msrc

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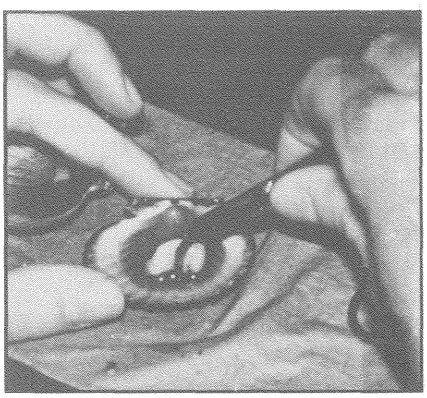
THE INSTITUTES OF MSRC

Helping Decision Makers Make Informed Decisions

Many of the Marine Sciences Research Center's activities focus on the Coastal Ocean, but its programs extend from the deep sea to terrestrial environments. Within all of these diverse programs, MSRC is committed to excellence in fundamental research. But the Center is also committed to the timely translation of the results of research into forms that can be used by decision makers to solve environmental problems.

Over the past several years, MSRC has established three institutes to help fulfill its mandate to convert data into information—timely information and useful information: useful to legislators, environmental managers, planners and other leaders. Each of the institutes— Waste Management Institute, Living Marine Resources Institute and Coastal Ocean Action Strategies Institute—was created by a special legislative initiative to meet the particular needs of Long Island and the metropolitan New York region. These three institutes are featured in this special edition of the Newsletter.



Studies on scallops are an important component of LIMRI's research program.

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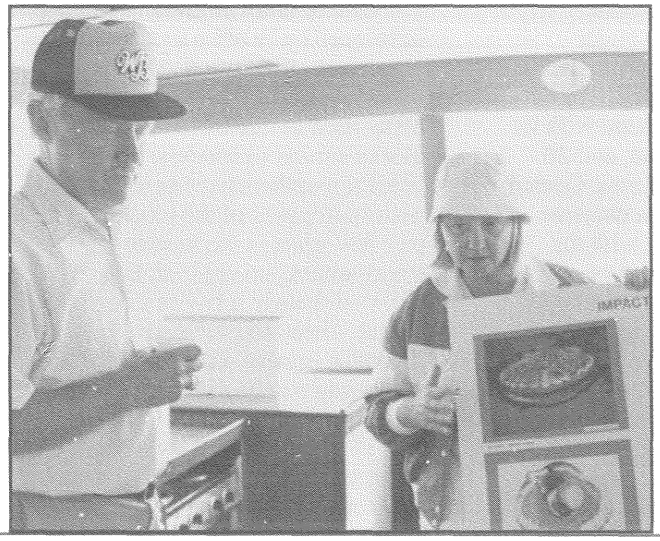


Aboard the LORD JIM for an instructional cruise, Senator Owen Johnson listens to Dr. Elizabeth Cosper explain her research on the "brown tide" algal bloom.

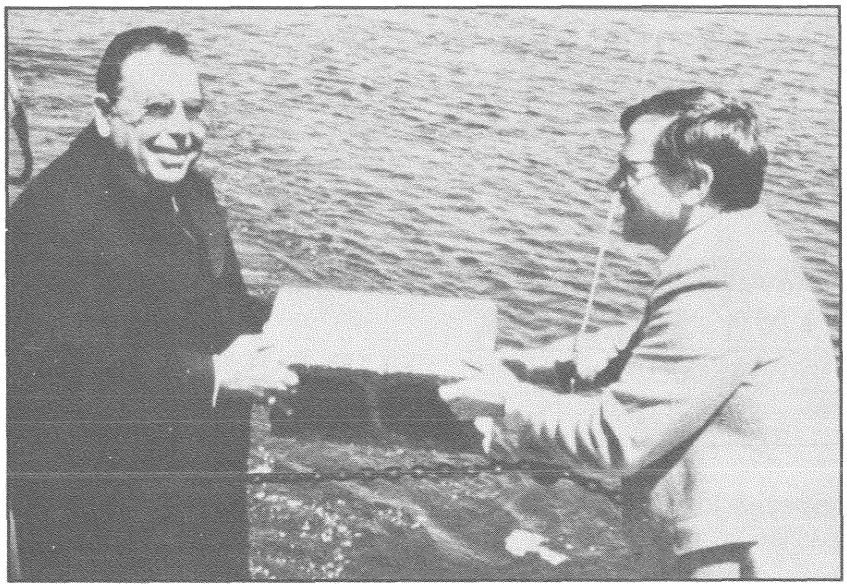
newsletter

WASTE MANAGEMENT INSTITUTE (WMI)

