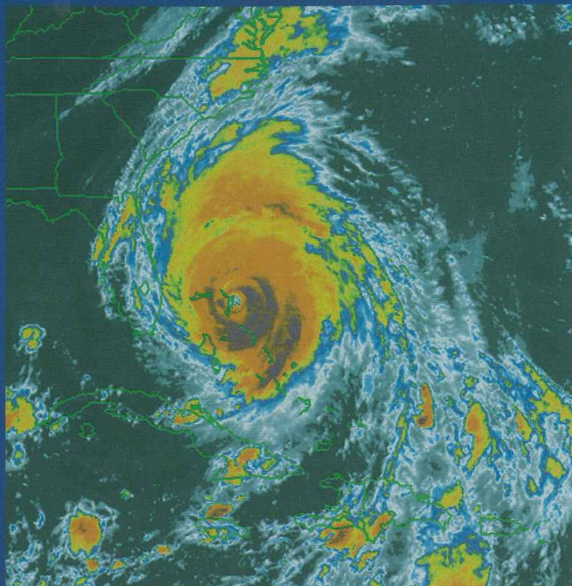


MARINE SCIENCES RESEARCH CENTER

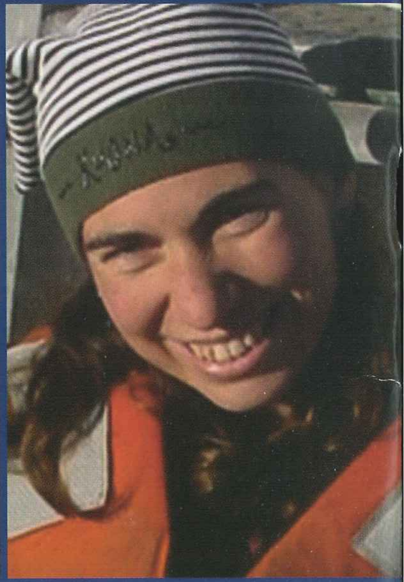
Biennial Report 2003–2005

STONY BROOK
STATE UNIVERSITY OF NEW YORK

MARINE SCIENCES RESEARCH CENTER

A CENTER FOR RESEARCH, EDUCATION AND PUBLIC SERVICE FOCUSED ON THE MARINE AND ATMOSPHERIC SCIENCES



Funding

The Marine Sciences Research Center receives funding from several sources. Base operational funding comes from Stony Brook University's $1.4 billion annual operating budget. This allocation has grown significantly in recent years, from $3.4 million in 2000 to nearly $3.8 million in 2005 *(see Figure 1)*.

State funding represents about 36 percent of MSRC's total operating budget. Faculty are extremely successful in attracting extramural funding to support research. Sponsored project expenditures average about $6 million annually, nearly twice the base state support provided to the Center *(see Figure 2)*. Sponsored research funding comes primarily from a variety of federal, state, county, and municipal sources.

The SUNY Research Foundation, a private, nonprofit educational corporation established in 1951, administers externally funded grants and contracts on behalf of MSRC.

MSRC and the New York State Department of Environmental Conservation (DEC) have expanded collaborations on research and monitoring projects that focus on high-priority marine resource management issues. The research is conducted by MSRC faculty, staff, and students with expenses reimbursed by DEC. Annual funding from DEC is now approximately $500,000.

Figure 3 shows the sources of MSRC operational funding for fiscal year 2005.

Figure 1

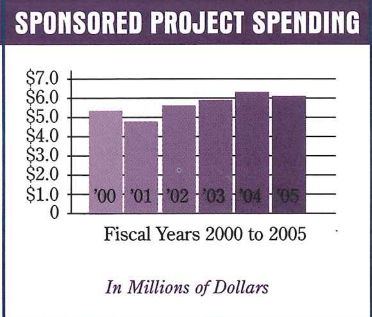


Figure 2

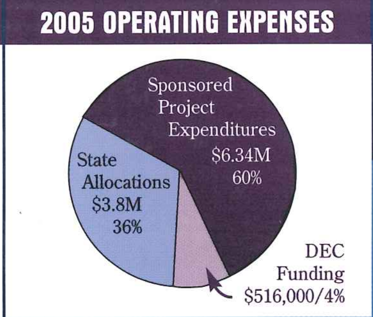


Figure 3

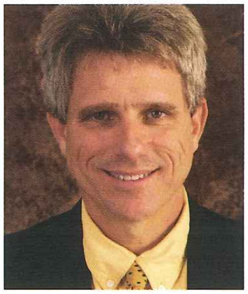
Established by the State University of New York Board of Trustees in 1965, MSRC is an internationally recognized center for marine and atmospheric sciences.

