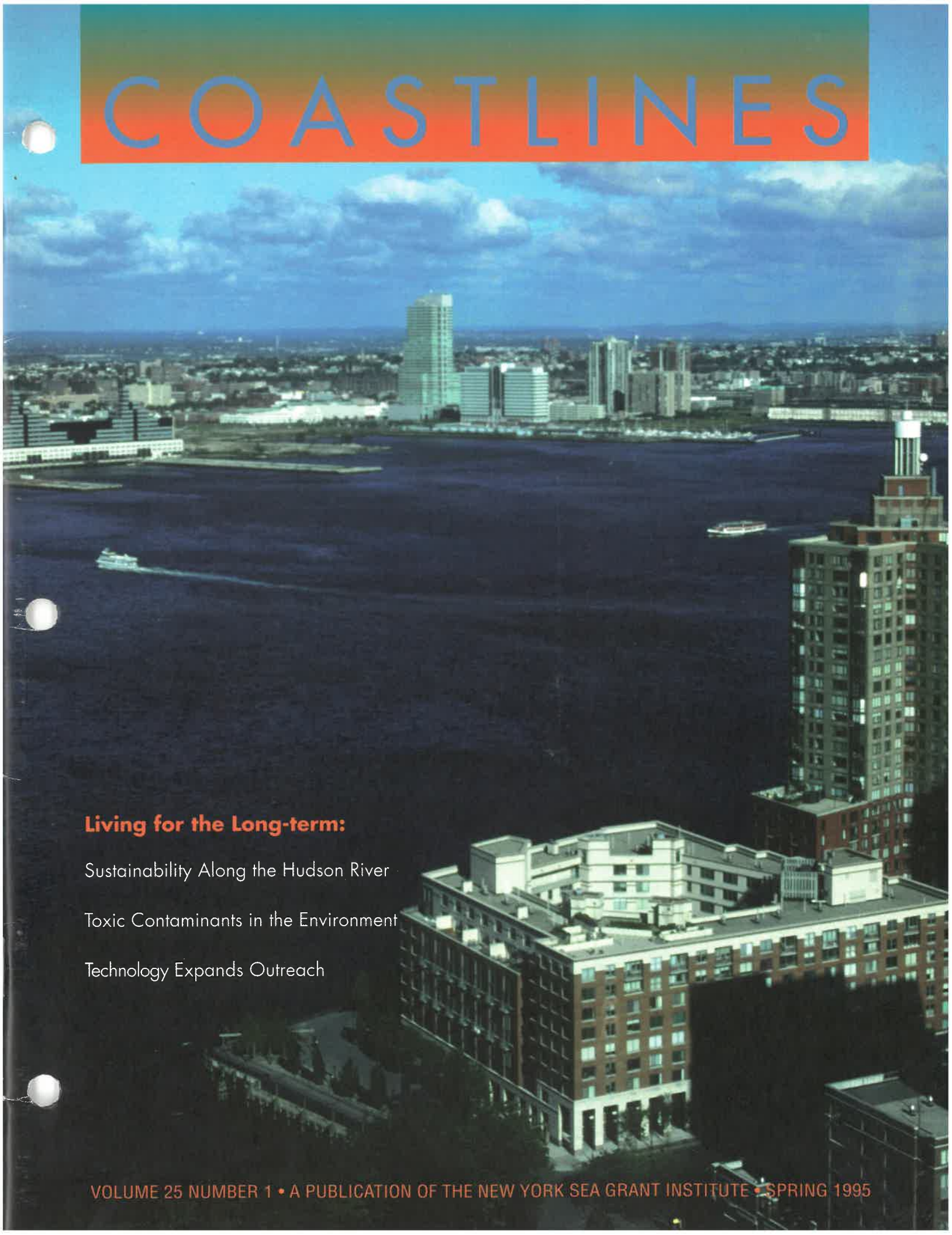
COASTLINES



Living for the Long-term:

Sustainability Along the Hudson River

Toxic Contaminants in the Environment

Technology Expands Outreach

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COASTLINES

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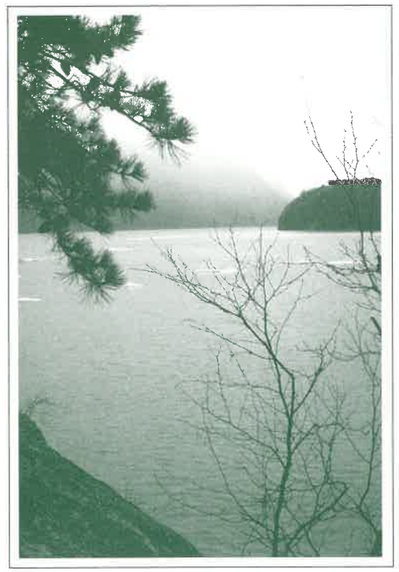
Hudson River looking north from Battery by Robert Linck

Note from the Director:

The spring issue of COASTLINES looks at problems associated with sustaining our environment, and the complexities involved with assessing and dealing with this issue. Sea Grant Extension Specialist Robert Linck explores the concept of sustainable development, and its potential application to addressing problems in the Hudson River. Some of the problems associated with toxic contaminants in the environment are the focus of another article highlighting some recently-funded Sea Grant work by investigators at SUNY at Stony Brook, SUNY College at Oswego, and the New York State Department of Health. These scientists are investigating atmospheric sources of contaminants to the urban environment, the behavior of toxic metals in marine food chains, and an approach to potentially destroy chlorinated contaminants bound to sediments using light energy. The results of their work will enable policy makers and managers to more effectively deal with contaminant issues in the future.

Also included in this issue is an article on how new technologies are being used to extend the reach of Sea Grant extension specialists.

I would like to announce the departure of Dr. Michael Voiland, associate director and program leader for the New York Sea Grant Extension Program. After 20 years with Sea Grant, Mike recently left Sea Grant to join the Office of Government Affairs at Cornell University. All of us at New York Sea Grant will miss him. Fortunately, some of Mike's responsibilities in his new position with legislative affairs will involve Sea Grant. A parting interview is in this issue.



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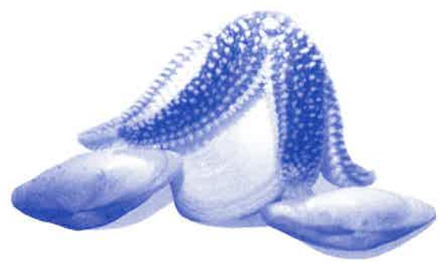

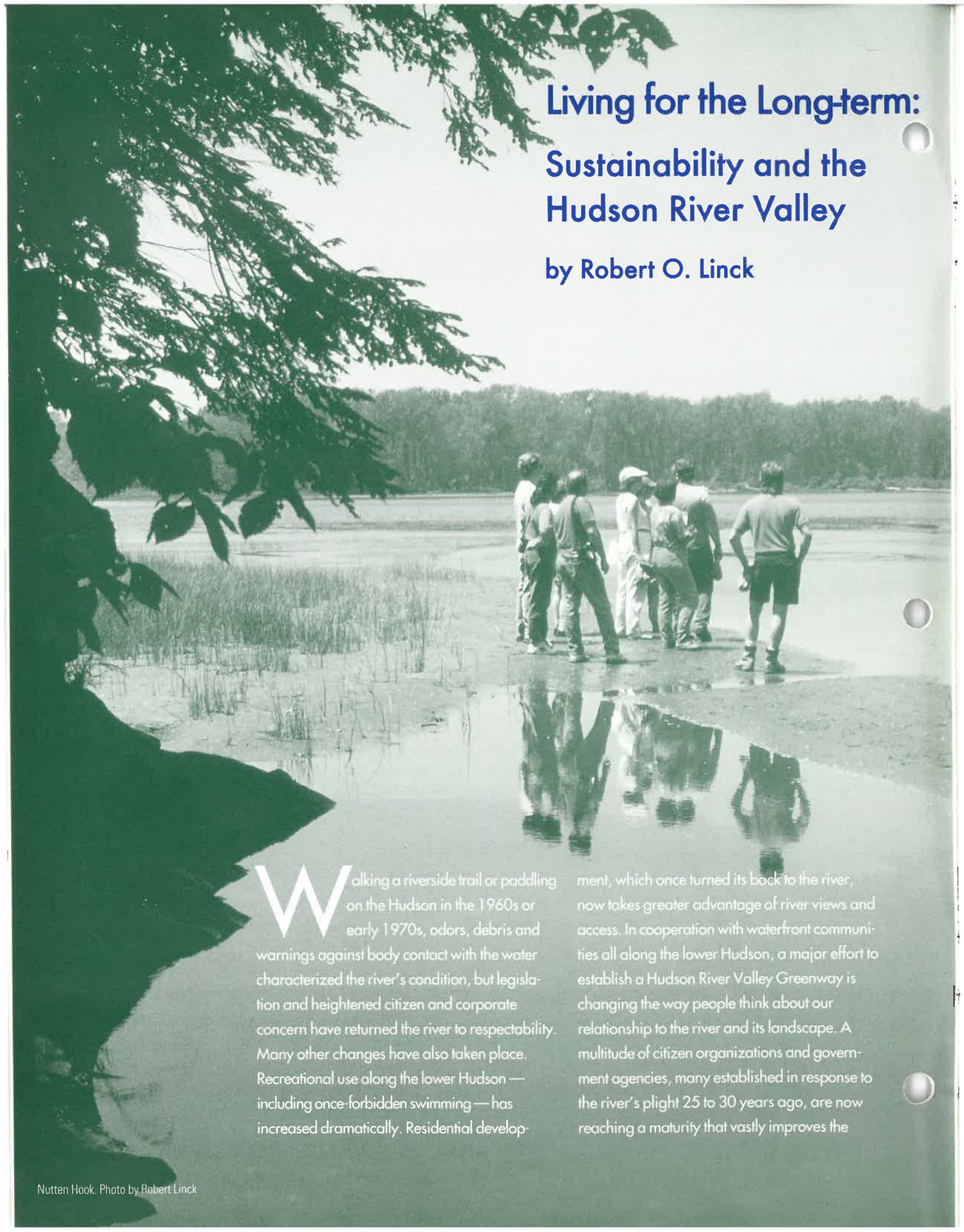

Living for the Long-term:

