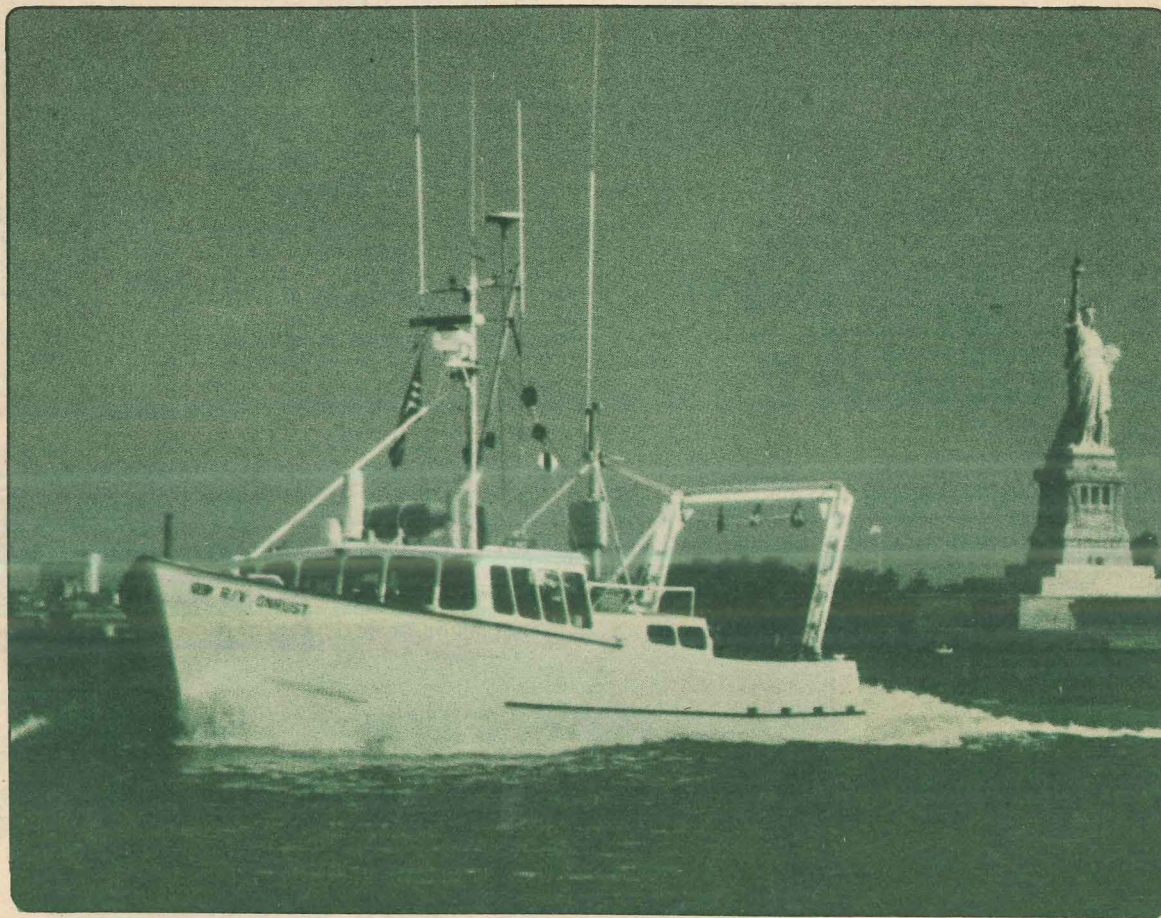


Stony Brook People

State University
of New York
at Stony Brook

September/October 1984

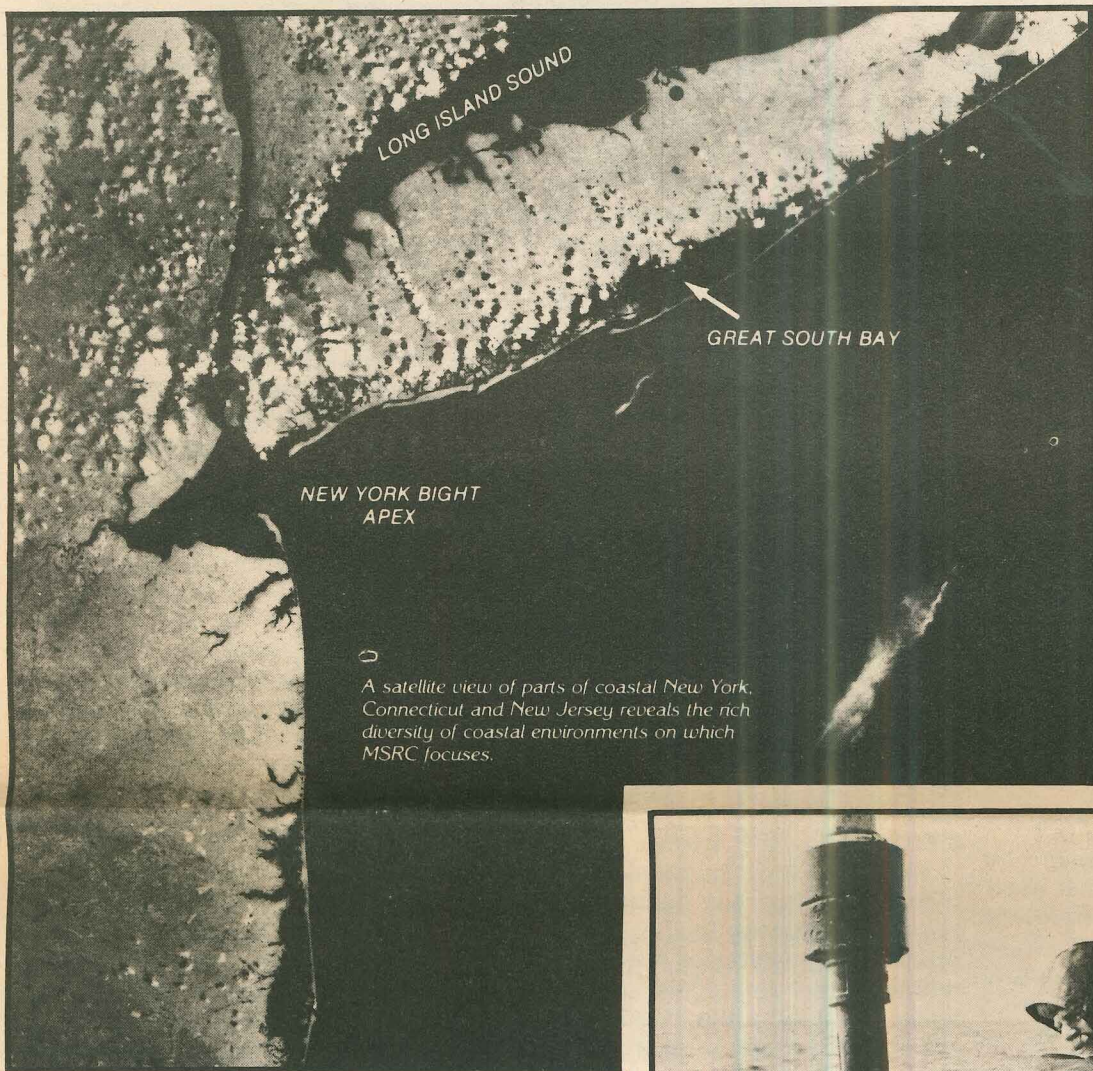
**Marine scientists:
making
research count**
(pages 4-8)





MSRC: Making Scientific Research Count

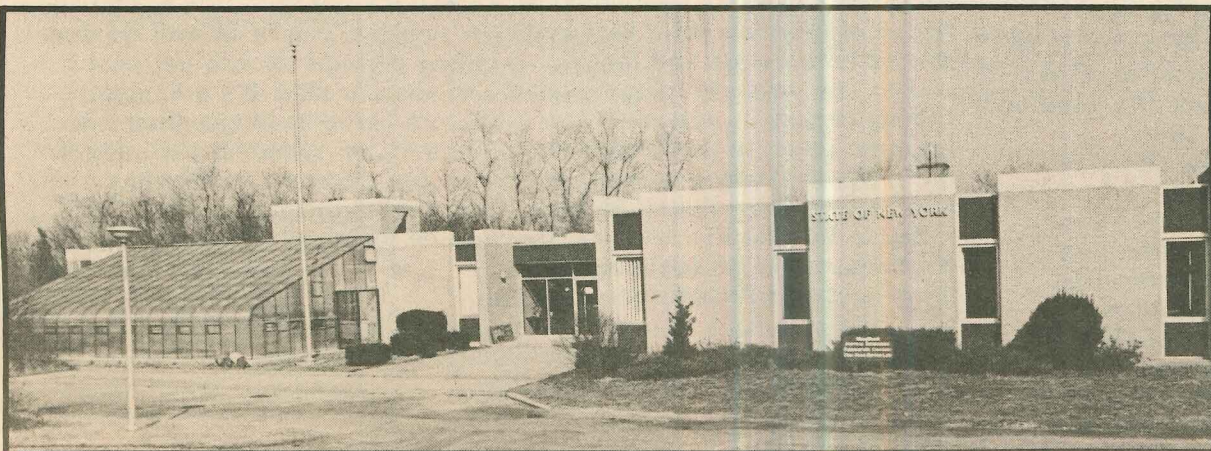
by Dr. J.R. Schubel
Director, Marine Sciences Research Center



PHOTOS BY MSRC GRAPHICS

MSRC scientists use a gravity corer to recover a sample of sediment from the seafloor.

The MSRC's Flax Pond Laboratory is equipped to provide a continuous supply of sea water for the culture of marine plants and animals.



Draw a circle with a radius of 50 miles around the Empire State Building and you account for approximately one in every ten residents of the United States. Nearly seven million people live on Long Island alone, approximately three million in Nassau and Suffolk counties.

If Long Island were a state, it would be the tenth most populous state in the United States. If it were a nation, it would be more populous than 50% of all the nations in the world today.

Not one of those seven million people lives as many as 10 miles from a coastal marine environment. One cannot live so far away and live on Long Island. Add Manhattan, the Bronx and Staten Island too and the population jumps to more than nine million—every one of whom lives within 10 miles of the coast.