Our mission is to work toward a better understanding of the interactions between ocean and atmosphere, and to help solve real-world environmental problems—locally, regionally, and globally.

We place a strong emphasis on the integration of research, education, and public service.

Report from the Dean and Director

A Time of Dramatic Change



It is a pleasure to present the Marine Sciences Research Center (MSRC) Biennial Report for 2003-2005. Dramatic changes are taking place, changes that expand our mission and make this a particularly exciting time in our history.

The most fundamental advance is the transfer of the undergraduate marine sciences program from Long Island University's Southampton College to Stony Brook University. These new majors allow us to serve more undergraduate students and set the stage for future growth of MSRC's programs. Our other two undergraduate majors, in Atmospheres and Oceans and Environmental Studies, also are experiencing rapid growth. Our graduate core courses and comprehensive exams have been revamped and updated as well.

MSRC's institutes are thriving. Our new Marine Animal Disease and Pathology Laboratory is so essential to marine resource management that the New York State Legislature allocated $750,000 in additional funds this year to support its work.

The Living Marine Resources Institute has been reinvigorated by the co-funding, with the New York State Department of Environmental Conservation, of two new faculty positions. The Institute for Terrestrial and Planetary Atmospheres also has added faculty to its ranks. In total, we welcome six new faces to our faculty this academic year.

The research endeavors of MSRC reach far beyond Long Island. Alaska, Antarctica, Bangladesh, Hawaii, Iceland, the Mediterranean, New Guinea, Samoa, and Venezuela are just a few of the locations where MSRC has major research operations underway. Our scientists are part of the international community of researchers focusing on global issues such as the causes and consequences of climate change.

Finally, MSRC is reconnecting with its alumni, who now number more than 675. Alumni gatherings are held annually. This year's event celebrates the many contributions of former MSRC Dean and Director and former University Provost Jerry R. Schubel to the Center's development.

To learn more about MSRC, please visit *www.MSRC.sunysb.edu*. There you will find information that describes our work and highlights the people who make this such a dynamic, productive organization.

David O. Conover
Dean and Director
August 2005

RESEARCH • EDUCATION • PUBLIC SERVICE

Faculty are developing a mechanistic understanding of how energy and nutrients are transformed as they move through marine ecosystems.

MSRC is committed to basic oceanographic and atmospheric research, while addressing pressing environmental concerns. These complex issues require a broad, interdisciplinary approach. Our scientists focus on such areas as:

Environmental Modeling and Prediction Mathematical models are important tools in the prediction of oceanographic, atmospheric, and ecological processes. By combining empirical data with modeling, researchers can explore the causes and consequences of natural phenomena and human disturbances.

Patterns and Impacts of Climate Change The Earth's climate and atmospheric composition have already been dramatically changed by human activities. MSRC scientists are quantifying the human forcing of climate, and studying its physical and biological effects on the planet. Understanding the links among natural variability, climate change, and human forcings is essential in developing rational approaches to increased "greenhouse" effects.

Environmental Health and Contaminants Chemicals and pathogens in the environment are a threat to ecosystem and human health, yet the sources, fates, and effects of these contaminants are often not well known. Faculty are investigating a variety of environmental health issues, together with colleagues in Stony Brook's Health Sciences Center, Brookhaven National Laboratory, and Cornell University Veterinary School.

Conservation and Management of Marine Resources MSRC collaborates with state and federal management agencies to develop better coastal management policies. Research interests related to these efforts include brown tides, shellfish dynamics, disease outbreaks, interactions between aquatic organisms and toxic chemicals, marine wilderness areas, and the evolutionary and ecological effects of fisheries.

Biogeochemical Transformation of Energy and Elements Human alteration of biogeochemical processes, such as carbon and nitrogen cycling, is thought to cause changes to the Earth's biosphere. Faculty are developing a mechanistic understanding of how energy and nutrients are transformed as they move through marine ecosystems. This new information can be used to mitigate the environmental problems that result from human activities. These projects include studies of the sources, transformations, fates, and fluxes of organic and inorganic compounds in planktonic and benthic systems; and studies of the relationships between genetic and physiological diversity of marine microorganisms and the processes that structure their habitats (including food web interactions).

