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## In This Issue



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# *Blanding's Turtle Microhabitat in Dutchess County*

By Tanessa Hartwig

Rare in most parts of their range, Blanding's turtles are classified as "Threatened" in New York State. Although their range is centered on the Great Lakes region in North America, isolated Blanding's turtle populations exist in eastern New York, eastern Massachusetts, southern New Hampshire, southern Maine, and southern Nova Scotia. In New York, the turtles occur in western Dutchess County, Saratoga County (one known population), Cattaraugus County, the eastern Ontario Lake Plain (one known population), and the St. Lawrence River Valley. In Dutchess County, they are found almost exclusively in outwash plains formed millions of years ago by retreating glaciers.

Blanding's turtles are medium-sized turtles with a shell about 8-10 inches long. The shell is dark and high-domed, resembling a World War II army helmet except for the light yellow speckles. Their most striking feature, however, is a bright, solid yellow neck – earning Blanding's turtles the nickname "yellow-neck mud turtles" in some parts of the country. Another feature is their charming "smile," an upward turn at both corners of the beak. The smile is an apt indicator of the turtle's easy-going behavior; in the six years I have been working with Blanding's turtles, I have never been bitten, and have only been hissed at a few times – usually by angry females when I disrupted their nesting activities.

Blanding's turtles use a diversity of wetlands to meet their needs throughout the year and during their lifetimes (Joyal et al. 2001, Hartwig 2004). Dutchess County Blanding's turtles use kettle shrub pools as core wetlands, those wetlands regularly used and typically occupied during critical times of the year, like winter and early spring. Kettles are depressions formed by stranded blocks of glacial ice, and the pools that form in these depressions are frequently dominated by buttonbush (*Cephalanthus occidentalis*, an aquatic shrub) on deep muck. The shrub thicket is often surrounded by a moat of open water vegetated with submerged and floating aquatic plants. To fulfill various life cycle requirements, the turtles use many other wetland types throughout the year – they can be found in deep ponds or lakes, marshes, forested wetlands, slow-moving streams and riparian wetlands, and woodland pools. Deep ponds, for instance, are often used as drought refuges in late summer, when core wetlands have dried. Turtles may also visit woodland pools and other wetlands to take advantage of substantial food supplies or suitable water temperatures. Because of their penchant for traveling long distances, Blanding's turtles may use almost any wetland within one kilometer of a core wetland (Kiviat 1997).

**Illustration: Blanding's turtle.**
**© Kathleen A. Schmidt 2001**

The need to travel long distances to meet seasonal or long-term requirements is one of the key reasons these turtles are now in trouble. As the landscape in Dutchess County changes from rural to suburban and urban, Blanding's turtles encounter ever-increasing dangers in the form of busy roads, intensely developed areas, and collectors. Agricultural equipment also poses a threat to traveling turtles. Females are particularly vulnerable to these hazards in June when they move long distances, often more than half a mile, to find a suitable nesting place. Our suburbanizing environment also threatens Blanding's turtle eggs and hatchlings, which are eaten by a variety of "suburbaphiles" – including raccoons, opossums, skunks, and foxes – or mowed over or plowed up by lawn or agricultural equipment.

Almost ten years ago, Hudsonia Ltd. (Red Hook, NY) designed wetland and upland habitats to replace those lost as part of an expansion project at Arlington High School in La Grange. Wetland sods and vegetation were moved from a 0.7-hectacre wetland (subsequently filled) to excavated basins nearby, producing 1.4 hectacre of deep-flooding, shrubby wetlands (Figure 1). These wetlands were strategically placed near pre-existing wetlands, creating a more diverse habitat complex and increased wetland acreage. Adjacent upland soils were graded and seeded to create sunny, sparsely-vegetated nesting areas. Since construction, Hudsonia has studied the population's response to the new habitats by live-trapping the turtles, gluing radio-transmitters to their shells, tracking their locations, performing nesting surveys, and comparing vegetation and biogeochemistry of natural and constructed wetlands.