Through a broad program of research, education and policy analysis, MSRC's Waste Management Institute has ensured attaining its very difficult goal: to reduce the impacts of waste generation and disposal on society. Established in 1985, WMI got off to a fast start, and now has a string of achievements that any institution with a far longer history would be proud to claim. The WMI staff of four full-time professors and its director, Dr. R. Lawrence Swanson, are responsible for a top-flight, diverse research program.

Initial funding for WMI was appropriated through the Legislative Commission on Solid Waste, chaired by Senator Caesar Trunzo. Since the beginning, Senator Trunzo and several other Long Island senators (Owen Johnson, Chairman of the Committee on Environmental Conservation; Kenneth LaValle, Chairman of the Committee for Higher Education; and James Lack, Chairman of the Labor Committee) have continued to support WMI's efforts. New York State's modest yet stable funding base has allowed the Institute to multiply its funding from other sources by more than threefold—a remarkable return on the state's investment.

The creation of the Institute at the University at Stony Brook was a natural decision on two counts. First, MSRC has been a leader in developing innovative solutions to waste management problems. Second, its geographic location offers a variety of challenging waste management problems: 55 miles from a major urban population fringing an important harbor and estuary, five miles from Long Island Sound with its densely populated shoreline, and 20 miles from the popular Atlantic Ocean beaches. The problems that emanate from this populous region, with the highest per capita production of garbage in the world and with a large share of its population living over the aquifer—Long Island's sole source of drinking water—are the gritty problems that WMI deals with routinely.



Senator Caesar Trunzo (l.) helping MSRC director J.R. Schubel toss the first incineration ash block overboard to build an experimental artificial reef. Senator Trunzo was the moving force behind the incineration ash block project.

Incineration Ash

New York has mandated that nearly all Long Island landfills be closed by the end of 1990. In response, many towns have already begun recycling programs to reduce their wastes. But even with recycling, there will be non-recyclable or residual wastes that will need disposal by other means. The method being adopted by some Long Island towns has been municipal incineration. Disposal of incineration ash, therefore is one of the greatest problems confronting our regulatory agencies. A pressing need to resolve this problem, and the farsighted vision of Senator Caesar Trunzo, have provided the impetus for WMI to develop solutions for safe disposal of ash wastes.

One of these innovative solutions developed by WMI is to stabilize municipal incineration ash in a concrete matrix. This composite is being used to make construction blocks similar to concrete blocks. WMI researchers have been performing tests of the blocks over the past few years in the marine environment, having built two artificial reefs in a bay of Long Island Sound. Their tests have given favorable results —the blocks are strong and sturdy and do not leach harmful substances.

The Institute will soon begin to test another product from incineration ash, construction quality cement blocks using incineration residue as an aggregate substitute. These construction grade blocks will be used to build a boathouse in a demonstration project at MSRC this Spring. The building will be an experimental facility, offered to the state and county health departments for monitoring. WMI expects that an integrated and intensive monitoring and research program will demonstrate conclusively that blocks from incineration ash are strong and safe.

WMI RESEARCH PROGRAMS

- Stabilized incinerator ash for manufacturing sturdy, environmentally safe construction blocks.
- Health and environmental impacts from fugitive dust associated with incineration of municipal solid waste.
- Decomposition of degradable plastics in the environment.
- Shell burn disease in crabs.
- Floatable wastes in our region's coastal waters and on its beaches.

Helping Businesses Recycle

"The greatest opportunities for increased recycling lie in the business and manufacturing sectors."

In another attempt to bring informed decision making to problem solving, WMI is embarking on a fast-food audit service program sponsored by the U.S. Environmental Protection Agency. This program, which is an EPA national demonstration project, will offer a free evaluation to participating restaurants of their facility's waste generation. The auditors will then issue a menu of options to the owner or manager for source reduction. Options might be, for example, to pack wastes more compactly, to use less throw-away items, or to recycle certain wastes.