Sampling for young fish on the Hudson River with a beach seine.

Students capture bottom sample.

Extremely minute contaminant concentrations can now be detected in groundwater and surface waters.

Research Highlights

The following pages are examples representing the diversity of projects underway at MSRC.

ELUSIVE CONTAMINANTS REVEALED

Human-derived organic contaminants have detrimental effects on marine ecosystems. But these substances are not only harmful, they're also sneaky. At concentrations as minute as less than one part-per-trillion, they are notoriously hard to detect in marine waters. Professor Bruce Brownawell has built a new mass spectrometry laboratory at MSRC to facilitate his detection and study of organic contaminants. The lab is centered on a sophisticated Micromass LC (time-of-flight) HPLC mass spectrometer system, capable of quantifying contaminants at the sub-part-per-trillion level in a wide variety of samples. Have instrument, will measure, and during the past two years Brownawell has documented the presence and concentration of pharmaceuticals and personal care products in groundwater and surface waters of Jamaica Bay; estrogen and other human steroid hormones in groundwater, wastewater, and sediments; pesticides used to control disease-carrying mosquitoes; and household detergents and surfactants and their breakdown products.

Deploying particle trap, Mediterranean Sea.

GLOBAL TRACE GASES

Professor John Mak studies the life span of trace gas stable isotopes in the global atmosphere. Together with the National Institute of Water and Atmospheric Research (NIWA) in Wellington, New Zealand, and the Max Planck Institute for Chemistry in Mainz, Germany, he looks at concentrations of greenhouse gases such as methane. He also determines general atmospheric background conditions of trace gases by analyzing the stable and radioisotopic composition of specific gases. This information can be used to determine how the lifetimes of various trace gases in the atmosphere will change due to human influences.

"Our goal," says Mak, "is to provide a global, multi-year measurement of trace gas atmospheric lifetimes and to determine year-to-year changes in those lifetimes. The data will be useful in comparing future and current lifetimes."

NIWA manages the project's field sites in New Zealand and Antarctica, and the Max Planck Institute samples at a site in Germany, while Mak oversees sites in Hawaii, American Samoa, and Iceland's Westman Islands. The field sites were selected not only for their geographic locations around the globe but also for the ancillary data provided by local laboratories. The National Oceanic and Atmospheric Administration (NOAA) operates a Climate Monitoring and Diagnostics Laboratory at the Hawaii and American Samoa sites; the Icelandic Meteorological Office maintains a sampling site in the Westman Islands. These local labs conduct *in situ* monitoring of carbon dioxide, ozone, temperature, humidity, and pressure.

PARTICLE FLUX AND GREENHOUSE CLIMATE CHANGE

The Mediterranean Sea is providing MSRC researchers with new information about the ocean's role in the global carbon cycle. The MedFlux project, an international study that includes Distinguished Professor Cindy Lee, professor Kirk Cochran, and their students, focuses on sinking of particles from surface waters to the deep ocean. Removal of particles from the surface ocean controls the rate at which the ocean absorbs carbon dioxide ($CO2$)—a major greenhouse gas affecting the Earth's climate—from the atmosphere. Determining the ocean's response to increased $CO2$ concentrations is critical in predicting how the global carbon cycle will respond to environmental changes.

The project has two objectives. The first is to determine how ocean minerals aid in the sinking and protection of organic carbon. The second examines the ratio of organic carbon to these "ballast" minerals. A variety of techniques, such as radiotracers, trace metals, and organic biomarkers, are used to quantify particle fluxes.

Distinguished Professor Lee notes, "Our results are quite exciting. They show that minerals aid in aggregation of particles and act as ballast to promote sinking. By using a new sediment trap that measures particle sinking rates, information gained from tracers measured in the traps, and the application of statistical techniques, we can produce a mechanistic model of particle sinking and remineralization."

In addition to MSRC researchers, MedFlux includes scientists from the Skidaway Institute of Oceanography, the University of Washington, and several European laboratories.

WHERE HAVE ALL THE HARD CLAMS GONE?