In 1999, when I started my graduate studies, Hudsonia had collected some preliminary data on microhabitat association (the habitat the turtles use within a wetland). The work seemed interesting, so I decided to pursue it further as a thesis topic. For the next 3 years, several assistants and I slogged through wetlands, using radiotelemetry to locate turtle positions. Every time a turtle was found, we surveyed a 3 x 3 meter plot with the turtle at its center. We measured water depth and temperature, recorded substrate type (the material the turtle was resting on), estimated percent cover of coarse woody debris (logs larger than 10 cm x 100 cm), and identified vegetation, estimating percent cover of each species and recording the nearest species to the turtle. We also sampled permanent random plots in natural and constructed wetlands annually. With these data, I was able to describe the microhabitat of Blanding's turtles at our site and compare habitat use in constructed wetlands to habitat use in natural wetlands. Twenty-one turtles were tracked over the three years. Most data were collected during May – August each year. Because the greatest numbers of plots

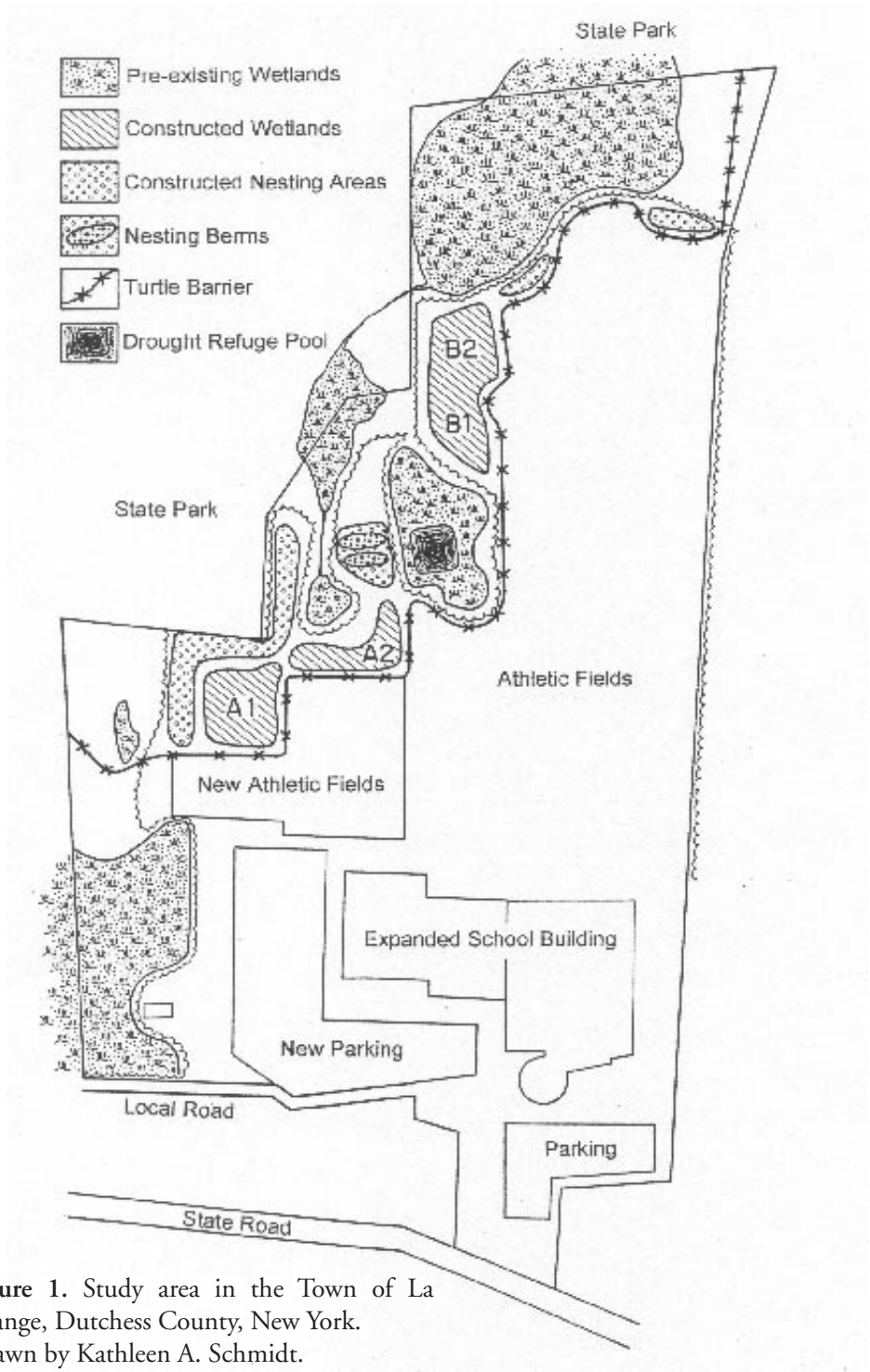


**Figure 1.** Study area in the Town of La Grange, Dutchess County, New York. Drawn by Kathleen A. Schmidt.

and individual turtles were sampled in 2002, I emphasized the interpretation of 2002 results.

Buttonbush was by far the dominant species in turtle-centered plots (natural and constructed wetlands combined), with a mean cover of 29%. Other individual species represented less than 9% each of the mean cover; most represented less than 1% of the total vegetation cover within each plot. Buttonbush was also the species most commonly observed near the turtle in natural wetlands (38% of observations; $n$ = 147); in addition, the floating liverwort *Riccia fluitans* was associated with turtles in natural wetlands (10% of observations). In the constructed wetlands, turtles were found most often in purple loosestrife (*Lythrum salicaria*; 51% of observations, $n$ = 72) or water celery (*Vallisneria americana*; 10% of observations). Total vegetation cover in all turtle centered plots was high, averaging 87%. Water depth in the turtle