"The greatest opportunities for increased recycling lie in the business and manufacturing sectors," said Sheldon Reaven, the principal investigator on the project. "Residential recycling is easy—one program serves 10 million people, whereas

business and industrial recycling has gone untapped because these programs have to be carefully tailored for each sector." WMI hopes this program will help restaurants respond to the Suffolk County plastics legislation if it does go into effect.

Floatable Waste Wash-ups

Floatable waste is one by-product of so much plastic use by society. These floating plastic bags, bottles, cups and jugs find their way into streams, back bays, and the ocean, and—when the wind blows right—onto our beaches. The summers of 1987 and 1988 were such notably bad years for washed up floatables, that federal, tri-state, and local governmental agencies moved into action with the aid of WMI. The Institute described the sources and mechanisms for transport in coastal waters, and in partnership with MSRC's COAST Institute, produced a unified "Floatables Management Plan" to locate and contain the sources of the floatables, to adopt strategies to clean beaches and educate the public, and to recommend legislation to ensure the quality of marine waters. The unified plan of action was widely adopted for the summer of 1989, and the public information booklet, "Floatable Wastes and the Region's Beaches: Answers to Some Common Questions," was disseminated to hundreds of schools, libraries, and agencies in the metropolitan region and Long Island.

"By helping to assure the public of the safety of Long Island's beaches, the Waste Management Institute materially helped local tourism."

While there was an increase in 1989 beach attendance over that of the previous two summers, this does not ensure that the problem is completely solved. But it is certainly on the road to being solved, and there are signs of restored public confidence in the health of our coastal waters. "The work done by the Waste Management Institute regarding the floatable wastes that contaminated Long Island beaches was a major contributor to improving the Long Island economy," said Pearl Kamer, Chief Economist of the Long Island Regional Planning Board. "By helping to assure the public of the safety of Long Island's beaches, the Institute materially helped local tourism."

Beaches of many other states have similar problems. In fact, most of Long Island's waste disposal problems are not specific to Long Island. In these days of too much waste and nowhere to put it, Long Island's waste management problems are the same as those confronting the nation. What WMI learns from its research and assessment programs can, and probably will, be applied across the nation.

LIVING MARINE RESOURCES INSTITUTE (LIMRI)

LIMRI was created in 1985 to investigate the basic processes governing the health of important marine fish and shellfish in the New York region. The Institute's goal is to expand and improve New York's commercial and recreational fishing and aquaculture. LIMRI is doing this with a staff of three full-time professors, seven associated members of MSRC's faculty, two technical staff members, and director William Wise.

New York State Senators Kenneth LaValle and Owen Johnson were the prime movers in creating LIMRI, and their scope of vision has proven astute. Again, this Institute's research combines a broad and varied program of basic and applied research to help legislators, planners, agency officials, and environmental groups make informed decisions. Most of these groups have at one time or another been intimately involved with LIMRI's activities.

Shellfish

Shellfish are a very important commercial resource in this region's bays, but have been subject to environmental assault and overfishing in recent years. The result is that the size of stocks available for approved harvest has dwindled dramatically. The goal of much LIMRI research is aimed at replenishing stocks by learning the best methods of shellfish culturing and field planting techniques.

LIMRI researchers are learning these methods by investigating shellfish biology and population dynamics. Studies of survival of seed and juvenile shellfish in the field have been a major target of LIMRI research, including studies on the effects of predation; the effects of "brown tide" and other algal blooms; and the effects of such environmental changes as loss of eelgrass beds, which are important nursery areas for growing juvenile scallops.

Contamination of shellfish beds with pathogenic viruses and bacteria remains a major concern on Long Island. In 1990 LIMRI, working in concert with state and local shellfish