Once upon a time, Great South Bay was a clam factory. During the 1970s, this region on Long Island's South Shore produced up to 60 percent of the hard clams (*Mercenaria mercenaria*) harvested annually in the United States. But by the early 1980s, overharvesting had reduced hard clam abundances in the Bay by more than 75 percent.

Faced with poor catches, baymen traded in their rakes and tongs for the hammers and saws of the Island's booming construction economy. The resulting relaxation in harvesting pressure should have provided an opportunity for the hard clam population to rebound, but it continued to decline. Hard clams in the Bay now are less than 1 percent as abundant as they were in their halcyon days. Professors Robert Cerrato and Darcy Lonsdale believe they know why.

Increased Filtration Time

In shallow, highly productive coastal environments like Great South Bay, filter-feeding and waste excretion by dense populations of bivalve mollusks can control the amount and type of phytoplankton in the water. In the 1970s, hard clams filtered the entire volume of water in Great South Bay in less than three days. With the decline in clam abundance, it is estimated that this filtration time now takes up to 50 days. Cerrato and Lonsdale speculate that, as hard clam filtration exerted progressively less control, the phytoplankton community of Great South Bay evolved into a mix of algal species less favorable for clam growth. This triggered lower clam growth rates, resulting in higher clam mortality rates. Persistently high mortality rates resulted in the current dearth of clams on the bottom.

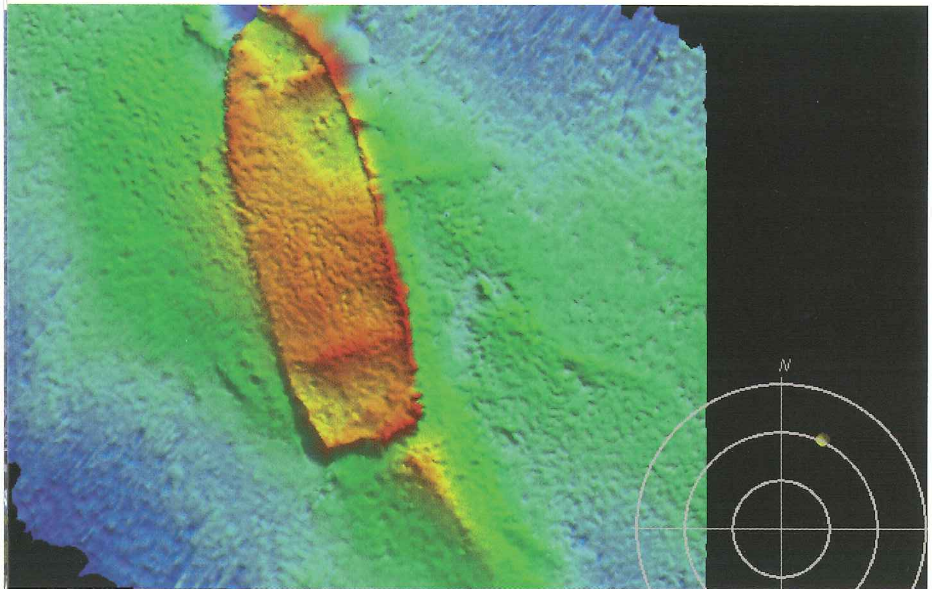
Reversing the Trend

Experiments by Lonsdale and Cerrato indicate that this chain of events may be reversible. In large experimental chambers, amount and species composition of phytoplankton changed when hard clams were added. (For example, the addition of clams prevented the development of brown tide, a clam-unfriendly algal species.) Cerrato and Lonsdale's laboratory and field studies have documented existing biofiltration conditions and hard clam growth in Great South Bay, as well as the effect of clam filtration on phytoplankton's nutritional value to clams.

The Nature Conservancy is using MSRC's findings as part of its baywide clam restoration effort. The Conservancy is stocking high densities of adult hard clams, in a number of spawner sanctuaries, to try and shift the phytoplankton community back to one more favorable for hard clam survival.

Sampling in-water experiment, West Neck Bay.

Hard clams in the Bay are now less than 1 percent as abundant as they were in their halcyon days.



Multibeam echosounder image of sunken vessel, Hudson River

Four hundred years of history have left their mark on the Hudson.