Sustainability and the Hudson River Valley

by Robert O. Linck

Walking a riverside trail or paddling on the Hudson in the 1960s or early 1970s, odors, debris and warnings against body contact with the water characterized the river's condition, but legislation and heightened citizen and corporate concern have returned the river to respectability. Many other changes have also taken place. Recreational use along the lower Hudson — including once-forbidden swimming — has increased dramatically. Residential development, which once turned its back to the river, now takes greater advantage of river views and access. In cooperation with waterfront communities all along the lower Hudson, a major effort to establish a Hudson River Valley Greenway is changing the way people think about our relationship to the river and its landscape. A multitude of citizen organizations and government agencies, many established in response to the river's plight 25 to 30 years ago, are now reaching a maturity that vastly improves the prospects for the Valley's future. We've learned a great deal and accomplished a lot, yet certain problems remain and new ones have arisen. How do these problems relate to each other and to the Valley's ability to sustain the ecosystem and human society over the long-term?

Nutten Hook. Photo by Robert Linck

Concerns and Opportunities

The Atlantic sturgeon has been in great decline on the East Coast of the United States. Today, New York and New Jersey are the only two states that allow a commercial harvest of the species, whose origins date back 200 million years. Hudson River waters provide the primary spawning areas for the sturgeon, and recent information suggesting a decline of juveniles in the river is raising doubts about the adequacy of even the current limits on the commercial harvest of adults, as presented in the Atlantic States Marine Fisheries Commission Fishery Management Plan for Atlantic sturgeon. In a recently-released white paper, the New York State Department of Environmental Conservation urges a conservative management approach, due to the sturgeon's long life span, late age at maturity, and susceptibility to overfishing. A number of management options are currently being discussed including either a total moratorium on the harvest and sale of Atlantic sturgeon or products in New York, or a fixed quota on the sturgeon harvest.

The Army Corps of Engineers received a $300,000 federal appropriation in 1994 to initiate the Hudson River Habitat Restoration and Enhancement Program on the estuary, in cooperation with the New York State Department of Environmental Conservation and the New York Department of State. A host of other organizations and agencies, including New York Sea Grant, are cooperating in the endeavor, which holds the promise of restoring some of the functions provided by fish and wildlife habitat long ago damaged or lost by dredging and filling activities. The final phase of the program might involve a variety of restoration techniques including removal of bulkheads or clearing culverts to improve the flow of water to tidal wetlands and back bays, installing fish passage facilities at dams on tributaries to the Hudson, or managing invasive non-native plant species that have degraded the quality of wetlands.

The coming year also represents a critical turning point on another issue long identified with the Hudson River. In 1973, the removal of an old dam near Fort Edward inadvertently released PCB-laden sediments downriver, eventually contaminating fish (which bioaccumulate the substance) throughout the estuary. Citizen groups, agencies, and the business responsible for the PCB production have for years debated a variety of approaches to managing the problem.

An interim Environmmental Protection Agency (EPA) "no action" decision in 1984 left the remnant deposits of contaminated sediments below Fort Edward untouched. A second, more comprehensive investigation began in 1989. The EPA's Hudson River PCBs Reassessment is now entering its final phase, with issuance of a series of technical reports and public meetings scheduled throughout 1995. The proposed plan is likely to be released in 1996, and hopes run high for an effective remedy that will lead to an easing of restrictions on sport and commercial fishing.

These and many other issues play themselves out against a backdrop of economic crisis in the Hudson River Valley. Now coming out of an economic recession, the ripple effects of corporate downsizing continue to occupy community leaders and citizens. Numerous conferences and meetings on how to stimulate the economy have been held, with many more to come. Business incubators and economic development zones have been established in areas hardest hit by the economic downturn. To revitalize the regional economy, local decision-makers and recovery experts have prescribed a diverse mixture of economic activity ranging from service industries like tourism and health care to manufacturing and foreign trade. Promoting economic vitality and protecting and managing natural resources once occupied two entirely different spheres of interest. However, as decision-makers have discovered the interrelatedness of our social, economic, and environmental problems, the tendency to deal with issues in isolation has begun to change.

Providing answers to complex questions that relate ecological and socioeconomic concerns is not easy. Planning for the future and responsibly deciding a course of action on any given issue typically involves an imprecise process of "balancing" projected social, economic and environmental implica-

West Point. Photo by Robert Linck

tions by conducting research and examining the scientific data, exploring technological and management options, weighing the spoken opinion of the affected public and business community, and predicting the outcome of various scenarios. Over the course of the past two decades, environmental impact analysis, land use planning, and resource management have markedly improved our ability to minimize human impacts on our land, water, and air resources. Despite impressive achievements, however, we are finding that the cumulative impacts of the multitude of decisions made by governments, businesses, and individuals sometimes have unexpected consequences or contribute to trends that are, at first, difficult to spot.

One water resource management example is illustrative. For years, the degradation of our rivers, lakes, and streams was addressed almost entirely by building sewage treatment plants and requiring industries to clean up the effluent from their facilities. Progress in reducing these "point sources" has been impressive, yet it has since become clear that many of our waterways are still in trouble. As it turns out, "nonpoint source pollution" is a more significant contributor to water quality impairment than officials once thought. The next generation of water quality improvements must address a problem that is incremental in nature — individual decisions, activities, and land uses that result in polluted runoff from streets and highways, home landscapes, agricultural land, construction sites, and managed forestlands.

Confronted by such a broad range of issues and the cumulative nature of many problems, is it possible to assess the overall ecological and socioeconomic health of a region like the Hudson River Valley? Is there any way to give it a regular "physical" that will tell us if our cumulative actions are bringing about a decline or improvement in regional well-being?

Sustainable development is a popular international concept whose promise for guiding future decision-making and policy development is now being extolled in places as diverse as the Upper Connecticut River Valley and the Puget Sound region. Integrating environmental, economic, and social concerns into a framework for their collective consideration, long-term sustainability could be a useful goal for citizens and decision-makers in the Hudson River Valley.

Sustainability at the International and National Level

The United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil during the summer of 1992, sought to establish an equitable partnership between developed and developing nations, nongovernmental organizations, businesses, and citizens throughout the world. Significant results of the conference included *Agenda 21* and the *Rio Declaration on Environment and Development,* which gave formal recognition to the interrelationships between peace, the environment, and development. It also brought into common usage the concept of sustainable development.

Sustainable development is most often defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (*Our Common Future*, United Nations World Commission on Environment and Development, 1987). Although it has been occasionally used as a synonym for environmentally-compatible development of land, it is not really about the built environment per se. Rather, it involves the development of a lasting human relationship with the world around us — one that can be maintained and renewed through the ages without diminishing its fundamental social, ecological, and economic support system.

As global ecological limits appear on the horizon and long-term sustainability emerges as a compelling international goal, a growing number of economists are questioning traditional economic theory. The field of ecological economics (see *Ecological Economics: The Science and Management of Sustainability,* Robert Constanza, ed., Columbia University Press, New York, 1991) offers challenges to both conventional economics and conventional ecology. Its proponents expand the importance of the interactions between the economy and the environment, but also elevate the significance of human interconnections with the rest of nature. In promoting the concept of sustainable development, they urge a fundamental reappraisal of the concept of growth. Although *sustainable growth* is often equated with sustainable development, international economic experts Robert Goodland, Herman Daly, and Salah El Serafy note that the dictionary definition of "growth" implies an increase in size or quantity, while that of "development" implies qualitative change. They go on to argue, "Our planet develops over time without growing. Our economy, a subsystem of the finite and nongrowing earth, must eventually adapt to a similar pattern of development without throughput growth." (Goodland et al, editors. *Population, Technology, and Lifestyle: The Transition to Sustainability,* Island Press, Washington, D.C. 1992).