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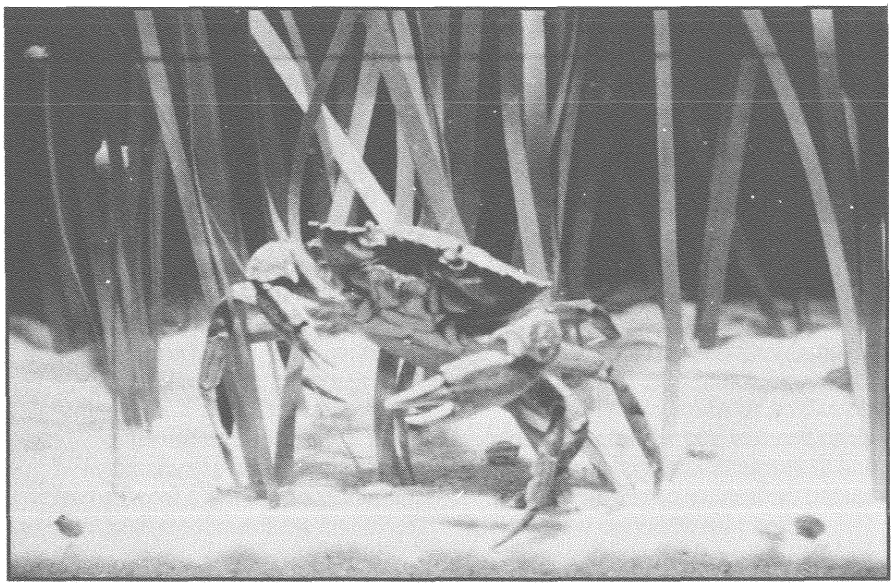
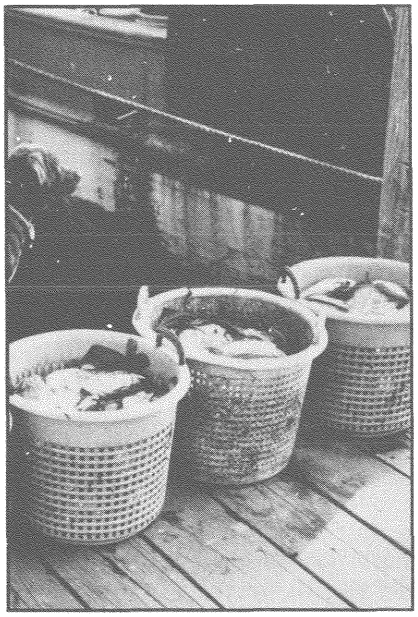


(left) Amid artificial eelgrass blades, the green crab preys on small bay scallops in a laboratory experiment to test the value of eelgrass meadows in providing refuge for juvenile scallops.
(below) Commercial bounty for sale: seafood from Long Island's coastal waters.



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managers and baymen, will conduct a comprehensive analysis of the most appropriate sampling program to identify the levels of these organisms in New York's inshore waters. The Institute's objective is to preserve the health of the shellfish-consuming public, and at the same time, to ensure that the amount of shellfish grounds open to clammers is at a maximum.

Bluefish

Bluefish are an important regional sportfish, and to a lesser degree, are at times commercially important. But bluefish are subject to unexplained fluctuations in abundance. Will fishery managers be able to predict future abundance or the effect of decreasing harvests? The need to devise a regional bluefish management plan has focused LIMRI research on the factors influencing migration into coastal nursery areas of the New York Bight.

Collecting these data has been a multi-year, personnel-intensive program. Two teams of researchers are involved, one sampling juvenile bluefish at sea in the New York Bight, and another group examining inshore nursery areas for the first signs of arriving young bluefish. These team efforts have already given answers to several important questions about the number and movement of bluefish stocks that exist along the East Coast.

It is now known, for example, that there are two distinct spawning seasons on the East Coast, one in spring and one in summer and that the spring-spawned juveniles are those that recruit in this area. These data and the future data that the researchers collect offer a good possibility that management programs will have a sound basis.

The Brown Tide

LIMRI scientists have been at the forefront of an intensive effort to understand what caused the "brown tide"—an algae bloom that severely disrupted some of Long Island's critical bay environments. While scientists are still uncertain about the exact combination of factors responsible for producing the bloom, LIMRI's researchers have made major advances toward understanding the nutrient requirements of the brown tide organism, how it destroyed important shellfish stocks, and the effect it had on the inshore environment of Long Island.

These and other projects being tackled by this Institute hold a vision for replenishing New York's precious but threatened resources, while other studies of a more basic nature hold the hope of opening doors of knowledge so that future researchers might also tackle a resource management problem.

LIMRI RESEARCH PROGRAMS

- The influence of sediment type on predation of planted hard clam seed by crabs.
- The role of sediment type in determining areas of natural clam abundance in Great South Bay.
- Use of microgrowth line formation as a tool for aging larval clams.
- Use of water circulation models to project larval shellfish transport in the Peconic Bays system.
- The role of eelgrass in providing bay scallops refuge from crab predation.
- Relationships between continental shelf spawning areas and inshore nursery areas for bluefish.
- Factors influencing the timing and path of migration of juvenile bluefish from oceanic spawning sites to estuarine nursery areas.
- The relationships between coastal development and coastal water and environmental quality on Long Island.