For each of these people the coastal ocean has a particular significance. New York's coastal ocean is a source of food; a source of recreation and aesthetic enjoyment; a livelihood; and a place to dispose of wastes. New York is a leader in each of these categories. To quickly broaden the picture of the uses we make of our coastal ocean, consider these few facts:

Uses of Our Coastal Ocean

- An estimated 40 to 50 million people visit New York's ocean beaches every year. More than 500,000 people enjoy our beaches on an average "beach day."

- Gateway National Park is the nation's busiest national park. Last year it received 10.1 million more visitors than Yellowstone and Yosemite National Parks combined.

- New York has more than 3,000,000 recreational fisherpersons; about half are marine. They spend about \$250,000,000 every year in pursuit of their avocation, not counting what they spend on boats and fuel. New York ranks second only to Florida in the value of its recreational fisheries.

- New York has more than 400,000 registered pleasure boats and an estimated 150,000 unregistered boats; many of these are used primarily in marine waters.

- Long Island's recreational industry is valued at more than 2.5 billion dollars a year. Most is marine-related.

- New York State has between 13,000 and 14,000 commercial fishing people nearly all of whom fish in marine waters. The aggregate value of the fish at the dock is estimated at more than \$45 million a year.

- Long Island is the birthplace of aquaculture in the United States with activities dating back to the early 1700s.

- One small, shallow estuary along the south shore of Long Island—Great South Bay—during the 1970s produced more than 50% of the nation's total harvest of hard clams, employing more than 6,000 people at its peak. Even today the industry has an aggregate value of more than \$100 million per year when all the multipliers are applied. Although now in serious trouble, the hard clam fishery remains a major industry.

- The Port of New York and New Jersey is one of the world's most important ports. In terms of total value of cargo handled, it ranks first among all United States ports. In terms of tonnage of cargo handled, it ranks second behind New Orleans.

- To maintain the port's channels, some 8 to 10 million cubic yards of material must be dredged each year. Most of this has been dumped in the sea off New York. About 10% of the total volume of material dredged is "polluted" and fails to pass the criteria for ocean disposal. Alternative disposal sites and strategies must be found if the operation of the port is not to be affected adversely.

- The only economic source of sand for the New York metropolitan area for fill and construction aggregate is submerged beneath the sea—below the sea floor of the Lower Bay of New York Harbor and the adjacent continental shelf. Historically, the Lower Bay of New York Harbor has been the world's largest open-pit sand mine.

• Long Island only has about 0.6% of the nation's total shoreline, but more than 10% of that part of the total which has been designated by the U.S. Army Corps of Engineers as having "critical erosion problems."

• Power plants located on New York's coastal marine waters withdraw more than 9 million gallons of water every minute, pass them and the small organisms they contain through condensers, and return them to the environment at elevated temperatures.

• 100% of all sewage sludge barged to the ocean by the entire United States is dumped in the New York Bight Apex. The amount of sewage sludge dumped into the ocean off New York and New Jersey probably will increase, although it may be dumped farther seaward.

The list goes on and on, but the point is clear: We New Yorkers make extremely varied and intense uses of our coastal marine environments. It is also clear that these multiple uses make conflicting demands on our coastal ocean and that those demands cause problems. These problems become opportunities for marine scientists to serve science and society.

Nowhere in the United States, perhaps in the world, is there a location more ideal than Long Island for development of an international center of excellence in coastal oceanography. The range and variety of natural environments in a limited geographical area is greater than anywhere else in the United States; and the diversity and intensity of the uses that society makes of these environments rival those of any comparable area in the world. These uses and the resulting conflicting demands cause problems that become opportunities for scientists to serve science and society. The opportunities are so numerous and so large that at times they seem insurmountable.

MSRC, A SUNY-Wide Center

It was in response to these problems and opportunities that the Marine Sciences Research Center (MSRC) was created in 1965 by a resolution of the SUNY Board of Trustees as a SUNY-wide center. The first appointments to the MSRC were made in 1968. This year the MSRC celebrated its 16th birthday. By all accounts, the MSRC is an adolescent; an institution in its formative years. But over that brief span of 16 years the MSRC has achieved a remarkable degree of distinction among oceanographic institutions. Much of its success is attributable to its special character. The Center takes full advantage of Long Island's unique qualities. In fact, it was specifically planned and nurtured carefully to fill a niche of enormous importance to New York and the entire nation.

One feature that distinguishes the MSRC from most of the nation's other leading oceanographic institutions is its clear and persistent focus on the coastal ocean, from approximately the outer edge of the continental shelf inland to the last traces of sea salt. The coastal ocean is the part of the world ocean with which people have their most intimate contact and upon which they have their greatest impact. It also is the part of the world ocean that has been neglected by most oceanographers and by most oceanographic institutions. Problems are more complex than in the deep sea, solutions less tidy. And for many the romance of the deep sea, the so-called "blue ocean," is missing. Not so for those who work and study at the MSRC. It is in the coastal ocean that they have elected to make their contributions to science and to society. The MSRC is the only comprehensive coastal oceanographic center in New York, and indeed the only one in the entire northeast United States. It is one of only a handful of such institutions in the country.

A second feature that distinguishes the MSRC from other oceanographic institutions, coastal and deep sea, is its commitment to the timely

translation of advances in science and technology into forms that can be applied readily by decision makers to resolve complex environmental problems.