centered plots ranged from 0 cm to 110 cm, with an average of 30 cm; depths were similar in natural and constructed wetlands. Interestingly, the turtles were associated with higher water temperature in the constructed wetlands than in natural wetlands from late June through early August 2002. Average water temperature was 22°C (range = 8–35°C). Turtles were most often found on muck in both wetland types; other substrates included hummocks, mud, and dead leaves.

I found no difference in microhabitat use between males and females. However, at the scale of the wetland complex, females were found in constructed wetlands more often than males (2001 $\chi^2$ = 15.13, df = 1, $P$ = 0.0001; 2002 $\chi^2$ = 88.14, df = 1, $P \leq 0.001$) (Table 1). Females were most likely to be found in constructed wetlands before and after nesting; many nest sites were near constructed wetlands. We frequently observed females basking in the spring; perhaps this behavior aids in egg development (Standing et al. 1999).

Turtle association with several habitat variables showed interesting seasonal patterns. Turtle use of both submerged vegetation and graminoids (grass-like plants) peaked in late July and August. The turtles often tended to avoid the constructed wetlands at this time; however, in July-August 2002 five turtles spent time in water celery in constructed wetlands. In the natural wetlands, the preferred graminoid and submerged vegetation was filamentous algae, spike-rush (*Eleocharis acicularis*), and aquatic grasses.

| Year/Wetland Type | # of female obs. | # of male obs. | Female : Male |
|---|---|---|---|
| *2000/Both* | 467 | 100 | 4.7:1 |
| *2000/Natural* | 297 | 68 | 4.4:1 |
| *2000/Constructed* | 170 | 32 | 5.3:1 |
| *2001/Both* | 633 | 330 | 1.9:1 |
| *2001/Natural* | 479 | 285 | 1.7:1 |
| *2001/Constructed* | 154 | 45 | 3.4:1 |
| *2002/Both* | 727 | 524 | 1.4:1 |
| *2002/Natural* | 490 | 472 | 1.0:1 |
| *2002/Constructed* | 237 | 52 | 4.6:1 |
| Total turtle observations natural (2000-2002) | | | 2091 |
| Total turtle observations constructed (2000-2002) | | | 690 |

**Table 1.** Number of telemetry observations of female and male Blanding's turtles in constructed and natural wetlands in Dutchess County, New York, USA, 2000 – 2002.