As the concept has gained international currency, there is increasing interest in its applicability at the national level within the United States. In response to the U.N. Conference on Environment and Development, the President's Council on Sustainable Development was established in 1993. The mission of the 25-member panel - with representatives from environmental groups, labor and civil rights organizations, the federal government, and business and industry - is to develop policy recommendations "to encourage economic growth, job creation, and environmental protection." The Council recommends development of a national strategy for sustainable development that can be implemented by the public and private sector. This strategy would include responding to recommendations in *Agenda 21* (the international policy declaration that resulted from the 1992 U.N. Conference) sponsoring projects that demonstrate and test the viability of the Council's recommendations, connecting with other nonprofit organizations, and educating the public about sustainable development.

Also at the federal level, the Department of Commerce recently issued a draft policy paper entitled *To Ensure the Nation's Future: Sustainable Development and the Department of Commerce.* Representing perhaps the first attempt by a federal agency to integrate the goals of sustainable development with its own mission, the paper outlines current actions and future opportunities for the Department of Commerce to advance sustainable development.

Some fundamental principles of sustainability have been offered by Herman Daly, senior research scholar at the University of Maryland School of Public Affairs (1990, "Toward Some Operational Principles of Sustainable Development," *Ecological Economics,* 2, p. 4). The first suggests that *the harvest rate of renewable resources must not exceed their regeneration rate.* If a greater volume of timber is being harvested than is being replaced by regrowth, then the practice is not sustainable in the long run. A second principle offered by Daly states that *waste emission rates must equal the natural assimilative capacities of the recipient ecosystem.*

Piermont Marsh from Tallerman Mt. Photo by Robert Linck.

Polopel/Bannerman Island. Photo by Robert Linck.

Aquatic and marine ecosystems thrive on nutrients from a host of natural and human sources, but excessive contributions can throw the system out of balance and into a state of overproductivity, eventually robbing the system of oxygen necessary for healthy populations of fish and other aquatic organisms. In this case, the oversupply of nutrients has exceeded the ecosystem's natural assimilative capacity. Finally, *the rate at which nonrenewable resources are depleted should not exceed the rate of creation of renewable substitutes, which necessitates the timely investment of a suitable portion of the income into developing renewable substitutes.* As our nonrenewable fossil fuel supplies are depleted, an adequate portion of the proceeds from their sale must be invested in renewable energy sources so that alternatives become economically available at the appropriate time.

Local and Regional Pursuit of Sustainability

Application of broad principles of sustainability at the local and regional level has captured the interest of a growing number of communities in the United States and around the world. Among the many communities pursuing a sustainable future, Seattle, Washington deserves special mention. Established in 1990, Sustainable Seattle exists as a voluntary network and civic forum that has tried to bring together businesspeople, community leaders, scientists, environmental organizations, educators, religious leaders, labor organizations, and social activists. Their mission has been to address the increasing concern over social, economic, and environmental welfare and to "face the future with clearer eyes and a more integrated, longer-term perspective" (*Indicators of Sustainable Community,* Sustainable Seattle, 1993) in Seattle and Puget Sound region. The conscious effort to link these issues together is highlighted by their "Indicators of Sustainable Community" project, which issued its first report of 20 indicators at the end of 1993 and just recently published its second report with 20 additional indicators. The indicators, or vital signs, of community sustainability were developed by over 200 volunteers. They include such things as the percentage of employment concentrated in the top ten employers, percentage of children living in poverty, adult literacy rate, the juvenile crime rate, number of good air quality days per year, vehicle miles traveled per capita and gasoline consumption per capita, and number of wild salmon returning to their home streams.

The first report of Sustainable Seattle revealed trends over a range of 10–20 years, depending on the availability of data for selected indicators. While some improvements in such indicators as ambient air quality and water consumption were noted, the report concludes that overall trends are leading the region away from long-term sustainability. The group is now using their findings to challenge the public to help find solutions to the problems.

Sustainability in the Hudson River Valley

A group of politicians, environmentalists, researchers, educators, citizens, and business leaders from the Hudson River Valley met last November for a conference entitled "Sustainable Development and Environmental Quality in the Hudson River Valley," sponsored by the Hudson River Environmental Society. Among the topics included on the agenda were the role that tourism and foreign trade might play in a sustainable Hudson Valley economy, ecological changes caused by present growth and development, the role that energy and resource depletion plays in ecological and economic sustainability, and sustained use of the transportation infrastructure. Discussions were far-ranging and represented a good first step in a process that may lead to a comprehensive look at sustainability in the Hudson River Valley.

What might be the next step in applying the concept of sustainable development along the Hudson River? Sustainable Seattle's Indicators Project may represent a good model. Supported by sound technical information and the participation of volunteers representing a broad range of interests, such a project could help focus future discussions on some specific indicators that can, over time, suggest trends toward or away from sustainability. The results could provide the basis for action at the local level and, in concert with similar projects in other parts of the country and around the world, they might stimulate policy change at higher levels of government. By making decisions with principles of long-term ecological, social, and economic sustainability guiding our way, the future could hold great promise indeed. ■

New York Sea Grant is seeking partners to stimulate further progress toward sustainable development in the Hudson River Valley. Readers interested in cooperating or learning more about the issue may contact:

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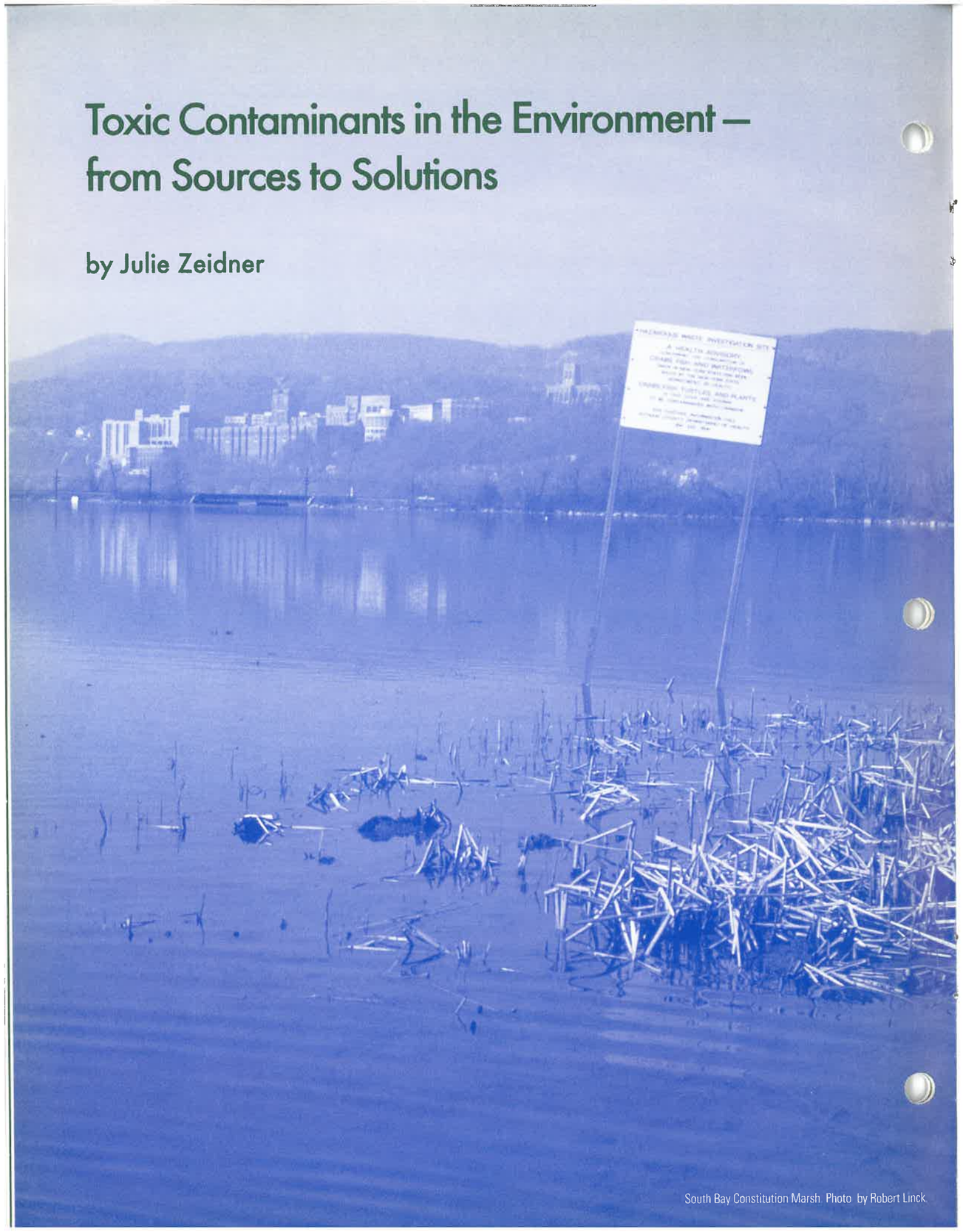
Toxic Contaminants in the Environment — from Sources to Solutions

by Julie Zeidner



South Bay Constitution Marsh Photo by Robert Linck

Toxic contaminants exist at high enough concentrations in some environments to pose potential health risks. These chemicals, by-products of the industrial age, work their way into the water, bind to sediments and soils, and are stored within the living tissues of plants and animals.