The MSRC has grown over the past 16 years from a small organized research unit into a comprehensive coastal oceanographic research center with a staff of approximately 100 and an annual budget of nearly \$4 million. It has developed from an organized research unit with no educational mandate into a Center with programs leading to the degrees of Master of Science and Doctor of Philosophy which enroll more than 100 students. Students come from around the world to study at the MSRC. Over the past five years they have come from every continent except Antarctica. More than 95% of the Center's graduate students are supported, and more than 80% of their support comes from non-State sources, primarily grants and contracts. Most of these graduate students work on problems of direct importance to New York.

Sponsored Research Support

Over the past decade the Center's sponsored research budget has increased by nearly ten-fold: from less than \$300,000 in 1972 to more than \$2.5 million in 1983. The Center has a broad funding base with sponsored research support from international bodies, private foundations, regional institutions, counties and municipalities, states, and from every federal agency that supports research in the marine sciences. The Center's faculty now numbers 23 on State-supported lines and an additional Research Foundation faculty of 11. Compared with the nation's other leading oceanographic institutions, the MSRC still is relatively small in terms of the size of its staff. Only by focusing its resources in a single unit—the Marine Sciences Research Center—and by that unit focusing its attention on the coastal ocean, has SUNY been able to achieve (with a modest investment of resources) a program of distinction in the marine sciences.

Research Programs

The research of the MSRC is of several kinds. Most is of the traditional mode. Individual scientists pursue their own interests by securing support for their research through conventional funding mechanisms. MSRC scientists have been enormously successful in these ventures bringing in more than \$3.00 for every \$1.00 they receive in faculty salaries from the State. This activity is at the heart of the MSRC's development as a center of excellence in coastal oceanography, but it is not enough. As an organized research unit of a public university—a public service institution—the Center has an obligation to maintain a good match between society's problems—real and perceived—and the programs it conducts. In the traditional mode where individual researchers pursue their own interests, the problem solvers select the problems. To maintain a good match between society's problems and the problem solvers, the problems must play a role in "selecting" the problem solvers. The Center has developed several mechanisms to ensure maintenance of an appropriate match.

In December 1980, the MSRC signed a cooperative agreement with the National Oceanic and Atmospheric Administration which calls for the MSRC to take a national leadership role in designing and conducting coastal oceanographic research programs and in translating research results into forms readily usable by decision makers. It also calls for developing strategies to ensure multiple-usage of the coastal ocean with predictable and acceptable impacts on the environment, on its living marine resources, and on the spectrum of uses society chooses to make of the coastal ocean.

The MSRC does not take advocacy positions on environmental questions. It sticks to what it does best—science. But it constantly searches for ways to use science to serve society by

improving the effectiveness with which advances in science and technology can be factored into environmental decision making.

The nation's record in this regard has been poor. There are many reasons for this. It is partly the fault of the scientist for failing to cast the results of research into forms that can be used readily by decision makers. It is partly the fault of the decision maker for failing to insist upon an identification and analysis of the full range of management alternatives before setting policy. It is partly because the problems are so complex. And it is partly because the data and information are so numerous, so widely dispersed and often nearly impossible to utilize in any sensible way on time scales appropriate to the decision maker. MSRC is dedicated to improving the access of the decision maker to advances in science and technology. Several recent examples of MSRC's efforts to improve the situation are described briefly.

Environmental Management Programs

In 1982 the MSRC initiated with support from the William H. Donner Foundation a new program—the Coastal Ocean Science and Management Alternatives (COSMA) Program—to expand and institutionalize the Center's already extensive activities in using science to assist decision makers. The program concentrates on developing and evaluating new and more effective tools and techniques for using scientific data and information in environmental management. COSMA also undertakes projects with are important interdisciplinary problems of at least regional interest. Problems investigated through COSMA must be approved by its Advisory Board. Once a problem has been selected, a project director is appointed and a working group selected with representatives from each of the disciplines required for a rigorous, interdisciplinary analysis. Often this requires that COSMA draw upon the full force of the SUNY system—a role appropriate for a SUNY-wide center—and even beyond. The working group is charged with the responsibility for identifying the full range of plausible management alternatives and for assessing the public health, environmental, ecological, economic and socio-political impacts associated with each alternative. Finally, the results of the analysis are cast in forms that facilitate appropriate comparisons and in terms that are readily usable by decision makers.

MSRC scientists recently completed an assessment of dredging and dredged material disposal alternatives for the Port of New York and New Jersey through COSMA. Earlier this year, the Suffolk County Legislature appropriated funds for a COSMA study of the management alternatives to rehabilitate and sustain Long Island's declining hard clam fishery. The output of this technical analysis will provide the basis for development of a comprehensive management plan which will be developed under the leadership of the Long Island Regional Planning Board.

In 1982 the U.S. National Oceanographic Data Center (NODC) designated the MSRC as their coastal oceanographic Data Development Facility and charged it with leadership in developing and testing mechanisms to facilitate the use of oceanographic data and information in environmental decision making that affects the coastal ocean. Initial efforts carried out in collaboration with COSMA have concentrated on exploiting the power, simplicity, and availability of the personal computer as a tool to facilitate decision making. The MSRC has been developing a computer-assisted data and information system for the Port of New York and New Jersey using the personal computer. Within the past year it was asked by the Federal Maritime Administration to develop a similar system for the Port of New Orleans. COSMA is now extending the applications of interactive computer-assisted information

systems to the preparation of environmental impact statements at the request of the U.S. Army Corps of Engineers.