The turtles also displayed noteworthy daily patterns. They were associated with neuston (floating plant material), in particular *Riccia fluitans*, during 1130 - 1600 h, whereas coarse woody debris use peaked at 1100 h and decreased to zero by 1650 h. Apparently, the turtles were basking on logs in the early morning and then switching to neuston by late morning, as the sun warmed the water surface. The neuston probably provides good camouflage and an abundance of food resources (macroinvertebrates). The turtles, therefore, may be conserving energy by basking and foraging at the same time (E. Kiviat, *pers. comm.*). Graminoids and submerged vegetation may provide a similar function in the late summer, allowing the turtles to remain protected by vegetation as the wetlands (including the buttonbush areas) dry up while at the same time providing an ample food source.

To quantify whether microhabitat use differed in natural versus constructed wetlands, I compared means of habitat variables in random plots to the means of habitat variables in microhabitat plots (for a full explanation of the statistics used, please see Hartwig 2004 or Hartwig and Kiviat *in press*). From this procedure, I was able to determine whether the turtles were selecting certain habitat variables, or simply using them in proportion to their availability in a wetland. In the natural wetlands, the turtles appeared to select algal and buttonbush cover, avoid total plant and herb cover, and were neutral towards purple loosestrife, combined cover of shrubs and loosestrife, and shrub cover. In the constructed wetlands, the turtles selected water celery, avoided herb, total plant, and purple loosestrife cover, and were neutral towards shrub cover. In addition, the turtles in the constructed wetlands consistently used total plant cover, shrub cover, and buttonbush cover less than turtles in the reference wetlands (Table 1).

The turtles' negative reaction towards purple loosestrife surprised me because, although it is considered invasive in the United States, I had often seen Blanding's turtles resting under lodged loosestrife, and believed they might be using it as a substitute for buttonbush – especially in the constructed wetlands where buttonbush is still uncommon. Purple loosestrife is very common, and very dense, in the constructed wetlands. The turtles may not be able to maneuver through this dense loosestrife, or they may prefer more open areas for purposes of thermoregulation. In the natural wetlands, loosestrife is more widely spaced and less common; hence the turtles do not avoid it.

These results have given us a better understanding of the habitats Blanding's turtles use within wetlands, and insight into their movement patterns between wetlands. We now know that the turtles are generally found in water depths up to 110 cm, with muck substrates and thick vegetation cover, and that preferred vegetation often consists of dense buttonbush, submerged vegetation, or neuston. Because they are shallower, have less tree cover, and contain plenty of large logs, the constructed wetlands are often used by basking turtles, particularly females. As a result of abundant basking sites and proximity to nest sites, the females also move into constructed

wetlands before and during nesting season. By late summer, most turtles have moved to the natural wetlands, which hold water later in the season than most of the constructed wetlands. Here, they spend their time in the remaining pools of water, or buried in muck. (Many turtles also move to larger ponds during this time.) By late fall, almost all turtles can be found in the natural wetlands, readying themselves for overwintering.

Several conservation themes are inherent in the above results. First, Blanding's turtles in Dutchess County appear to have specific reasons for preferring buttonbush swamps rather than other wetland types. Therefore, the integrity of these wetlands should be protected, especially if they are within 1 km of a known Blanding's turtle population or occurrence. A 200 m wide buffer of natural vegetation and undisturbed soils around a core wetland will help maintain hydrology and water temperatures, prevent pollution from toxic chemicals or silt, and provide food resources for the turtles (Blanding's turtles eat a variety of aquatic invertebrates, many of which depend on leaf litter as a food resource). In addition, Blanding's turtles regularly use the upland areas within 200 m of a core wetland to bask and estivate (rest during periods of hot weather), as well as to lay eggs. Deep muck substrates (≥ 70 cm) may also be important to the turtles as areas in which to bury themselves during hot weather or for other reasons; care should be taken not to introduce inorganic sediments into these wetlands via construction activities or sanding of roads. Wetland management for Blanding's turtles should include enhancing or maintaining emergent and submerged vegetation and basking logs. In known Blanding's turtle wetlands, thinning dense stands of purple loosestrife might be beneficial.