"The Waste Management Institute's assistance to Suffolk County in furthering regional recycling and, to a broader constituency, in exploring the reusability of incineration ash residue has earned it the respect of local decision makers."

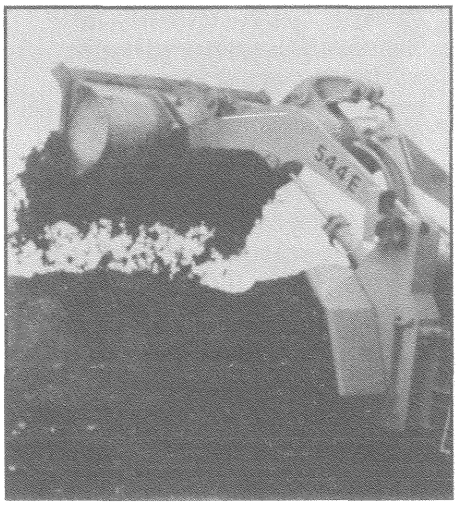
Another product is now in the testing stages—poured, prestressed concrete forms. These forms would be used in the construction industry and in mitigating beach erosion. These rapidly expanding technologies using incineration ash are not only recycling a waste product into a useful product, they are also offering Long Island a source of construction aggregate and opening new business opportunities.

Evan R. Liblit, Commissioner of the Town of Babylon's Department of Environmental Control, believes that WMI has already made significant contributions on both the local and national scale in finding meaningful solutions to the solid waste management problem. "The Institute's assistance to Suffolk County in furthering regional recycling and, to a broader constituency, in exploring the reusability of incineration ash residue has earned it the respect of local decision makers," said Liblit.

WMI sees a bright future for the stabilized ash products in many applications. There is already a great deal of support for this research, including funding from special appropriation from the state legislature, the Long Island Regional Planning Board, and several industrial firms.

Fugitive Ash Dust

A related research program focuses on the fine-grained incineration ash particles that fly in the air and escape to the outside, near the incinerators, called "fugitive dust." Researchers at WMI are investigating if these tiny particles contain harmful metals and organic contaminants. If so, they may be a threat to plant workers inhaling them and to the nearby environment as they settle onto the ground and perhaps percolate into the groundwater. Thus, there may be a need to develop ways to reduce fugitive dust in the vicinity of these plants.



Plastic Wastes

"The significance and impact of degradable plastics on the environment is still not known, but given society's reliance on plastic products, it is imperative that we have an impartial organization like Waste Management Institute to test the products in the environment."

Another WMI study focuses on the demise of discarded plastics, which constitute 2% to 7% by weight of the entire solid waste stream—a formidable amount when considering how little plastics weigh. Plastics are also durable, resisting degradation, which is a mixed blessing since they take up space in landfills for decades.

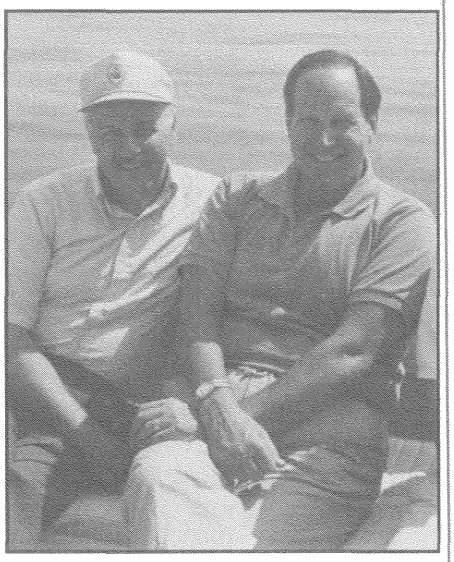
The Suffolk County Legislature has passed, but not yet enacted, a bill that would ban much of the plastic fast-food packaging. This precedent-setting legislation has prompted much needed research on degradable plastics, a task that WMI has undertaken. According to James H. Heil, Town of Brookhaven Commissioner for Waste Management, "The significance and impact of degradable plastics on the environment is still not known, but given society's reliance on plastic products, which are not all suitable for recycling, it is imperative that we have an impartial organization like WMI to test the products in the environment."