Lead in gasoline, and other metals used in industrial processes like cadmium and mercury, are the focus of scientific research due to their potential ecological or human health effects. Pesticides like DDT and other chlorinated hydrocarbons, polychlorinated biphenyls (PCBs) used in electrical equipment, and polynuclear aromatic hydrocarbons (PAHs) contained in petroleum and released from burning coal and other fossil fuels also represent health concerns that have warranted further research.

In several studies funded by the New York Sea Grant Institute, environmental scientists at the State University of New York (SUNY) at Stony Brook, the SUNY College at Oswego, and the New York State Department of Health, have made strides in understanding how these potentially toxic substances interact with the environment and living organisms. Their results are important in the ongoing policy debate over source reduction and remediation of contaminated sediments, and may hold promise in the development of new technologies to control the amount of toxic substances in the environment.

The Problem

While many toxic chemicals like PCBs, DDT and lead in gasoline have been banned in the U.S. for as long as 25 years, field studies indicate that contaminant levels have not always dropped dramatically. Many of the compounds scientists are measuring in the environment are not due to new input, but are due to existing materials recycling between soils, water, and the atmosphere. Some of these semivolatile compounds like mercury, PCBs and DDT, persistent because of their stable structures, get rained down and then revolatilized into the atmosphere, repeatedly cycled through the biosphere until they are effectively cold-trapped at high latitudes where they threaten Arctic ecosystems.

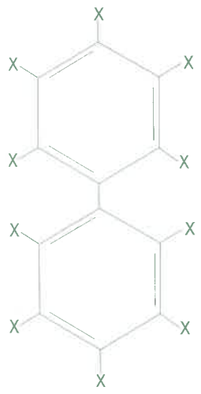
From the rural banks of Lake Ontario to the densely populated shores of Long Island Sound, researchers have measured high levels of toxic contaminants in sediments and water. In the Great Lakes, 43 areas have been identified as Areas of Concern by the International Joint Commission based on a range of contaminants. The EPA declared the St. Lawrence River in Massena, New York and Foundry Cove along the Hudson River Superfund sites after dangerous levels of PCBs and cadmium were discovered there. PCBs and chlorinated pesticides are approaching or exceeding sediment quality criteria in many areas of Long Island Sound. High concentrations of PCBs found in prized sportfish like salmonids, bluefish and striped bass, as well as in American eel, have resulted in fish consumption advisories for marine waters, the Hudson River, and the Great Lakes.

The Hudson River serves as an example of how ecosystem contamination may have broad implications for long-term ecological and economic sustainability. Since a large-scale release of PCBs into the Hudson River more than 20 years ago, the issue of how to clean up the Hudson is yet to be resolved. Toxic contaminants have led to health concerns, a severely reduced commercial fishery, unresolved debate over the appropriate course for cleansing the river, and lasting damage to the River's public image.

The Source of Toxic Contaminants

In a recent New York Sea Grant study, historical inputs of PCBs, PAHs, pesticides, mercury and cadmium to salt marshes along western Long

Island Sound were characterized by Dr. Kirk Cochran, as well as Dr. Bruce Brownawell and David Hirschberg of the Marine Sciences Research Center (MSRC) at SUNY Stony Brook. By measuring concentrations of contaminants in numerous peat and sediment cores, their research indicated that atmospheric deposition of organic contaminants like PCBs and PAHs was a significant, and possibly dominant source. Concentrations of organic contaminants near urban areas calculated by researchers were significantly higher than those observed at remote sampling locations elsewhere in North America: more than 250 times higher for PCBs and more than 100 times higher for PAHs.



Polychlorinated biphenyls
X = H or Cl

The results suggested that the atmosphere could be a major source of PAHs to western Long Island Sound. Samples taken of PAHs in the cores showed varied concentrations, but there appeared to be a relationship between the concentrations of combustion-derived PAHs and proximity to major roads. Other lines of geochemical evidence suggest that direct runoff is not controlling the inputs of PAHs to the marsh.

Elevated metal concentrations in sediments around western Long Island Sound were also identified as high by the MSRC research team. These scientists observed that heavy metal concentrations in surface sediments had not changed very much since 1972, as a result of continuous mixing of the surface layer by both physical processes and burrowing organisms, coupled with the slow sedimentation (less than one millimeter per year) characteristic of the Sound. However, surface sediment metal concentrations for copper, lead, and zinc appear to be enriched from three to ten times above levels in deeper sediments, which scientists believe predate the Industrial Revolution.

Researchers measured drastically decreased levels of DDT toward the surface of the cores probably due to the banning of the pesticide DDT on Long Island in 1966.

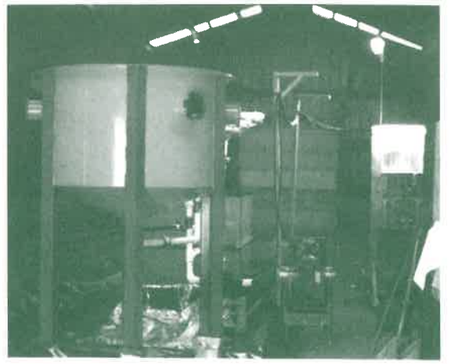
These contaminant level concentrations appear to be consistent with loadings from the atmosphere, and not from other sources like sewage discharge and urban runoff measured in Long Island Sound, Brownawell said.

In a current New York Sea Grant-funded study at SUNY Stony Brook, Brownawell and Dr. Larry Swanson are studying whether atmospheric deposition is the primary source of organic contaminants and nutrients to coastal urban areas close to New York City. Brownawell is an environmental chemist with the Waste Management Institute within MSRC and Swanson is the director of the Institute.

Understanding where pollution comes from is the first step necessary in determining how it might be controlled. While transport of contaminants in the atmosphere has long been suspected as one of the main sources of pollution to many environments, it is also the source hardest to measure. Previous studies of atmospheric deposition have been conducted in more rural environments where there are fewer sources of pollution that might interfere with the measurement of atmospheric deposition. In urban environments, atmospheric deposition has been largely ignored due to a magnitude of other point and nonpoint pollution sources, Brownawell said.

Brownawell and Swanson will use sampling equipment designed to measure deposition of contaminants associated with rainfall used previously by researchers in less urban areas of Chesapeake and Narragansett Bays.

The new study by Brownawell and Swanson will help determine whether the contaminant fluxes these scientists observed in peat and subtidal cores are consistent with contaminant fluxes from the atmosphere. By measuring concentrations of these toxic substances in the air near


Partially assembled pilot scale reactor used by SUNY at Oswego Environmental Research Center at a state Superfund site.

New York City and western Long Island Sound, and comparing them to other environments, researchers can determine how much is coming from the metropolitan environment versus other point and nonpoint pollution sources.

Their work could have a number of management implications for policy makers whose efforts have focused on capping other sources of contaminants to New York coastal areas.

"If you're talking about controlling other pollution sources, they're not going to have much of an effect and won't be very cost efficient, if the atmosphere is the primary source," Brownawell said.

Natural Processes at Work on Toxic Contaminants

Sea Grant-funded scientists are also making headway in understanding how natural processes can be used to reduce concentrations of toxic contaminants in the environment. Dr. Ronald Scrudato, a geologist with the Environmental Research Center at the SUNY College at Oswego, is currently studying how ultraviolet light and naturally-occurring minerals can be used to degrade PCBs. The development of a remediation technology using photocatalytic processes to deal with PCB-contaminated sediments and soils and other types of chlorinated hydrocarbons is another thrust of Scrudato's research.

A large percentage of PCBs have come into the Great Lakes atmospherically. In Lake Ontario, hydrophobic PCBs attach to fine-grained sediments and are accumulated in the lipid resources of biota. Some of Scrudato's original work utilizing sunlight to degrade PCBs in contaminated sediments was done on Contaminant Cove, a Superfund site in Massena. Scrudato used a photocatalytic reactor designed to mix contaminated sediment from the site in a slurry and expose it to artificial UV light systems. His research team was able to degrade more than 90 percent of the PCBs in contaminated sediments in a 24-hour period.

In a current study, Scrudato and his colleagues, Drs. Brian Bush and Chia-Swee Hong of the New York State Department of Health, and Dr. Richard Roberts and James Pagano of the Environmental Research Center are examining how direct sunlight can be used to degrade highly insoluable, lipophilic PCBs in Lake Ontario. He is also studying the effect of titanium dioxide, a common mineral in the earth's crust, on this process. When natural catalysts, such as titanium dioxide, coming from erosion and weathering of rock are suspended in the water and interact with sunlight, they might serve as a photocatalyst to further help break down PCB compounds in the water column.

In addition to Sea Grant funding, Scrudato has received more than $500,000 from the U.S. EPA, the Center for Hazardous Waste Management, the Great Lakes Research Consortium, Cornell University, SUNY Albany, the National Institute of Environmental Health Sciences, ALCOA aluminum, Alcan, and B&K Metals, Inc. to develop remediation technologies to treat contaminated sediments. Last fall, Scrudato designed a pilot scale

photoreactor to treat a ton of contaminated sediment slurry from a state Superfund site.