Movement of turtles into constructed wetlands to bask and during nesting season underscores the importance of maintaining a complex of connected wetland habitats to provide a variety of resources. New wetlands, even if they do not function as core habitat, can increase the capacity of the landscape to support Blanding's turtles. In Dutchess County, where many wetlands have been lost or fragmented by agriculture and development, it may be necessary to create wetlands to keep some populations viable, or to create safe connections between wetlands and between wetland and upland habitats.

Detailed management recommendations can be found in an upcoming report, "Blanding's Turtle Habitats in Southern Dutchess County" (Hartwig et al. *in prep*), which will also include maps of potential Blanding's turtle habitats in six towns (Beekman, Fishkill, La Grange, Poughkeepsie, Union Vale, and Wappinger). Please contact the author (845-758-7274 or hartwig@bard.edu) for more information or volunteer opportunities.

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*Since 1981, Hudsonia has conducted environmental research, education, training and technical assistance to protect the natural heritage of the Hudson Valley and neighboring regions. A non-advocacy organization, Hudsonia serves as a neutral voice in the challenging process of land use decision-making. Their work includes education, basic and applied research on rare species and their habitats, wetlands and estuaries, and the study of invasive plants and other threats to biodiversity.*

CREATING SUSTAINABILITY WITHIN OUR MIDST

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June 23-27, 2007

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The 4th biennial conference of the United States Society for Ecological Economics (USSEE) will take place at Pace University. Partnering with Pace's Institute for Environmental and Regional Studies as a co-sponsor, the conference will offer a variety of themes and special symposia featuring our collective interests as well as regional issues and amenities.

HRES members may register at our new co-sponsoring rate. This is for members of organizations that have helped to spread the word about USSEE '07. We want you to come, so we are providing a special registration rate for HRES members.

www.usee.org/conference.htm

### Save the date:

On Friday, 21 September, HRES plans to present Congressman Maurice Hinchey our Distinguished Service Award at our 2007 Annual Meeting. Please stay tuned for the remaining program and the site for our dinner.

## IES & the Hudson River

By Lori Quillen

For over two decades, researchers at the Institute of Ecosystem Studies (IES) have been paying close attention to the Hudson River. From investigations on the aquatic food web to long-term research on invasive species, the Institute's work is generating a better understanding of how the river functions as an ecological system. This information is critical to informing environmentally sound management and conservation efforts.

The IES Hudson River Research Program is a collaborative effort among a team of five IES scientists and several research support staff. Broad in its geographical and intellectual scope, the group has produced a rich body of knowledge about the river's ecology. Instead of looking at the river in isolated parts, projects strive to take in a "river view," with field sites located from the Battery in Manhattan to the Troy Lock.

Institute staff began studying the river more than twenty years ago and attempted to describe relationships within the lower food web. Projects have evolved to address complex questions about submerged aquatic vegetation, invasive plants and animals, native mussels, fish populations, and the ways in which watershed development impacts water quality. Integrated long-term research is a hallmark of the program, as is collaboration with other organizations.

Many Hudson River Research Program projects share a common theme— how is the river responding to human-generated changes? Europeans settled along the banks of the Hudson River over four centuries ago. Since that time, the river has been subjected to shoreline development, industrial and municipal contaminants, boating, and invasive species. In an effort to touch on all of these areas, ongoing IES data collection includes water sampling, watershed monitoring, and the mapping of habitat and organisms.

Of particular interest is the way that non-native species are influencing the way that the river ecosystem functions. One of these invaders is the zebra mussel, a small bivalve that is native to Russia. Accidentally introduced into the Great Lakes in 1986, zebra mussels made their way into the Hudson River in 1991, when IES researchers were in the process of conducting long-term food web studies. This put researchers in the unique position to record the ecological conditions of the river before and after the invasion.

