economic well-being. The most cited definition of ecotourism, suggested to be the first, was developed by Mexican architect Hector Ceballos-Lascurain in 1983:

*Ecotourism is purposeful travel to natural areas to undertake the cultural and natural history of the environment, taking care not to alter the integrity of the ecosystem, while producing economic opportunities that make the conservation of natural resources financially beneficial to local citizens.*

Other definitions build on the Ceballos-Lascurain definition — travel to natural areas, protecting resources, economic benefits to local populations — while others add components

of social responsibility, education, and travel not only to natural areas, but limit this travel to fragile, pristine wilderness. And while these definitions of ecotourism that require travel to natural, pristine wilderness, and protected areas may conjure up visions of intrepid ecotourists hiking in the rainforests of Central America or trekking through Nepal, by shifting the focus of how we define ecotourism from *where* it operates to *how* it operates, ecotourism development can be applied to almost any locale.

The shift from the more restrictive place-based definitions toward those based on how ecotourism operates is premised on a set of environmental principles or ethics. Environmental



PHOTO BY SARAH MEYER

*Ecotourism promotes stewardship of the natural resources on which it depends.*

ethics is a moral philosophy dealing with our relationships and interactions with the non-human world. With the move toward an ethics-based approach, ecotourism is not restricted to pristine nature or wilderness, but may include any setting of human-environmental interrelationships. It is not about a physical place, but rather about tourist behavior, and does not presuppose a specific environment, but does presuppose a specific ethic of how tourism takes place in that environment.

### **Ecotourism's Promises**

Ecotourism has the potential for sustainable economic development, can aid in the protection and conservation of local natural resources, and help preserve local culture and heritage. In developing countries, ecotourism plays a key role in protecting endangered species and threatened natural resources. In other cases, a portion of ecotourism profits provide much needed funding for natural resource conservation projects. The benefits of the ethical approach to ecotourism are realized not only at the local level (economic development, resource protection, etc.), but also through the ecotourists themselves as their relationship with the non-human world is re-defined by instilling an environmental ethic. A quality ecotourism experience might encourage an individual to start a local conservation project, a water quality monitoring project, or advocate for other environmental issues in his or her own community.

### **Some Challenges**

The challenges to comprehensive, coordinated, and planned ecotourism development are many, presenting themselves in the form of market competition, lack of clear and consistent policy at all levels of government, limited access to financing, and the desire for larger scale tourism development. The ecotourism industry, as with any commercial industry, can be seen as a competitive, market driven, lucrative niche market. However, other tourism enterprises using the label of eco- or green-tourism to “cash in” on this lucrative market without living up to the ideals of “true” ecotourism often make it difficult for ecotourism operators to continue providing a quality product while maintaining their core ideals and principles. This may ultimately lead them to trade environmental sustainability for financial sustainability, eventually squeezing out ecotourism as more non-specialized tourism takes over.

Ecotourism development can be especially challenging in rural areas where it is often easier to quantify the economic benefits of large scale tourism development than the collective economic benefits of multiple and diverse small scale tourism operations. As these areas look toward tourism for economic development, they often look for larger scale tourism development, foregoing the more community-based micro-business approach of ecotourism development. While research has shown that producing large profits are often not the goals of ecotourism operators, they still require sufficient investments to remain competitive in the marketplace. Also, as tourism is mostly a seasonal and sometimes tenuous industry, ecotourism entrepreneurs in particular, with their smaller niche markets, often find difficulty accessing financing from traditional lending institutions, a further deterrent to ecotourism. Finally, clear, consistent policy from all levels of government regarding ecotourism is also needed if the industry is to overcome challenges to realizing its full potential. While many policy makers extol the virtues of ecotourism development, there is little actual policy in the United States directly addressing ecotourism development.

### **An Ecotourism Approach for the Finger Lakes Region**

The Finger Lakes region as a venue for ecotourism does not hold up to definitions

**A quality ecotourism experience might encourage an individual to start a local conservation project, a water quality monitoring project, or advocate for other environmental issues in his or her own community.**



Visitors to Grimes Glen near Naples, NY.

PHOTO BY SARAH MEYER

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**The Finger Lakes region as a venue for ecotourism does not hold up to definitions that presuppose a specific undisturbed natural environment, but does hold up under the ethics approach to defining ecotourism and the potential for developing ecotourism principles in the region.**

that presuppose a specific undisturbed natural environment, but does hold up under the ethics approach to defining ecotourism and the potential for developing ecotourism principles in the region. For instance, we might investigate the cultural landscape of the Finger Lakes wine-producing area for its ecotourism potential which might include an understanding of the cultural landscapes that have evolved through wine making, the relationships of wine to micro-climate and soils, the evolution of land use patterns, or the geologic history that created the Finger Lakes as some of the many possibilities in the naturally and culturally rich Finger Lakes region.

The continued growth of tourism in the Finger Lakes Region has the potential to strain our natural resources and municipal infrastructure. According to research sponsored by the New York Wine and Grape Foundation, the number of tourist visits to New York wineries has increased tenfold since 1985, with the Finger Lakes accounting for the majority of the visitors. As tourism continues to grow in the Finger Lakes Region (tourism is the world's largest industry and New York's State's second largest industry) further strain on these resources may diminish the very qualities that attract so many to the region.

While ecotourism holds many promises for sustainable tourism and economic development, there are also some challenges to realizing those promises. Can a shift to ecotourism development in the Finger Lakes Region minimize the impacts of tourism while providing the important economic benefits on which many communities depend? This article is not intended to answer that question, but rather to provide a basic understanding of ecotourism from which to begin a discussion on ecotourism's potential role in the Finger Lakes Region.

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