Scrudato hopes this process may also be used to treat contaminated sediments without requiring excavation. Sediment curtains could be used to surround contaminated sites along the Hudson River. A mixing motor would then be utilized to disturb sediments with an artificial form of titanium dioxide and then the sediments are exposed to UV light from lamps suspended over the curtains.

Remediation of contaminated sediments has important policy implications. The disposal of material from dredging projects is of particular concern to scientists, because contaminants bound to sediment particles may get transferred through the food chain from benthic communities to fish and shellfish consumed by humans.

Photo by Ian Stupakoff.

Scrudato has testified before the New Jersey Assembly with regard to the New York-New Jersey's Port Authority problems related to dredged sediments. The Port Authority of New York and New Jersey, is confronted with having to dredge sediments to keep shipping channels open, but disposal options for these contaminated sediments are controversial. New York environmental groups are demanding that disposal of these sediments in a federally approved mud dump five and a half miles off of Sandy Hook be stopped in the future. A task force appointed last June by New Jersey Governor. Christine Todd Whitman has recently called for burying contaminated dredge material in two underwater clay pits in Newark Bay. The idea has won endorsement by environmentalists, but still has to be approved by federal agencies. Photocatalytic processes could also be used to treat contaminated harbor sediments, Scrudato said.

"We think photocatalytic processes can play a very effective role in degrading contaminants associated with these harbor sediments," said Scrudato, noting that the process not only treats contaminants but mineralizes the compounds into relatively harmless amounts of carbon dioxide and chlorides.

Impacts of Toxic Contaminants on Marine Food Chains

While some toxic compounds like PCBs and PAHs can be broken down by natural processes and use of remediation techniques, metals cannot be degraded. Understanding how toxic metals behave in marine food chains has been the focus of a series of research projects directed by Dr. Nicholas Fisher, an ecologist in the Waste Management Institute of the Marine Sciences Research Center at SUNY Stony Brook.

His work in recent years has focused on the bioaccumulation, retention and impacts of metals on marine organisms at the bottom of the food chain, such as phytoplankton and the herbivores that feed upon the phytoplankton.

A 1992 Sea Grant study of Foundry Cove, the most cadmium-polluted site in the world, was conducted by Fisher working with Drs. Jeffrey Levinton and Glenn Lopez. Twenty-six years of nickel-cadmium battery production left Foundry Cove along the Hudson River near Cold Spring, New York contaminated by 179 metric tons of cadmium. In 1984, a remedial investigation of Foundry Cove was conducted by the EPA and the New York State Department of Environmental Conservation. Foundry Cove was declared an EPA superfund site and millions of dollars were committed to its cleanup.

"People complain about how much the regulatory process costs, but they don't look at what the benefits to the environment have been."

Dr. Nicholas Fisher. Photo by Ian Stupakoff.

Sea Grant-funded researchers found that crabs and grass shrimp in Foundry Cove could absorb cadmium directly from the water in dissolved form, and retain high amounts of this metal.

They also found that natural processes were removing cadmium from the system at a fairly rapid pace. Each year, tidal action alone was carrying between 500 and 1,000 kilograms of cadmium on suspended sediment particles out to sea where the metal was diluted to levels that were not considered harmful to estuarine organisms.

Foundry Cove is an example of how nature acts to correct imbalances. "Sometimes the best solution to pollution is dilution," said Fisher. "If the EPA had stopped to look at the result of our study they might not have spent millions of dollars and let nature take its course, instead."

The study of the trophic transfer of metals in marine organisms is a field that is largely unexplored, Fisher said. Organisms exposed to metals may develop a strategy for sequestering contaminants in their systems in such a way that the metals do no harm to them, but the organism may still be dangerous for a predator to eat.

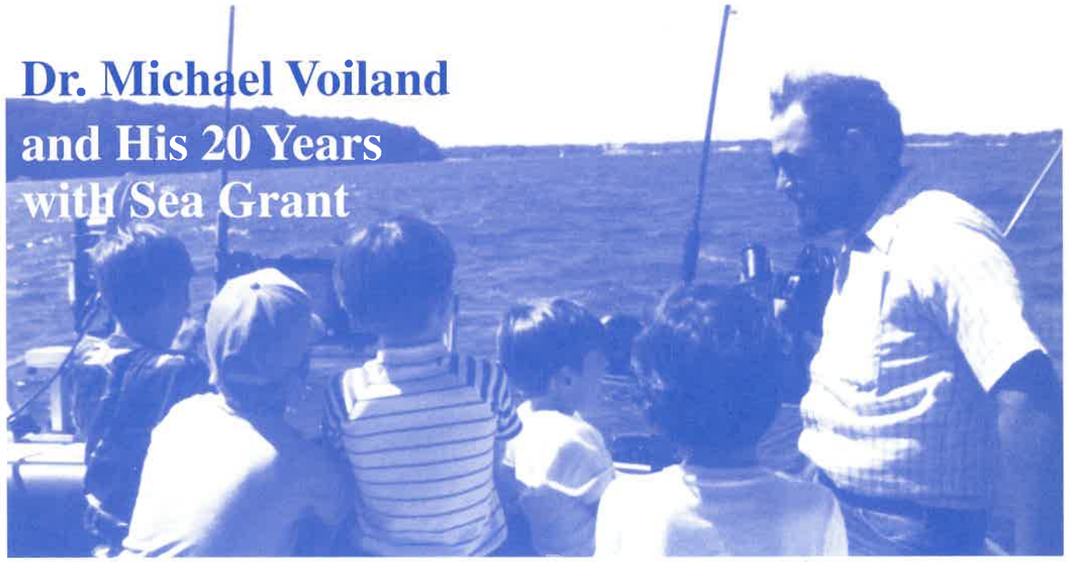
Policy Considerations

Despite the serious concerns scientists have over the impact of toxic contaminants in the environment, they generally agree that coastal conditions have improved as a result of regulations passed in the last two decades. Industry has become more responsible as a result.

"There have been tremendous improvements in environmental quality because of the Clean Water and Clean Air Acts, and other environmental regulations," Brownawell said. "What the public doesn't seem to understand is that we still have problems with some of these chemicals, although the problems would have been much worse if we hadn't reduced the input of these chemicals in the environment. People complain about how much the regulatory process costs, but they don't look at what the benefits to the environment have been, and what remediation costs have been avoided by reducing input in the first place. If we hadn't had regulatory action and bans and source controls, the levels would be much, much higher."

There is still a great deal that is unknown about how toxic contaminants interact with the environment, at what levels they become dangerous to living organisms, and how to mitigate their impacts. Policy makers are constantly faced with the dilemma of balancing known and unknown risks of contaminants with the need for development. Understanding how contaminants get into the environment, what happens to them once they are there, and what can be done to either minimize their effects or get rid of them will be crucial to managers forced to deal with these issues. ■

Dr. Michael Voiland and His 20 Years with Sea Grant



For 20 years, Dr. Michael Voiland has helped shape the New York Sea Grant program. Beginning with his work as a graduate assistant on a research project to serving as an extension specialist for 10 years, and extension program coordinator and associate director, the 45-year-old former Long Islander has watched Sea Grant evolve over the past two decades.

This past winter Voiland left Sea Grant to accept a new position as senior legislative associate for Environmental and Agricultural Programs with the Cornell University Office of Government Affairs. After 20 years of devotion to a single program, Voiland said he wanted to try something new. His new job will keep him connected to Sea Grant since New York Sea Grant is a joint program of the State University of New York (SUNY) and Cornell University, and his responsibilities cover Sea Grant efforts.

It was Voiland's childhood experiences on the Long Island Sound, and his love for fishing and boating, which sparked his interest in coastal issues. He received his masters from SUNY at Albany in geography, and his Ph.D. in geography from the SUNY College of Environmental Science and Forestry (CESF) in Syracuse.

At CESF, he became a graduate research assistant on a New York Sea Grant research project involving the first inventory of the charter fishing boat industry in New York. But it wasn't until he participated in a Sea Grant Extension-sponsored program at SUNY Oswego on Lake Ontario Salmonid Program development issues that he was introduced, first-hand, to Sea Grant extension at work and "was hooked." He knew extension education would enable him to increase awareness and attitudes that shape public policies about coastal waters.

Voiland's most rewarding efforts for Sea Grant have involved economic impact studies documenting effects of fishing in the Great Lakes, and helping anglers succeed in returning sport-caught species to the water with minimal post-catch mortality.

Before he moved on to his new post, Coastlines Assistant Editor Judith Hogan spent some time talking with Voiland about Sea Grant's past and future.

Q: How do you define Sea Grant?

A: In its essence, it is a special university-based approach to generating and extending research results to users, managers, and stewards of our nation's coastal resource, through a partnership of federal, state, local and private interests. It is an outstanding example of solving coastal resource problems and advancing positive resource development opportunities through the development and dissemination of unbiased research-based information. Sea Grant is, at its core, non-regulatory, process and information-based, and highly collaborative.