Averting Crises

One of the more important roles MSRC plays—one which perhaps only universities and a small number of private and national research laboratories can fulfill—is to identify potential problems, long before they become crises, while they are still at a stage that Herman Melville would have called “loomings”—indistinct images on the horizon. And having identified a “looming,” the next steps are to design an appropriate research program, secure the necessary funding, carry out the research and cast the results of that research into forms readily usable by decision makers to prevent the “looming” from becoming a crisis. The role is that of a problem averter. It is akin to the practice of environmental preventive medicine, and it is a practice that receives considerable attention within the MSRC.

The 1983 National Academy of Sciences report on acid rain coupled with the likelihood of early and recurrent oil crises suggests strongly that the nation's air quality standards and criteria will be made more stringent and that our dependency on coal will increase substantially in the near future. A result will be the production of enormous volumes of coal wastes—fly ash and scrubber wastes—which we will have to discard in an environmentally acceptable manner. Because of research started seven years ago by MSRC scientists, a potential waste disposal crisis for Long Island and for many other coastal areas throughout the world can be averted.

Coal Waste Artificial Reef Project

In 1976 MSRC scientists anticipated that the country would run short of oil in the 1980s, that many oil-fire power plants would convert to coal and that coastal areas could have serious problems disposing of the resulting coal wastes—fly ash and scrubber wastes—as raw waste products. The Center proposed combining the fly ash (fine-grained powder) and the calcium sulfate scrubber waste (which has the consistency of toothpaste) with additives to produce stabilized blocks and testing their suitability as construction materials for artificial reefs. The first tasks were to determine whether stable blocks could be produced and whether contaminants would be leached from them. Technology was developed to produce stable blocks for a range of waste components and curing conditions. Extensive laboratory tests showed that water forced through the blocks under pressure did not purge contaminants from the blocks. The blocks locked up contaminants far better than we had expected. The next step was to determine whether organisms would settle and grow on and in the blocks in nature and whether these organisms would take up contaminants. In 1977 a small experimental reef of stabilized coal waste blocks was placed in an estuary near the University. Control reefs made of concrete blocks and natural rocks were constructed nearby. Three years of monitoring demonstrated that the coal waste blocks supported a lush growth of plants and animals as abundant and diverse as the flora and fauna on the concrete blocks and on the rocks. It also proved that these organisms were not enriched in contaminants.

The final test was to demonstrate the feasibility of transferring the block-making technology to the faculty floor and then to construct in the ocean a large reef composed of 500 tons of coal wastes as 18,000 blocks, each the size of a standard concrete block. The reef was constructed on September 12, 1980 in the Atlantic Ocean in 70 feet of water about four miles southeast of Fire Island Inlet on Long Island's south shore. Governor Hugh L. Carey, New York State Energy Research Development Authority Commissioner James LaRocca and Stony Brook President John H. Marburger threw over the first block.

An extensive research and monitoring program of this reef has demonstrated that blocks made of stabilized coal wastes not only are an environmentally acceptable method for disposal of coal wastes, but can enhance our uses of the environment for recreational fishing. Small experimental reefs have been constructed in Chesapeake Bay and Lake Ontario by MSRC's scientists working in collaboration with local institutions. The waste disposal strategy now has been tested in fresh water, brackish water and full sea water, and with support from appropriate State and federal regulatory and management agencies. A recent film—“To Build a Reef, the C-WARP Project”—describes the development and findings of the Center's Coal Waste Artificial Reef Project.

Because of the unusual ability of stabilized coal wastes to “lock-up” contaminants, MSRC scientists now are stabilizing sewage sludge and some industrial wastes with coal wastes and are conducting extensive tests in the laboratory to determine whether they could be disposed of safely in that form. There is another potential application. Recently, there has been pressure to close down landfills and to construct resource recovery plants to burn garbage and trash. While resource recovery facilities reduce the solid waste disposal problem, they do not eliminate it. Approximately 15% (by mass) of what is burned remains as ash. For Nassau and Suffolk counties alone this would amount to 200,000 tons per year.

Harvesting the Sun's Energy With Seaweed

Through the Center's Marine Biomass Program, MSRC researchers are investigating the feasibility of developing commercial seaweed “energy farms” in the coastal waters of New York. This project, which was initiated by the New York Sea Grant Institute, is an important part of the over-all plan to reduce U.S. dependency on foreign oil for our energy needs. On an energy farm, seaweeds are cultivated, harvested and then fermented to produce methane, alcohol or natural gas.

Growth rates of nine major species of local seaweed were determined in tank cultures at the Flax Pond Laboratory's greenhouse. Based on their seasonal growth patterns, chemical composition and digestibility, three or four species have been selected as the most attractive candidates for biomass farms. The biology of these species is being studied in greater detail and faster growing, hardier strains will be developed.

Preliminary work was conducted with cultivating these seaweeds offshore in small raft-like structures. Last fall MSRC biologists and SUSB engineers deployed an experimental test farm in Long Island Sound to investigate the economic feasibility of large-scale marine biomass farms.

Responding to Crises

The MSRC responds to crises when they occur. One example is the anoxia event in the New York Bight in the summer of 1976. Another is the breaching of the barrier island at Moriches by a winter storm in 1980.