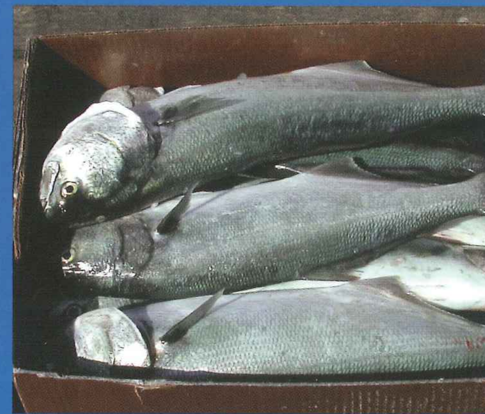
SECRETS OF THE SEAFLOOR

What does the bottom of the sea look like? How can detailed images of its murky depths help us understand the health and diversity of bottom-dwelling organisms? These and other questions are being answered by Professor Roger Flood. He uses a sophisticated sonar-like technology to "see" the Hudson River's underwater landscape, in the first extensive survey of the River since the 1930s.

Four hundred years of history have left their mark on the Hudson in the form of shipwrecks, dumped cargo, and dredge spoils. These bottom anomalies tell a fascinating tale of those who have sailed to and from the port of New York. Riverbed data illuminate sediment transport pathways and lead to insights on contaminant transport, larval transport, and archaeology.

Flood's system—a Multibeam Echosounder attached to the MSRC research vessel R/V Pritchard—collects information from about 120 beams as the boat cruises above the seabed. The echosounder determines water depth from the echo time, and provides information on bottom sediment type and distribution from the strength of the echo. Flood is working with scientists from Columbia University, Lake Champlain Maritime Museum, and the archaeology department at Stony Brook University. The project is supported by the New York State Department of Environmental Conservation (DEC), NOAA, and the National Park Service.

RECRUITMENT BLUES



MSRC is the world's leading center for bluefish research, thanks to investigations by Professor David Conover, his students, and colleagues.

The bluefish (*Pomatomus saltatrix*) is one of the most popular saltwater game fish along the United States East Coast and in many other parts of the world. Legions of anglers eagerly await the annual arrival of this highly migratory fish, which spends the winter in offshore waters of the Southeast. Adult bluefish spawn there in early spring, and again in early summer in the continental shelf waters of the Mid-Atlantic. Previously, Conover demonstrated that the relative contribution of these two discrete spawning events to the fishable stock of bluefish varies over time. He and his students are attempting to understand why this occurs, and what factors determine the survival of spring- vs. summer-spawned bluefish.

Fewer Spring-Spawned Fish

Since the mid-1980s, bluefish abundance along the East Coast has declined dramatically. Conover suspects that the reason for the decline is poor production of spring-spawned bluefish in recent years, coupled with the failure of summer-spawned fish over this same time period to contribute to the adult bluefish population. Verifying this hypothesis will help fishery managers predict future trends in bluefish abundance, and aid in devising appropriate fishing regulations to maximize the prospects for a rebound in the stock.

POLLUTION ALTERS WINTER FLOUNDER

Pollution is often blamed for the decline in abundance of marine fishes. But it can be difficult to establish a strong causal connection between the presence of a contaminant and a decline in the abundance of a fish stock.

Substances that disrupt endocrine function in fish are introduced to coastal waters via Sewage Treatment Plant (STP) effluents. Professor Anne McElroy's research previously demonstrated that effluent from several New York City STPs interferes with the production of estrogen in larval and juvenile fish. McElroy now conducts field studies on whether winter flounder, a species in poor abundance in New York's waters, are showing signs of endocrine disruption. She is working in Jamaica Bay, which receives effluent from four STPs and many combined sewer overflows, and has a relatively limited exchange with the Atlantic Ocean.

Widespread Endocrine Dysfunction

McElroy and colleagues find that winter flounder in Jamaica Bay show subtle but clear evidence of endocrine alterations, in non-spawning adult and young-of-the-year (YOY) juvenile fish. The effects are widespread throughout the Bay. YOY fish appear to be more sensitive than adults to endocrine-active compounds. Fish collected in 2002, 2003, and 2004 from Grassy Bay, the most contaminated area of the Bay, show elevated expression of the egg yolk precursor protein vitellogenin (VTG).

The sex ratio in YOY Jamaica Bay winter flounder appears to be skewed toward female fish (1:9). Skewed sex ratios also were observed in non-spawning adults. Elevated levels of VTG in adult non-spawning females in Grassy Bay indicate that these fish are responding to endocrine-active compounds in their environment.