Several attributes make zebra mussels a force to contend with: lack of predators, a high reproductive rate, and voracious appetites. Few native animals find them palatable and adult mussels produce 30,000 to 400,000 young a year. They adhere to hard substrate-- clogging water pipes and blanketing docks and bridge abutments. Over the past fifteen years, the prolific species has become the most abundant filter feeder in the river's freshwater reaches. They have greatly reduced several types of plankton and caused a decline in dissolved oxygen.

Plankton are microscopic plants (phytoplankton) and animals (zooplankton) that form the base of the aquatic food web. They are an essential food source for a range of animals, from larval fish to native freshwater mussels. Over the last decade, IES research has documented that zebra mussels are causing a decline in plankton abundance. This has ushered in several significant ecological changes in the river, including a shift in resident fish populations.

For young fish that live in the open water, plankton are a dietary staple. With zebra mussels reducing plankton availability, open-water fish also are declining in response to the invasion. Impacted species include striped bass, a popular sport fish, and the commercially important American shad. When a river's ability to support young fish changes, flexible management strategies are needed to plan for long-term viability.

Zebra mussels are not the only invaders altering the Hudson River ecosystem. Water chestnut, a floating aquatic plant native to Eurasia, is also causing problems. Introduced to the river in the early 1900s, water chestnut is now the second most abundant plant in freshwater tidal areas. In slow moving parts of the river, thick mats of the plants can cover acres of open water.

Water chestnut's floating leaves blanket the water's surface, blocking out sunlight and preventing underwater photosynthesis. This is a problem because in healthy systems underwater plants add dissolved oxygen to the aquatic environment. In areas that are heavily invaded by water chestnut, oxygen levels are very low beneath the beds. Low oxygen conditions diminish the quality of habitat for fish and other animals. They can also affect the way that nutrients and metals cycle within the river.

In some areas of the river, IES researchers also have found that water chestnut can displace beneficial submerged aquatic vegetation (SAV). These rooted underwater vascular plants, such as water celery, provide critical habitat for a range of river life, including commercial and recreational fish species. Relative to open water habitat, SAV beds are home to a greater diversity of river life. And, unlike water chestnut, plants play a critical role in supplying oxygen to the water.

Water chestnut is not the only threat to SAV beds; humans are also inadvertently harming these important plants. Because SAV beds grow in shallow areas of the river, plants are prone to being damaged by motorboat propellers. This tends to happen during high tide, when plants are not visible at the water's surface. Boater education and reliable SAV bed maps can help minimize avoidable losses. The Institute is taking a role in advancing both of these objectives.

In addition, the Hudson River Research Program is exploring questions about how changes in the watershed influence river function. River bacterial growth exceeds phytoplankton growth; this indicates that organic matter from the watershed is augmenting bacterial growth. Carbon from

soils and vegetation is an important part of the lower food web and it appears that the input of dissolved organic carbon is increasing for reasons that are still unclear.

The IES Hudson River Research Program is committed to sharing their findings about the Hudson River ecosystem. With over one hundred papers published in scientific journals, as well as mainstream magazine, radio, and television coverage, IES research helps inform sound river management strategies. To ensure that useful information is being applied to real problems, IES scientists provide direct advice to a range of local, state and national management agencies. Data sets are also being used as part of the Changing Hudson Project, an education venture connecting real science with classroom learning.

To learn more about the research topics mentioned, visit http://www.ecostudies.org/IES_hudson_river.html

To learn more about the Changing Hudson education project, visit http://www.ecostudies.org/chp.html

*Lori Quillen is a Public Information Specialist at the Institute of Ecosystem Studies (IES).*

***Founded in 1983** by the eminent ecologist Dr. Gene E. Likens, IES is a world-renowned leader in applying the ecosystem approach to some of society's most pressing problems, from the quantity and quality of freshwater resources to the health of our forests. The unbiased scientific information produced by IES scientists is essential to sound environmental policy, management decisions, and education curricula.*

*Airel view of the Hudson courtesy Kara Goodwin, IES*

## Conference Report: Who's Doing What? Educational Programs Centered on the Hudson Valley

Many environmental education programs make good use of the Hudson Valley. Using the river and its surrounding lands as a focal point provides a wide variety of environmental topics and the opportunities for hands-on experiences. In this way, programs can reach audiences ranging from kindergarteners to local decision-makers to the public at large.