On the day of the storm, MSRC received a call for help from Suffolk County Executive Peter Cohalan. The following day MSRC scientists began to install instruments in Moriches Bay to assess the effects of the breach on flooding of coastal areas, on salinity levels within Moriches Bay, and on how the increases in salinity would affect hard clams and other living marine resources in the back bay area.

The scientists also took a longer view of the problem. The 1980 breach at Moriches was not the first time Long Island's barrier island had been breached, and it will not be the last. There was a need for a predictive tool which decision makers could use to arrive quickly at

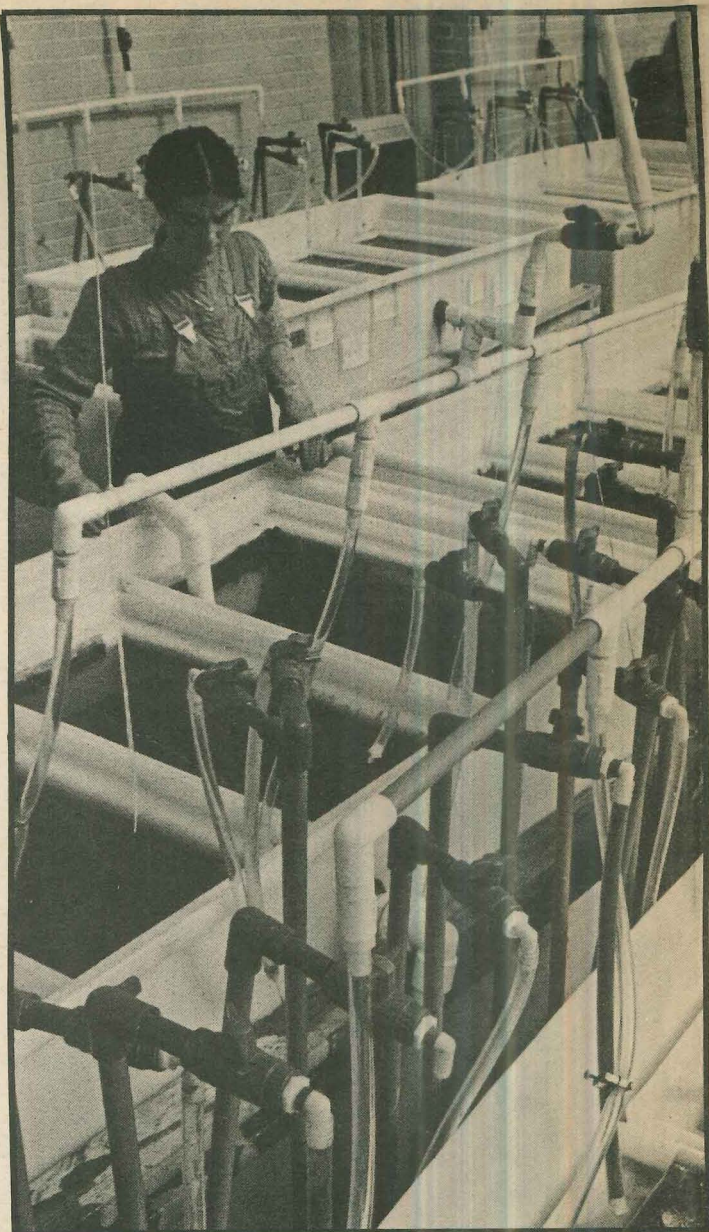


Top: The final phases of MSRC's Coal Waste Artificial Reef Project involved dumping 500 tons of coal waste in the form of blocks from this bottom-dumping barge to form an artificial reef.

Above: The R/V Onrust on a SUNY-wide education cruise from Port Jefferson to Albany. The cruise is divided into a series of half-day legs, each dedicated to the special needs and interests of an individual campus.

Left: MSRC staff member checks cultures of seaweed at the Center's Flax Pond Laboratory as part of the Marine Biomass Program.

Below: MSRC researchers in the Biomass Program measure seaweeds to determine growth rates.



a decision whether-or-not to repair a breach. Quick action could save enormous amounts of money.

Such a predictive tool has been developed. It is a computer model which simulates the hydraulics of the Moriches Bay system. This model can be used to determine the probable environmental impact of any future breach of the barrier island, not only for Moriches Bay, but also for the other bays along Long Island's south shore. Concurrent biological studies demonstrated that subtle changes in the salinity of the Bay that might result from such a breach are reflected by a change in the patterns of diurnal, and longer period growth rings in clam shells. The MSRC's activities in coastal geology and coastal engineering are expanding.

Coastal Changes

MSRC scientists identified the shore and near-shore zones of Long Island's south coast as areas in which research was required to produce improved coastal management strategies. Two kinds of information were especially important: the seasonal changes in beach volume which result from changes in wave activity over the year, and the rate at which land is lost due to submergence by rising sea level. Both problems required an innovative approach because of the complexity and variability of the shore environment.

In order to calculate the seasonal gains and losses of beach volume, the scientists decided upon a long-term, intensive series of measurements covering the entire length of the shoreline of the concerned community. The scientists used volunteer observers, sometimes students from local high schools. The East Hampton, Long Island, study continued for four years and required monthly surveys of 20 profile lines. The average seasonal losses on the East Hampton beach (measured down to mean sea level) were found to be 48 cubic yards per foot during the first year. Similar results were obtained from a later study at Bay Shore, Long Island. In addition to producing the required data, the program proved to be a significant contribution to local environmental education and to increased public awareness of environmental processes.