Q: Has the role of extension specialist changed?

A: Basically, not much. The job is essentially the same in purpose, unbiased educational approach, high performance standards, creativity, dependence on people and teaching skills. The subtle changes have included a greater emphasis on technical and specialized skills; increased solicitation of and success at gaining outside grants to support the program; expanded geographic range of duties in the mid-1970's when specialists became more multi-county oriented in their purview; today many exercise national leadership duties; and a more veteran and stable staff. All of these changes were influenced by fiscal constraints, and the professional growth and development of staff.

Q: What direct effect does Sea Grant have on the public?

A: You can see positive results from Sea Grant efforts everywhere along the coastline. Erosion and wave damage control structures and less-rigid approaches still serving their purposes; water and power utilities avoiding service interruptions because of early-warning and control measures applied against zebra mussel biofouling; a productive and proactive New York Seafood Council, New York State Charter Sportfishing Council, and regional and statewide marine trades associations; various volunteer marine education-oriented networks up and running; improved historical, environmental and tourism interpretive resources in many communities; Native American efforts to better the environmental stewardship on their own coastal reservation lands; a heightened awareness of the fact that nonpoint source pollution into street drains lead to and have a qualitative effect on coastal waters.

Q: Has the public's perception of Sea Grant changed over the years?

A: I think today that many more people, agencies and organizations know about Sea Grant than in 1976. And on the whole, I think the program's reputation is extremely positive and strong. I feel that in the mid-1970s, Sea Grant was viewed as the "new, naive, rich kid" in the resource development and conservation arena. Today, Sea Grant staff are often the "best connected" and savvy sources of information on a coastal topic. To some observers, Sea Grant might be superficially viewed as just another federal grant program, born in the Great Society program mill of the mid-1960s, that gives tax dollars to universities for interesting but unnecessary research and education programs. But upon closer examination, others, including the Heritage Foundation, the National Academy of Sciences' National Research Council, and those who have worked for or with Sea Grant or have been users of its information, have come to view Sea Grant as a truly innovative, cost-effective, collaborative partnership of the nation's great coastal-state universities with state, federal, and private interests.

Q: Has the research focus changed dramatically?

A: In the mid-1970s, many Sea Grant research projects were often straightforward, base-line efforts – inventories, surveys, impact studies, applications of well-known and proven technologies from other fields to the coastal resource. Today, the research is so much more competitive, problem-focused, sophisticated, and cutting-edge than 20 years ago.

Q: What effect have the different federal administrations had on Sea Grant?

A: At both the state and federal level, the tide is turning clearly to less public spending, greater public program efficiencies, higher standards of effectiveness and accomplishment, reduced regulatory burdens on the private sector in particular and on private lives in general, greater partnering of programs between all levels of government, and more creative approaches to public and private collaboration and information-sharing.

Q: What is the biggest challenge facing Sea Grant in the midst of the new wave to cut federal spending?

A: To make certain that those elected view Sea Grant as a truly unique, valuable, inexpensive program that enhances the wise use of natural resources and the lives of coastal people, all the while solving resource problems and developing new technologies to benefit those resources.

Q: How will Sea Grant survive the storm of budget deliberations?

A: The things that will buffer Sea Grant from injurious budget cuts are the same things that have insured its survival and viability since 1981, when Sea Grant was first targeted for elimination in the federal budget. These include development and documentation of its positive impact and *success stories*; its audiences' testimonials of the importance of Sea Grant-funded university research and education efforts; its dedicated staff working closely and productively with the many audiences who need impartial and the best-available information to improve their quality of life; and its success in convincing state and federal legislators that Sea Grant is one of those special programs that is effecting positive changes in the fabric of coastal communities in a highly efficient, non-regulatory, people-empowering way.

Q: What message would you send to the budgetary powers-to-be about Sea Grant?

A: State and federal leaders, in their efforts to make government smaller, more cost-effective, less intrusive, and more participatory at all levels, should look closely at the Sea Grant and Land Grant models and their remarkable records of accomplishment. They would discover a simple concept and approach that fits all the premises of less and better government, and enlightened, innovative, and non-regulative cooperation among the public and private sectors and our great institutions of higher education. Sea Grant is a partnership that, through non-advocacy, non-regulatory research and educational approaches, is often key in solving major coastal resource issues and to benefiting the socioeconomic lot of the nation's coastal residents and businesses. ■

New York Sea Grant Publications

Please send requests with a self-addressed mailing label for the following publications:

New York
Sea Grant Institute
115 Nassau Hall
SUNY at Stony Brook
Stony Brook, NY
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or call 516.632.9124

Make checks payable to New York Sea Grant

New York's 1993 Bed and Breakfast and Inn Industry

Diane Kuehn

This New York Sea Grant study identifies the present status of New York's bed and breakfast and inn industry and provides owners with up-to-date marketing, promotion and business management information. Kuehn's study estimates that over the next several years increased promotion of the industry will prove helpful. The results also indicate that owners should continually evaluate the effectiveness of their promotional techniques, and identify where their guests come from before implementing any promotional strategy. 10 pages. $1.00

Aquaculture Marketing Survey

Ken Gall and
Linda O'Dierno

The object of this survey was to obtain information that would help aquaculture producers better understand the purchasing practices of consumers, retailers and good service businesses, as well as the attitude and perceptions about seafood in general, and aquaculture-produced products in particular. The project was funded by the Northeast Regional Aquaculture Center and supported by New York Sea Grant and the New Jersey Department of Agriculture. 109 pages. $10.00.

Zebra Mussels in the Hudson: A Guide for Educators

Robert J. Kent

A guide for educators focusing on how zebra mussels are affecting the Hudson River that provides detailed background, biology, and control mechanisms for the species. The guide provides a teaching outline for the classroom, and suggestions on related student projects.

Additional information on the safe use of zebra mussels in the classroom and laboratories, as well as monitoring booklets for student projects is also included. 7 pages (plus additional materials). Free.

Scenic Byways, Trails, and Corridors and Their Impacts

Diane Kuehn, et. al

Scenic byways, trails and corridors simplify travel routes for visitors and can help communities direct visitors to important attractions and areas. They can benefit communities by increasing the real property value of the adjacent lands, and provide a mechanism for educating visitors and residents on the historic and cultural resources located on the roadways. The fact sheet, produced by the Great Lakes Sea Grant Network, describes the impacts of those scenic trails and corridors through the use of case studies from the Great Lakes region. 4 pages. $.50.

The following publication is available from Media Services, 7 Cornell Business & Technology Park, Cornell University, Ithaca, New York, 14850.

Marine Science at Work– Case Studies and Youth Action Plans

Robert J. Kent and
H. David Greene

This three-part practical teaching outline focuses on environmental science in the areas of food fish contaminants, marine fish populations, and the relationship between surface runoff and coastal water quality. The publication, designed for youth educators, discusses water quality issues, seafood safety, and fisheries management. The three chapter units focus on fish contaminants, striped bass, gardening and water quality. Each unit has a suggested lesson plan. There is also an appendix for New York State Regents curriculum. 24 pages. $6.00.

Other newsletters available from Sea Grant:

- Charterlines
- Coastal Educators News
- Commercial Passenger Fishing Vessel News
- *Dreissena!*
- Great Lakes Research Review
- Marine Archaelolgy
- Marine Facilities Notes
- Marine Network News
- New York Great Lakes Water Level Update
- Perspectives: Great Lakes Program
- Tourism News

Journal Reprints

Isolation of Virus Capable of Lysing the Brown Tide Microalga, *Aureococcus anophagefferens.*

K.L.D. Milligan and E.M.Cosper. 1994. Science. 266:805-807. Free.

Laboratory Efficacy of Enrofloxacin for the Control of *Aeromonas salmonicida* Infection in Rainbow Trout.

P.R. Bowser, G.A. Wooster, and H. Hs. 1994. Journal of Aquatic Animal Health. 6:288–291. Free.

Seasonal Feeding and Fecundity of the Calanoid Copepod *Acartia tonsa* in Long Island Sound: is Omnivory Important to Egg Production?

H.G. Dam, W.T. Peterson, and D.C. Bellantoni. 1994. Hydrobiologia. 292/293: 191–199. Free.

Energy Density and Size of Pelagic Prey Fishes in Lake Ontario, 1978–1990: Implications for Salmonine Energetics.

P.S. Rand, B.F. Lantry, R.O. Gorman, R.W. Owens, and D.J. Stewart. 1994. Transactions of the American Fisheries Society. 123:519–534. Free.

Processes Controlling Recruitment of the Marine Clanoid Copepod *Temora longicornis* in Long Island Sound: Egg Production, Egg Mortality, and Cohort Survival Rates.

W.T. Peterson and W.J. Kimmerer. 1994. Limnology and Oceanography. 39(7):1594–1605. Free.

Rapid Growth, High Feeding Rates, and Early Piscivory in Young-of-the-Year Bluefish (*Pomotomus saltatrix*).