"Who's Doing What? Educational Programs Centered on the Hudson Valley," was organized by the Hudson River Environmental Society and held at Columbia Green Community College. The conference drew more than 80 people, who discussed the current and future status of environmental education. Displays showed representative materials for explaining concepts like watershed hydrology, events such as snapshot day, and student projects culled from educational programs in the Hudson Valley.

The goals of environmental education have evolved, said Alan Berkowitz of the Institute of Ecosystem Studies. Providing facts is no longer enough. Rather programs seek to produce informed citizens who have the desire and the know-how to make environmentally conscious decisions in their daily lives. Students are not the only focus of educational programs. Berkowitz called attention to the fact that teachers learn about emerging environmental issues from a variety of sources-- including the media, Environmental Education Centers, and each other.

The Conference was organized into four content areas by audience: K-12 education, college and university programs, professionals and policy-makers, and the general public. Presenters showed how they engage their audience with both straightforward and creative approaches. Many K-12 Programs use the lure of outdoor activities to "hook" the students. For example, Mohonk Preserve's Outdoor Field Studies Program brings students to the Shawangunk Ridge. For students with special needs, aspects of the experience are brought back to the classroom. Conversely, the Hudson River National Estuarine Research Reserve makes real data from their field sites available to students to via the internet. This approach has the potential to serve a very large audience. Margie Turrin of Lamont-Doherty Earth Observatory and Hudson Basin River Watch engages high school students in land use policy with study of actual projects and input from local officials. In this approach, student activities are tied to curriculum standards for both environmental science and government courses.

The demographics of college students seeking courses in Environmental Sciences are changing, said Richard Feldman of Marist College, who suggested that this presents an opportunity to "green the entire college curriculum," that is, to integrate environmental issues into non-science courses. A series of courses at Mount Saint Mary's College for students in elementary education uses the Hudson River as a theme to tie together Math, Science and Technology. The Lotic Scene Investigation (LSI) Program trains college students in several aspects of watershed assessment. The Environmental Consortium of Hudson Valley Colleges and Universities collaborates to develop environmental citizenship, including solving environmental issues, engaging policy makers, and educating the public. By sharing resources and knowledge across the Consortium, goals can be set which no institution could achieve on its own.

Town planners, advisory committees, and land stewards can get assistance and information from Cornell Cooperative Extension on local land use planning, water resources, and forest management in a rapidly suburbanizing Valley. Cooperative Extension agents excel at matching research findings with real-world problems and ensuring that new science is applied appropriately. Many individual landowners and volunteers on town government committees have learned about Biodiversity Conservation through short courses supported by the Hudson River Estuary Program. Teachers can get help in developing interdisciplinary curricula for their classes through grants from Teaching the Hudson Valley.

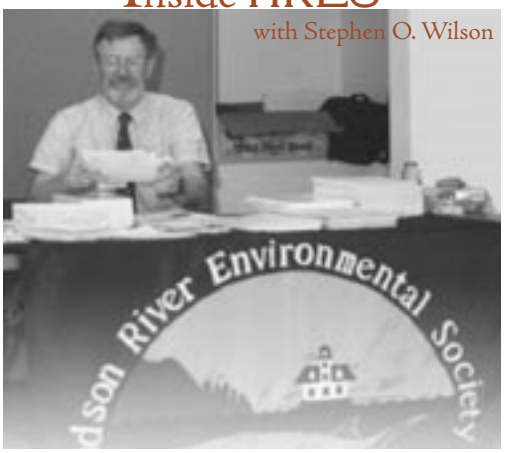
How to reach the general public? Whereas some people actively seek knowledge about local environmental issues, others need a magnet to draw their attention to important changes. The Estuary Program takes advantage of waterfront facilities such as parks and boat launches along with cultural events to provide educational opportunities to a broad array of people. They also support classroom activities, media, and the Internet to ensure that many Valley residents appreciate the ecological, historical and esthetic qualities of the region. Even in Manhattan there are opportunities along the Hudson River for school groups and the public to learn about and appreciate their natural resources and rich history.