The second problem—calculating the rate at which the land of a particular town is submerged by rising sea level—resisted solution because of the practical impossibility of determining the actual length of a town's shoreline and the changes along it. Instead, MSRC scientists calculated the distribution of the land area of Long Island towns with respect to the elevation of that land, or in technical terms, the towns' "hyposometry." Putting this information together with existing data on sea level changes in this century, the scientists determined that during a 60-year "lifetime," Westhampton Beach loses 2.4% of its land area due to submergence, while East Hampton loses 1.3%. This computational method is particularly useful in estimating the impacts on the towns of future rates of sea level change which would accompany projected climatic changes.

Dredging Management

One of the most crucial problems facing the nation's ports—large and small—concerns the management of dredging and disposal operations. The persistent shoaling of navigation channels makes dredging imperative in order to maintain navigable waterways for commerce and recreation, but the disposal of dredged sediment can be especially troublesome if the sediments are contaminated.

Subaqueous burial of dredged sediment beneath the sea floor may be one way to better isolate and contain contaminated sediments as well as to restore the disposal site to its original condition. Such a project has never been done, but MSRC biologists, geochemists and geologists have collaborated to show that the technology is available to construct a deposit of dredged sediment in a pit and to cover the deposit with sand to reclaim the sandy sea floor at the site. They have designed

such a research project for New York Harbor. The first stage of the operation has been completed successfully.

Fisheries and Aquaculture

While harvesting food from the sea provides employment for tens of thousands of New Yorkers and New York's fishing and shellfishing industries have an aggregate value of well over \$100 million per year, the management of our fishery and shellfishery resources has not been very successful and in recent years significant sections of these industries have declined. MSRC scientists have launched a two-pronged attack on the problem: first, to improve management of the natural stock through careful study of the organisms and the systems to which they belong, and second, to develop methods of aquaculture which simplify the management requirements.

The fisheries research program at the Center, following the first approach, has focused on those species that are important as food for commercial fishes as well as the commercially important species themselves. The behavior of the Atlantic silverside, and the American sand lance, for example, have been studied in great detail. The sand lance, it was found, spawn in December and January, several months before the annual spring bloom of the plankton on which they feed. However, the sand lance larvae have low metabolic rates and are adapted to drifting passively until the bloom begins. This strategy permits the larvae to be in place, ready and waiting, when the bloom begins and, since the bloom lasts only two weeks, the sand lance is able to make optimum use of this food source.

MSRC's second approach to the resource management problem is through aquaculture research. Five faculty members, four technicians and 10 to 15 graduate students are directly involved in studies of shellfish aquaculture. However, the multidisciplinary nature of MSRC allows additional faculty and students to participate in and strengthen specific projects. For example, a major study is presently underway to determine the significance to shellfish aquaculture of resuspended bottom sediments in Long Island Sound. This study includes MSRC geologists as well as aquaculture scientists and will determine whether, as has been indicated, certain shellfish grow more rapidly when held in cages suspended just above the sea floor. The results of this and other MSRC aquaculture research projects can be expected to have far-reaching effects on the future development of New York's shellfish industry.

New York Sea Grant Partnership

MSRC scientists designed at the request of the New York Sea Grant Institute a comprehensive plan for an interdisciplinary study of the Great South Bay. When the study was designed in 1978 the object was to improve our understanding of the processes that made the Great South Bay the world's most productive hard clam factory and to make that knowledge available to decision makers in forms appropriate for development of strategies to conserve this important resource and industry. By the time the study had begun, the objective had shifted to acquiring this knowledge to rehabilitate a fishery that was in serious trouble. Over the past five years, more than \$800,000 has been provided through the New York Sea Grant Institute, and more than \$1 million in all, for this important study. Most of the research has been carried out by scientists at the MSRC.

The results of the numerous scientific projects, many of which have been published in scientific journals, are now being integrated into a book for a broader audience. Many of the findings already have been integrated into management strategies by the towns, the county and the State in order to rehabilitate the hard clam fishery.

The MSRC's close and effective partnership with the New York Sea Grant Institute has played a key role in the development of the MSRC as a comprehensive center of excellence in coastal oceanography and, as a result, in its

ability to respond effectively to New York's problems and opportunities. It was through Sea Grant's professorship program that the MSRC was able to initiate new programs in shellfish biology and seaweed mariculture. It was also through Sea Grant's ability to respond quickly and its willingness to invest in high-risk research with potentially high payoff, that the MSRC has been able to launch a number of its most important projects. These projects have developed into large, multi-year interdisciplinary studies with substantial support from several agencies. Among such studies are the Coal Waste Artificial Reef Project (C-WARP), Marine Biomass Project, Great South Bay Study, and a study to assess the feasibility of combining sand mining and waste disposal.

The MSRC is working with the New York Sea Grant Institute to establish within the Center a new Living Marine Resources Institute (LIMRI). It

is expected that LIMRI will play enormously important roles in stimulating one of New York's most promising high technology, growth industries—aquaculture—and in revitalizing and stabilizing its important fisheries, and in developing new fisheries. LIMRI will have programs of research, education and public service, and will have a diagnostic facility which will be an activity of the Veterinary College of Cornell University.