QPX (QUAHOG PARASITE UNKNOWN)

After hard clams all but disappeared from Long Island's South Shore, Raritan Bay in New York Harbor assumed center stage in the local clam fishery. However, as a result of sewage contamination, its waters were closed to harvesting of shellfish for direct human consumption. So Raritan Bay clams were harvested and transplanted to privately held aquaculture leases in shellfish-certified waters of eastern Long Island.

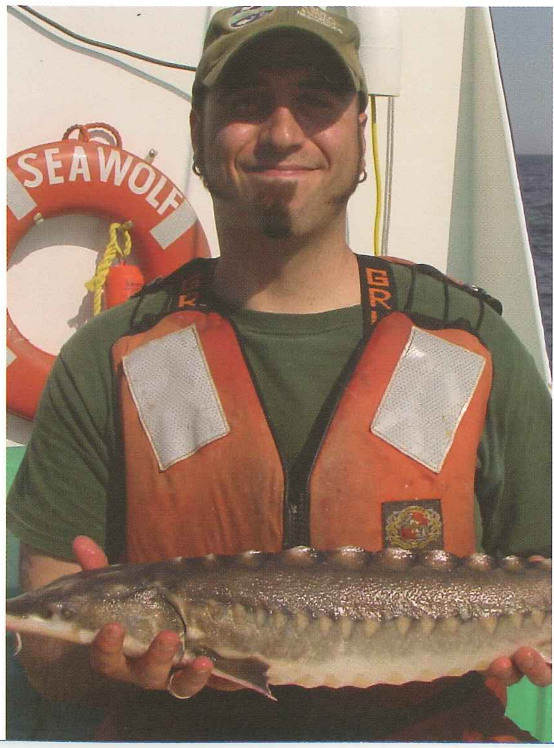
The transplant program was suspended in 2003, when MSRC scientist Bassem Allam—working in the Center's Marine Animal Disease Laboratory—found "Quahog Parasite Unknown" (QPX) in Raritan Bay clams. QPX, a microscopic particle that belongs to a group of organisms common in marine waters and sediments, causes disease in hard clams. These unique organisms possess characteristics of both an animal and a fungus.

A Mysterious Infection

Although we do know that QPX threatens only clams and not humans, its nature and origin remain unclear. Laboratory experiments have demonstrated that QPX from a diseased clam can infect other clams, but exactly how that happens is not understood.

Scientists are not sure how long QPX existed in Raritan Bay clams. Recent testing shows QPX levels there have dropped dramatically. Allam assayed clams from Long Island's Peconic Bay, which receives most of the Raritan Bay clams. Fortunately, ambient QPX levels in Peconic Bay clams were low, suggesting that earlier clam transplants had not spread the disease. These findings prompted the New York State DEC to reopen the Raritan Bay clam transplant program in May 2005, on a smaller scale and with an extensive QPX monitoring program.

Although we do know that QPX threatens only clams and not humans, its nature and origin remain unclear.



Atlantic sturgeon captured aboard the Seawolf.

Brazilian research vessel Hermano Gomez

Novel methods should significantly advance the quantitative understanding of sediment biogeochemical processes.

NEW INVENTION IMPROVES SEDIMENT ANALYSIS

Researchers recently developed a new optical sensor for analyzing marine sediments in the field and the laboratory. Distinguished Professor Bob Aller, with postdoctoral associates Qingzhi Zhu and Yanzhen Fan, devised a planar optode that allows real-time measurements of pH in 100 cm2 sediment sections in the bioturbated zone (top ~ 20 cm). This method, together with a new planar pCO2 sensor, provides resolution of complex concentration patterns and reactions that could not previously be resolved with single average measurements. These novel methods should significantly advance the quantitative understanding of sediment biogeochemical processes.

Building a Better Probe

Planar optodes (optical sensors) are solute-specific fluorescent probes that interact with a particular component of the environment. Aller's team immobilized the fluorescent probe; it retains the normal response of the fluorophores while attached to a fixed surface. The fluorescent probe is covalently bound to a sheet of polyvinyl alcohol that looks similar to a transparency sheet. The sheet is rugged, reusable, and transparent, and allows a visual picture of the sediment in addition to the fluorescent image. Image analysis software recreates a highly resolved image (E 10s of microns). Aller—recognized by SUNY's Research Foundation with a "Promising Inventor" award—expects this new technology to have industrial and agricultural applications.