The Hudson Valley of the future depends on an informed and engaged population to guide preservation of the ecology, esthetics and culture of the region, while at the same time supporting a high-quality lifestyle for all residents. The diversity of educational programs available now and in the planning stages will help us collectively reach these goals.

Full details on the Program and Information about presenters is available at www.hres.org

# Inside HRES

with Stephen O. Wilson




While the first portion of our 2006-07 fiscal year was characterized by a rather full program calendar: our *Annual Meeting* in September; two very successful conferences on *Climate Change in the Hudson River Valley*; and our February conference, *Who's Doing What? –Education*; this spring, we have focused, mostly, on organizing potential future programs for the next year.

Here is a quick summary of our ideas, some of which should appear soon as conference programs:

- Contaminants in the Lower Hudson (CARP II);
- Kayaking, canoeing and ecotourism in the Hudson River Corridor;
- Nitrates as run-off contributors to HR Nutrients;
- Air quality issues in the HR Valley, especially mercury in the food chain;
- Protecting very small wetlands and vernal pools;
- More *Who's Doing What? –Environmental Education in the New York City Metropolitan Area*;
- Developing target ecosystem characteristics for NY Harbor restoration.

Former Society President, Bob Henshaw and I have developed a proposal for HRES to make a major contribution to the Hudson-Fulton-Champlain Quadricentennial Celebrations with a series of symposia in 2009, which address *400 Years of Environmental Stewardship in the Hudson River Valley*. These will be accompanied by either a special Quadricentennial publication in 2009, or post-symposia proceedings. We are seeking potential authors/presenters on topics such as: geology, water, aquatic biota, forests, terrestrial biota, air, etc. We also feel that there should be some integrative topics such as landscape and environmental perception, agricultural management, development of Hudson River transportation systems, impacts of military campaigns and strategic locations of natural resources.

By virtue of the assistance that HRES is providing to the U.S. Society for Ecological Economics in launching their conference: *Creating Sustainability within our Midst: Challenges for the 21st Century*, our members are being offered a 25% discount of the full conference registration. The 4-day conference program with as many as seven concurrent workshops, symposia and discussion groups, is posted on www.ussee.org/conference/htm, as are a detailed events schedule and registration forms. It will be held at the Pace University's downtown New York City campus, 1 Park Place, on 23-27 June.

I look forward to hearing from you, and to seeing you at our next event.

Executive Director

## An Appeal to HRES Members

The Hudson River Environmental Society's mission is to facilitate discussion of environmental issues throughout the Hudson River watershed. Over the last 37 years, we have done this through the publication of numerous books and monographs and by hosting more than 60 conferences. You can find a list of our publications and conferences on our website (www.hres.org).

As a membership organization, we are cognizant of the need to reflect the concerns and interests of our members as we continue to provide a public forum for complex issues facing the Hudson Valley.

As President of the Board of Directors, I would like to open a line of communication with you. Please feel free to contact me or any member of the Board with your concerns for the environment of the Hudson River Valley, and ways that we can better meet our mission. We hope that you will send us your comments about topics you are interested in, and add your suggestions to the list of our potential programs. I look forward to hearing from you.

William H. Shaw,
President
(whshaw10@earthlink.net)

*HRES was founded in 1970 to help science enlighten decision-making by bringing together scientists, educators and decision makers.*



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CITY

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## HRES ANNUAL DUES

**Individual**

- ☐ $25 Student
- ☐ $50 Regular
- ☐ $100 Sustaining
- ☐ $1,000 Life

**Institutional**

- ☐ $500 Not-for-Profit or Educational Institution
- ☐ $750 Corporate

Please indicate the appropriate box and mail your payment to:
*Hudson River Environmental Society*
6626 Stitt Road
Altamont, NY 12009-5423
Attn: Membership
Checks should be made payable to HRES and *are* tax deductable. HRES is a non-profit, IRS 501(c)(3) corporation, Federal ID #23-7078474

*WELCOME!*