F. Juanes and D.O. Conover. 1994. Canadian Journal of Fisheries and Aquatic Sciences. 51:1752–1761. Free.

Motivations and Satisfactions of Lake Ontario Boating Salmonid Anglers.

W.F. Siemer and T.L. Brown. 1994. Journal of Great Lakes Research. 20(2):457–470. Free.

Technology Expanding Sea Grant's Outreach Efforts

By Judith N. Hogan

When Chuck O'Neill started as a Sea Grant Extension Specialist 15 years ago, his communication tools were essentially a phone, the U.S. mail service and one-on-one interaction with individuals and organizations. Then came the technological age: computers provided databases for easy information retrieval, faxing afforded instant document transmittal, and video production offered an exciting alternative to printed materials.

Nowadays, O'Neill is broadcasting information through satellite signals and sharing his knowledge on electronic networks.

There's no question that technological advancements are providing Sea Grant specialists with expanded outreach capabilities on the state, national and international levels. But, as O'Neill quickly points out, the new tools are not replacing the old.

"Sea Grant is tapping into all these technologies which allow us greater access to our audience. The computers allow us to get on the internet, access researchers and universities all over the country on a daily basis. I have used the video technology for a number of years. But we all still rely on the old ways, especially one-on-one interaction," O'Neill said.

Initially involved with coastal engineering resource management, O'Neill's current programming focus involves zebra mussel issues and serving as director of the Zebra Mussel Clearinghouse. When he began his latest zebra mussel initiative he was faced with the problem of reaching a national audience to establish task forces. His solution involved using satellite teleconferencing, which allowed his program to be simultaneously viewed by hundreds of people in over 20 states. This avenue of "distance learning," said O'Neill, allowed him to disseminate needed information and reach out to states he wouldn't have been able to without exorbitant travel and cost.

A satellite video conference involves transmitting a live television program, produced at an "uplink site," by satellite to "downlink" sites equipped to receive satellite communications. Audiences across the country can phone and fax in questions to the panel. Most times, downlink sites include a "wrap around program" which provides specific information and discussion on a local basis.

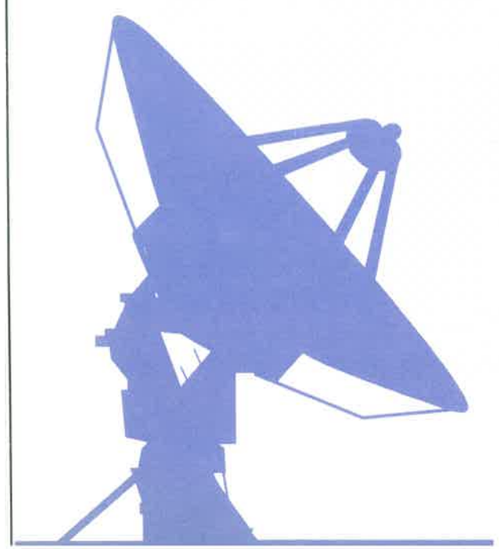
O'Neill's intent was to get cooperative extension staff and state agencies at inland states involved in a new training initiative and to provide general information about zebra mussels. He mailed out 2,000 notices detailing the conference and the available downlink sites. Long distance attendees were at 40–45 sites

throughout 20 states, including New Hampshire, Florida, and California.

"We feel it was a success because we were able to reach so many people at the same time, and we have had great feedback on the conference," said O'Neill, who is planning at least two more uplink programs on zebra mussels during 1995.

Several other Sea Grant specialists have also been active in this new communication technology. New York Sea Grant Acting Associate Director Dave White, along with Extension Specialist Jay Tanski, downlinked a docks and marinas conference held in Madison, Wisconsin last October to two sites, allowing their respective audiences, upstate and on Long Island, access to the conference. White, based at Cornell University, praises distance learning, which he first used in the late 1980s. Back then, White teleconferenced through the phone lines, presenting a talk on fish compost and waste disposal to attendees at a Minnesota conference.

This past October's docks conference was White's second satellite project.



"The local marine industries were very receptive because it provided another tool for information they might not have gotten since they couldn't attend the Wisconsin conference," White explained .

With the help of Cornell University and the State University of New York (SUNY), New York Sea Grant is able to both uplink and downlink conferences. The zebra mussel conference was televised from Cornell's television studio and the university provided personnel for production. Cornell Cooperative Extension Media Services uplinks at least seven to eight conferences a month from its facilities.

White and Tanski are planning a satellite conference this year on boater pumpout and waste handling. Though they applaud the ability to bring national expertise to a local region, they emphasize that the technology is not a cure-all for local issues.

"It's hard to transmit, in one hour, the problem as it pertains to a certain area. With distance learning you provide a general overview of the problem so that many different areas can benefit," said Tanski, adding, "It comes down to the specific area's problems where you make the impact. Distance learning is not going to replace the telephone and one-to one interaction, it's another tool that can be effective." Tanski has served as a specialist in coastal processes and facilities since 1983.

Helen Domske

Dave Greene

Photos by P. MacNeill

Access is still the crucial concern to the specialists since many audiences don't have computer capability, access to downlink sites, or even available fax machines.

So as Sea Grant specialists use new technology to do their jobs better, they introduce their audiences to new communication tools.

"We try to educate ourselves and then take that information and share it with our audiences. As we become proficient we integrate it into our ongoing educational programs," said White. "Sometimes it can't work, such as when our audience doesn't have internet access or e-mail capability. Then we fall back on other traditional methods of newsletters and phone calls."

David Greene, an extension specialist at the Sea Grant office in East Aurora, works closely with Native Americans and is aiming to get the state's eight reservations "on-line," communicating through electronic bulletin boards and connected on the information highway.

"Some of the reservations are on line, some aren't. Reservations are in a variety of stages, both culturally and technologically. Their technology use and experience depends on their funding resources. The hardest part is figuring out how to do the actual hook ups," said Greene, adding that reservations across the country can stay in touch on line through a Native American electronic bulletin board posted out of Washington State University.

Internet forums are also proving valuable to Sea Grant Extension Specialist Diane Kuehn, at the SUNY College of Oswego, who specializes in Great Lakes tourism and economic development.

"In the field of tourism, many new internet mail forums have been set up which I use to advertise the publications and information Sea Grant provides," Kuehn said. "I have been getting good response from these, and several are global, which really expands our audience and our access to new ideas."

Helen Domske, a Sea Grant extension specialist at SUNY Buffalo involved in ecosystem issues, is impressed by the organization's leadership role in embracing new technology.

"As educators we must be aware of the importance of interactive learning," Domske said. "Technology such as satellite conferencing, which makes state and national experts available to a broader audience, is excellent. It offers a whole new world in reaching out to people." ■

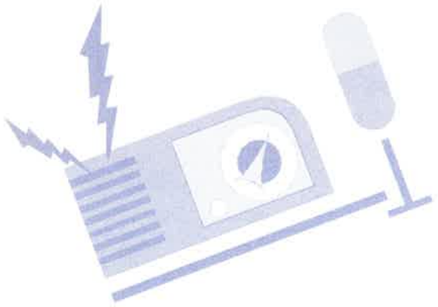
Diane Kuehn

Chuck O'Neill

Jay Tanski

Dave White

CURRENTS



Lower Power Radio Project in Hudson River Estuary

The Hudson Valley has been hit hard by economic recession and corporate downsizing in recent years and the economic ripple effects are leaving no one untouched.

New York Sea Grant and Cornell Cooperative Extension of Ulster County are teaming up with municipalities, nonprofit organizations, and the business community to stimulate the local economy by catching the attention of travelers and informing them of noteworthy cultural and natural attractions on both sides of the Hudson River.

With information provided by Oregon State University Extension Service (Special Report 890. March 1992), New York Sea Grant and Cooperative Extension have proposed the establishment of a travelers' information (or low power radio) station in Kingston, New York.

Low power radio is a specialized form of AM radio broadcasting first used in the 1970s to inform travelers of traffic and weather conditions. More recently, it has been used in state and national parks, airports, and theme parks to provide information to specific audiences. Passers-by can tune into the assigned frequency, as advertised on highway signs, and hear information about local attractions, lodging, boating and fishing, and other information and education that will encourage visitation and enlightened use of natural resources. The selection of broadcast range and equipment is flexible, depending on needs and budget constraints.

Working with a committee of representatives from the tourism industry and nearby municipalities, Sea Grant and Cornell Cooperative Extension of Ulster County have explored various broadcast options and have applied for a Federal Communications Commission license to operate a 10-watt AM radio station with a minimum range (radius) of 2.5 miles. In the meantime, they are working on broadcast messages and signage to alert potential listeners.

Better Detection of Paralytic Shellfish Poisoning

Scientists have made progress in the search for a better detection method of Paralytic Shellfish Poisoning (PSP), since the USDA reported that standardized samples of PSP toxins sent for analysis at labs across the country resulted in significant errors.