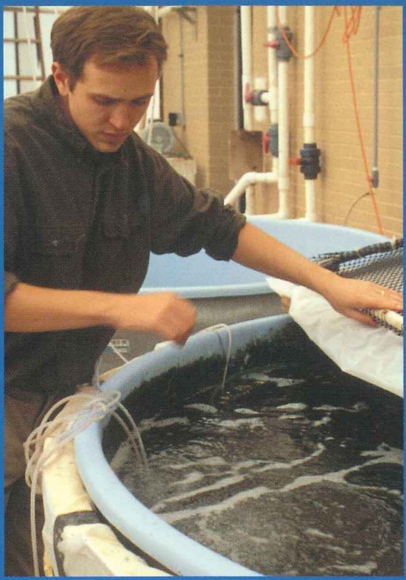
THE VENEZUELA CONNECTION

There has been little information available on how the tropical ocean responds to climate change. Now Venezuela's Cariaco Basin is providing Professors Mary Scranton and Gordon Taylor—and their students Xueju Lin (Ph.D.) and Dane Percy (M.S.)—with valuable data.

The ten-year, multi-institution CARIACO (Carbon Retention in a Colored Ocean) project examines the hydrography, nutrient chemistry, carbon dynamics, primary productivity, and microbial biomass of the Cariaco Basin off Venezuela's northern continental shelf. The area is uniquely suited to this work: it is very deep with poor circulation and high rates of sedimentation, and its sediments are well-preserved.

Scranton and Taylor are looking at the interrelationship between bacterial populations in the system and its chemistry, and how these populations vary from oxygen-containing water to anoxic (below 250 meters).

The Cariaco system was thought to be static, "but we've found that it varies," says Scranton. "We've seen how much horizontal motion of the water through the system is influencing it. There are lots of currents and injections into the middle of the water column." During the past ten years of monthly cruises, the MSRC team has identified new groups of protozoans, and observed how open ocean eddies, changes in the wind regime, several floods, and an earthquake have changed the circulation and biology of the ocean. Weather in the area also has altered dramatically, providing Scranton and Taylor with data on how the Cariaco Basin has changed in response.

Education

UNDERGRADUATE

MSRC offers undergraduate degrees in Atmospheric and Oceanic Sciences (B.S.), Marine Sciences (B.S.), Marine Vertebrate Biology (B.S.), and Environmental Studies (B.A.), as well as a minor in Marine Sciences. The marine sciences and marine vertebrate biology degrees were created when Stony Brook University and MSRC absorbed the undergraduate marine sciences program previously offered at Southampton College of Long Island University. MSRC faculty and marine sciences/marine vertebrate biology students will have access to teaching and research facilities at Southampton College for a three-year period.

GRADUATE

MSRC offers M.S. and Ph.D. degrees in Marine and Atmospheric Sciences. The rigorous graduate program includes core courses, advanced and specialized courses, weekly seminars, and original research undertaken by graduate students under the tutelage of a faculty member.

PUBLIC SERVICE

As New York State's only graduate research institution in marine sciences, MSRC is the region's source of expertise in balancing conflicting uses of the fragile coastal environment. We work closely with natural resource managers, planners, coastal businesses, environmental groups, and elected officials at all levels of government to ensure that their decisions are informed by the best scientific knowledge available. The Center also conducts public education programs, often in collaboration with local schools and community organizations.

SPECIAL PROGRAMS

Several institutes within MSRC focus on specific areas of concern. These include the Institute for Terrestrial and Planetary Atmospheres, the Waste Reduction and Management Institute, and the Living Marine Resources Institute. The Long Island Groundwater Research Institute operates in conjunction with Stony Brook University's Department of Geosciences.

FACILITIES

MSRC is located on the South Campus of Stony Brook University, midway between Montauk and Manhattan. The pristine Flax Pond salt marsh is home to the Center's Flax Pond Marine Laboratory, which provides flowing seawater facilities for experimental research. Berthed in nearby Port Jefferson Harbor, the 80-foot R/V SEAWOLF is fully equipped for oceanographic research and is the Center's major research vessel. MSRC's branch of the campus library system—the Marine and Atmospheric Sciences Information Center—offers electronic access to a wide collection of journals and monographs. MSRC also operates a marine station with teaching and research labs, docking facilities, and research vessels in Southampton, N.Y.