Making Scientific Research Count

In its most recent five-year review mandated by the State Education Department, the two distinguished reviewers stated: "The Marine Sciences Research Center is rapidly acquiring international stature as one of the very best coastal oceanography centers in the world. Its location is excellent. The variety of adjacent coastal domains, proximity to a major urban influence, and economic importance of marine

resources of the waters in the vicinity of Long Island are uniquely extreme for any comparable stretch of coastline in this country."

While the geographical focus of the Center's research activities is New York's coastal waters, the MSRC's faculty, students and staff work in coastal environments throughout the world. The MSRC has worked with developing countries to plan for the orderly development and conservation of their important coastal areas in ways that are consistent with their economic priorities. It has worked with developed countries to conserve, and when necessary, to rehabilitate important coastal areas. As a result of its activities here and abroad, the acronym MSRC has come to stand not only for the Marine Sciences Research Center, but also for the center that is Making Scientific Research Count.



Monica Bricelj '84 carries out experiments on the physiology of juvenile hard clams at the Blue Point Hatchery facility on the south shore of Long Island.

MSRC's Monica Bricelj '84 pries open the secrets of clams

At the end of the second World War, Ivo and Maida Bricelj left Europe to settle in Argentina, near a large estuary called the Rio de la Plata. A few years later their daughter Monica was born, and as she grew so did her fascination with the aquatic creatures of the estuary.

This lifelong interest inspired her to pursue formal studies in marine life, and so she attended the College of Exact and Natural Sciences at the University of Buenos Aires, Argentina, specializing in aquatic ecology. The opportunity to further her education in the United States came with the award of a Fulbright-Hays Fellowship in 1977-78.

From 1977 to 1979, Monica Bricelj worked on her M.S. in marine environmental science at SUNY's Marine Sciences Research Center (MSRC) at Stony Brook. Her adviser was Dr. Robert E. Malouf, and her thesis dealt with "Fecundity and related aspects of hard clam (*Mercenaria mercenaria*) reproduction in the

Great South Bay." According to Dr. Bricelj, "The study was designed to test the belief that the larger chowders weren't fecund; they were supposedly not as successful at reproducing as the smaller clams." The study demonstrated that the number of eggs produced increases with the size of the clam and that eggs spawned by chowder clams are as viable as those of smaller clams. These findings are favorably viewed, since the larger clams are cheaper, and the results of this study have led to the concept of establishing spawning sanctuaries, wherein certain areas would be set aside to protect the larger clams. Dr. Bricelj pointed this out as "...an alternative management strategy for the protection of the clam population in the Great South Bay."

Upon successful completion of her masters degree, Monica Bricelj remained at the MSRC, this time to earn her doctorate in coastal oceanography. Her dissertation was titled "Effects of suspended sediments on the feeding physiology and growth of

the hard clam, *Mercenaria mercenaria*." Interest in this area was generated by the report of Danish investigators that growth of surf clams and mussels is enhanced by the presence of low concentrations of suspended sediments. In contrast to this, Dr. Bricelj found that growth and feeding of hard clams was inhibited rather than stimulated by silt loads. "Different bivalve species thus vary considerably in their response to a given environmental parameter. An understanding of these differences is important in selecting suitable field sites and species for culture."

Dr. Bricelj obtained her Ph.D. in May of 1984, and is currently an adjunct assistant professor at the MSRC. Along with Dr. Malouf and Dr. Robert Cerrato she has received funding from the New York Sea Grant, Department of Commerce, for research on "growth, reproductive effort, and physiology of the bay scallop, *Argopecten irradians*" in the Peconics-Gardiners Bay System of eastern Long Island. Jennifer Epp, a graduate student at MSRC, is also participating.

In discussing this project, Dr. Bricelj noted, "The bay scallop

supports an important commercial and recreational fishery on the east coast. This species has also been identified as a very promising candidate for mariculture efforts in New York State. Bay scallops have a very short lifespan, since they experience mass natural mortality in their second year. There is evidence that the timing (season) of mortality varies with latitude along the east coast of the U.S."

An example Dr. Bricelj cited is the southern bay scallop, found in Florida. This group experiences mass non-predatory mortality right after spawning. Their main growth occurs in the spring. The northern bay scallop, on the other hand, grows mostly in autumn, and manages to live through the winter for an average life of one-and-a-half years. "The causes for the difference in patterns of natural mortality are not yet known."

"As part of our project," Dr. Bricelj explained, "we are investigating the factors influencing the mass, post-spawning mortality of scallops on Long Island. We hypothesize that mortality is not attributable solely to post-spawning emaciation, such as occurs in salmon, since maximum growth of the adductor muscle, the only marketable part of the scallop, occurs in the fall, after spawning." She added that "...the bay scallop's short lifespan offers the unique opportunity to study the aging processes in a marine vertebrate."

In addition to her responsibilities at SUNY's MSRC, Monica Bricelj is also working as an assistant professor at Southampton College, Long Island University, where she teaches an undergraduate course in aquaculture. She resides in Miller Place with her husband, Dr. Eddie Duek, who works in the Chemistry Department at Stony Brook. She plans to continue her current work, and also expresses an interest in the future possibility of establishing cooperative research studies between her native Argentina and the United States.