According to researchers at the Marine Sciences Research Center at the State University of New York at Stony Brook, surfclams are remarkably efficient when it comes to accumulating PSP toxins. They hold up to three times the level of toxins than the blue mussel, which is used as the primary indicator organism for PSP monitoring programs. Surfclams toxified with PSP-producing dinoflagellates are capable of converting weakly potent PSP-toxins to even more potent compounds at high rates in their tissues, which might explain why the detoxicification process takes so long, according to Researcher Dr. V. Monica Bricelj.

PSP, caused by periodic blooms of toxic dinoflagellates (red tide), has threatened nearshore shellfisheries for decades, and most recently, valuable offshore harvesting areas including those of the surfclam and ocean quahog. PSP poses a serious public health concern, and has the potential to harm an important segment of the seafood industry.

New PSP detection methods are also being studied by Dr. Greg Boyer of the SUNY College of Environmental Science and Forestry and researchers at the Woods Hole Oceanographic Institute.

Current PSP toxin analysis involves injecting toxified shellfish extract into a mouse. The toxicity is determined by how many units are required to cause death between a span of five to seven minutes. Another method, using high performance liquid chromatography (HPLC), has been deemed complicated and expensive since it involves a great deal of equipment and personnel time. In that process, each toxin in the PSP sample is measured separately using HPLC columns, which proved costly since there is usually a whole range of toxins involved. Researchers also said the process did not provide accurate results.

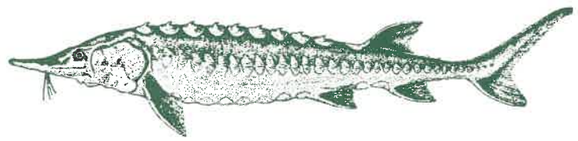
Dr. Boyer's research team has discovered that using a simple electrochemical detector with the use of HPLC columns is a much more reliable, inexpensive, and portable method. In redefining the process, the researchers also found that the purity of silica used in the HPLC column is a very important variable affecting reliability, and after 1,500 tests of 16 different types of columns, the team has narrowed down the field of suitable HPLC columns to use for PSP analysis.

Feed Additive May Reduce Hatchery Pollution

Researchers at Cornell University's Department of Agriculture and Biological Engineering have identified a feed additive for hatchery and fish farming operations that reduces the amount of fecal material discharged in wastewater.

Increasing restrictions on hatchery and fish farming operations calling for reductions in waste discharges are increasing costs associated with running such operations. Installing expensive waste treatment equipment could be a final blow to a struggling facility.

In a New York Sea Grant project by Dr. Michael Timmons, the Cornell researcher has identified a feed additive that increases the density of fecal material deposited by the fish, making it easier to mechanically collect and separate the matter from the waste stream. Wastewater quality is also improved by the feed additive because it decreases the solubility of the feces, which retains many of the nutrients not used by the fish. The feed additive, available from commercial sources, is more expensive than conventional feed, but more economical than installing expensive water treatment equipment.



Identifying Sturgeon Stocks Will Aid Rehabilitation

Atlantic sturgeon populations have been severely depleted throughout their range along the Atlantic and Gulf coasts. Researchers are hoping that the development of DNA markers in the Atlantic sturgeon population will help target direct species rehabilitation efforts for the troubled fishery.

By identifying how many distinct breeding stocks contribute to assemblages of sturgeon in the New York Bight, management plans could be formulated to increase population levels.

In a current New York Sea Grant study Dr. Isaac Wirgin at the New York University Medical Center and his colleague John R. Waldman of the Hudson River Foundation have found that sturgeon populations are genetically differentiated along the Atlantic and Gulf coasts. This preliminary data suggests that homing fidelity of the sturgeon is high.

The research will identify both mitochondrial and nuclear DNA markers which can be used to identify stocks. This stock status information can be used in the development of management plans to conserve current populations.

Photo by Robert Linck

Public Trust Doctrine Revisited

In recent years, there has been a rebirth of attention, cases and authoritative writings on the subject of the Public Trust Doctrine, a law dating back to the Romans, which gave states a title interest in tidal areas — essentially all lands touched by the ebb and flow of the tide lying below the mean high tide line.

The Public Trust Doctrine was created to protect the public interest in fishery and navigation. Each state is a trustee of the waters in navigable rivers, streams, lakes and in the coastal ocean up to the ordinary or mean high water mark. In many cases, the public also owns the bottomland under these waters, as well as the plants and animals living there. States have the responsibility to protect these areas for public uses, such as navigation and fishing.

Recently, the Public Trust Doctrine has come under scrutiny with respect to the public's right to use and access the water. In response to increasing questions about the Doctrine, legal experts from coastal states and public officials met for a conference on Long Island in December to discuss the law as it relates to both public access and private property ownership rights. The conference was co-sponsored by the Albany Law School, the New York State Department of State, the New York Sea Grant Institute, the New York State Legislative Commission, and the New York State Bar Association. Speakers included legal experts from Pace, Columbia, Albany, Hofstra and Touro Universities.

While the Doctrine's original intent was to limit obstructions to trade and commerce, its interpretation has recently broadened to address environmental concerns. Speakers said that New York state is at a crossroads as it grapples with the balancing of public and private rights as it relates to issues such as the right to rebuild in coastal areas, environmental regulations, and fishing laws.

A video tape of invited speakers' presentations is available from New York Sea Grant (six hours running time) for $50.00.

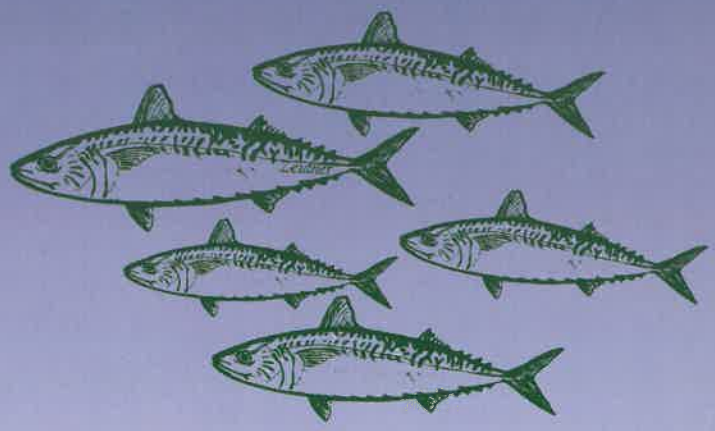
Seafood Corner

Atlantic mackerel (*Scomber scombrus*) are small, fast swimming, schooling fish abundant throughout the northern Atlantic Ocean. The Atlantic mackerel is a member of a large family of marine fish called *Scombridae* that includes more than 40 different species of mackerel and tuna. Ranging between one to two pounds and 12 to 18 inches in length, Atlantic mackerel are among the smallest members of this family. The Atlantic mackerel's streamlined, bullet-shaped body, forked tail, and smooth satiny skin with tiny scales are characteristic of this family of ocean fish.

Atlantic mackerel stocks are underexploited and can sustain substantially more fishing, according to a 1993 National Marine Fisheries Service Status Report on the Fishery Resources of the Northeastern U.S. In New York, between 350,000 to 580,000 pounds have been landed at New York ports each year for the past decade with most of the catch landed on Long Island during the months from March through May.

Atlantic mackerel are usually found in the marketplace in the form of fresh whole fish or fillets. This fish is a good choice for health conscious consumers. It provides a good source of protein and contains more omega-3 fatty acids than most common commercial fish species. Atlantic mackerel's strong, full flavor is complemented by other citrus-based sauces including cranberry, gooseberry and rhubarb, as well as tangy marinades and cajun sauces.

Nutritional Information (for 3 ounces baked Atlantic mackerel)	
Calories:	218
Protein:	20 grams
Total Fat:	15.0 grams
Saturated Fat:	3.5 grams
Omega-3:	1.0 gram
Cholesterol:	75 milligrams
Sodium:	95 milligrams



Mackerel Putanesca

(An original recipe by Chef Stanley Kramer — Docks Oyster Bar & Seafood Grill, NYC)

2 large (10 oz or more) or 4 small mackerel fillets with skin on
flour for dusting
2 tablespoons olive oil
1 teaspoon each of:
- onion diced fine
- chopped garlic
- chopped fresh oregano
- chopped fresh basil
- chopped fresh parsley

6 diced anchovy fillets
8 black Nicoise olives (pitted & halved)
2 teaspoons small capers
4 diced pepperoncini or Tuscan peppers
2 tablespoons tomato puree
6 plum tomatoes, diced
salt & pepper to taste

Season fish with salt and pepper. Dust with flour and shake off excess. Saute fillets in olive oil — flesh side first for 2–3 minutes. Turn fillets over and cook other side for an additional 2–3 minutes until flesh turns opaque. Remove fillets and keep warm. Save oil. Saute onion and garlic in the oil that the fillets were cooked in. Cook until soft but not brown (about 5 minutes). Add capers, anchovies, pepperoncini, olives, basil and oregano. Cook for several minutes. Added canned tomato juice or puree. Mix well and add diced plum tomatoes. Simmer approximately 5 more minutes. Salt and pepper to taste. Pour sauce over mackerel fillets. Sprinkle with chopped parsely. Serve with orzo (rice shaped pasta) or rice pilaf. Serves 2 to 4.

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