STONY BROOK
STATE UNIVERSITY OF NEW YORK

MSRC Resident Faculty 2003-2005

Bassem Allam
Assistant Professor, marine pathology

Josephine Aller
Research Professor, microbial ecology, biological oceanography

Robert Aller
Distinguished Professor, sediment biogeochemistry

Robert Armstrong
Associate Professor, ecological modeling

Stephen Baines
Research Assistant Professor, aquatic biogeochemistry

Henry Bokuniewicz
Professor, coastal geology

Malcolm Bowman
Distinguished Service Professor, physical oceanography

Bruce Brownawell
Associate Professor, biogeochemistry

Robert Cerrato
Associate Professor, benthic ecology

Robert Cess
Distinguished Emeritus Professor, atmospheric sciences, climate change

Edmund Chang
Associate Professor, atmospheric sciences, climate dynamics

J. Kirk Cochran
Professor, geochemistry, chemical oceanography

Brian Colle
Associate Professor, atmospheric sciences

Jackie Collier
Assistant Professor, biological oceanography

David Conover
Professor, fisheries

Robert deZafra
Professor, atmospheric sciences, atmospheric remote sensing

Alistair Dove
Assistant Professor, parasitology

Nicholas Fisher,
Professor, marine biogeochemistry

Charles Flagg
Research Professor, physical oceanography

Roger Flood
Professor, geological oceanography

Marvin Geller
Professor, atmospheric sciences, atmospheric dynamics

Christopher Gobler
Associate Professor, biological oceanography

Steven Goodbred
Assistant Professor, geological oceanography

Sultan Hameed
Professor, atmospheric sciences, climate change

Paul Kemp
Associate Research Professor, microbial ecology

Cindy Lee
Distinguished Professor, chemical oceanography

Darcy Lonsdale
Associate Professor, zooplankton ecology

Glenn Lopez
Professor, biological oceanography

Kamazima Lwiza
Associate Professor, physical oceanography

John Mak
Associate Professor, atmospheric sciences, atmospheric chemistry

Jack Mattice
Professor, invertebrate physiological ecology

Anne McElroy
Associate Professor, aquatic toxicology

Stephen Munch
Assistant Professor, fisheries, ecological modeling

Bradley Petersen
Assistant Professor, seagrass community ecology

Sergei Piontkovski
Research Associate Professor, physical-biological coupling in marine ecosystems

Nicole Riemer
Assistant Professor, atmospheric sciences

Frank Roethel
Research Professor, chemical oceanography

Sergio Sanudo-Wilhelmy
Associate Professor, chemical oceanography

Mary Scranton
Professor, chemical oceanography

Peter Strutton
Assistant Professor, biological oceanography

Robert Swanson
Professor, physical oceanography

Gordon Taylor
Professor, microbiological oceanography

Prasad Varanasi
Professor, atmospheric sciences, climate change

Duane Waliser
Associate Professor, atmospheric sciences, ocean-atmosphere interactions

Dong-Ping Wang
Professor, physical oceanography

Joseph Warren
Assistant Professor, fisheries oceanography

Robert Wilson
Associate Professor, physical oceanography

Peter Woodhead
Research Professor, fisheries

Minghua Zhang
Professor, atmospheric sciences, atmospheric circulation

Additional joint-appointed and adjunct faculty are listed on the MSRC Web page, www.MSRC.sunysb.edu

CONTACT INFORMATION

Marine Sciences Research Center
Stony Brook University
Stony Brook, NY 11794-5000

Dr. David O. Conover
Dean and Director
Phone: (631) 632-8700
Fax: (631) 632-8915
E-mail: *David.Conover@stonybrook.edu*
Web page: *www.MSRC.sunysb.edu*

Produced by Stony Brook University
Office of Communications

Yvette St. Jacques *Assistant Vice President*
Joanne Morici *Editorial Director*
Susan Tito *Senior Editor*
Susan Scheck *Copy Editor*
Karen Leibowitz *Art Director*

Written and edited by Susan Risoli
Designed by Donna Anselmo
Photos: R. Cerrato, Krista Collier, Michael Duffy, Keith Dunton, Roger Flood, Glenn Jochum, Cindy Lee, Nichole Maher, Anne McElroy, M. Scranton, A. Zulkowski