In this research project, WMI is assessing various types of plastics placed both in water and on land, including cornstarch-based degradable plastics marketed by Archer Daniels Midland Company of Illinois. The Institute's researchers have buried plastic sheeting in landfills, compost heaps, and beach strand lines and periodically dig up samples to determine the rates of degradation, a property that has rarely been systematically studied in plastics.

Besides testing plastic sheeting degradation, the researchers will be also be testing the decomposition rates, transport patterns in coastal waters, and floatability of injection-molded degradable plastics, such as tampon applicators, which appear to sink more readily than the non-degradable applicators presently being used. The aesthetic, and consequently economic, impacts of these sewage-related floatable wastes landing on beaches is obvious. Wash-ups of such wastes during the summers of 1987 and 1988 turned millions of people away from the beaches at a cost to the region of more than $2 billion in lost revenues.

WMI researchers will investigate potential environmental impacts from the breakdown of the plastics, particularly any potential toxicity to marine organisms. They will also assess the effects of using degradable plastics on recycling endeavors.

Senators Kenneth LaValle (l.) and James Lack, both strong supporters of MSRC's institutes, enjoy an instructional cruise of Long Island Sound.



COASTAL OCEAN ACTION STRATEGIES (COAST) INSTITUTE

The COAST Institute, created in 1988 under the directorship of J.R. Schubel, has as its goal to develop and implement management policies and practices to resolve regional environmental issues. It does so by forging partnerships with decision makers, scientists, and the public. The COAST Institute is only one half of the coin, however. To perform as a whole, COAST relies on the other half—the Long Island International Forum on the Environment (LIIFE).

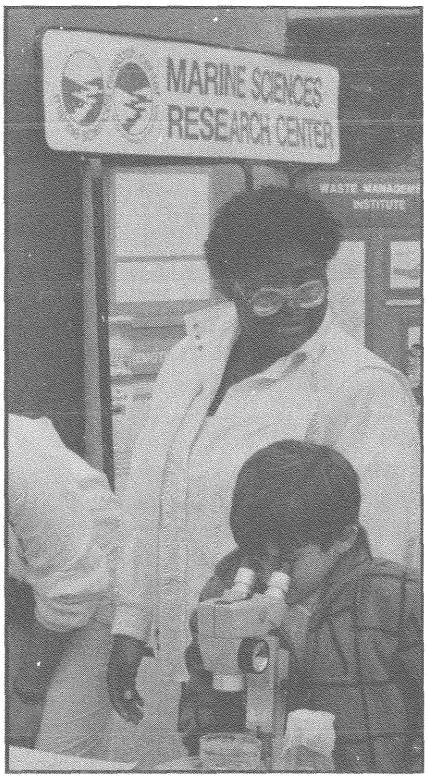
LIIFE brings together creative thinkers from around the world for one week each autumn at the Montauk Lake Club on the secluded east end of Long Island. At each session, experienced leaders and decision makers from many different public and private institutions tackle one major, global environmental problem relevant to the Coastal Ocean of this region. The resultant product is a white paper report identifying new, alternative approaches to the regional problem, along with innovative ideas for solutions on the global scale.

The output of the LIIFE forum is the starting point for the COAST Institute. COAST's responsibility is to analyze the problem presented by LIIFE in greater detail and at a regional level. Each summer, COAST brings together scientists and decision makers—legislators, business and agency leaders and planners—to formulate management actions for solving the target problem. Forging partnerships with key individuals from the various sectors increases the likelihood that these management policies will be put into practice.

Working closely with the Waste Management Institute, COAST held its first gathering in 1989. The first project, supported by the New York State Assembly Ways and Means Committee and the New York State Urban Development Corporation, addressed the problem of medical and other types of floatable wastes in regional coastal waters and on beaches. The goal, built upon an earlier conference on these problems held by Waste Management Institute, was to develop a comprehensive management plan to eliminate floatable and medical wastes from our region's coastal waters and beaches.

The jointly produced Waste Management Institute and COAST Institute "Floatables Management Plan," which resulted from the meeting, was completed this past summer and disseminated to relevant Federal and state and local agencies in the tri-state region. The plan was received most favorably: all of its key elements have been adopted by the agencies with responsibility and authority to carry them out.

MSRC's three institutes have very ambitious agendas to fulfill, but already have made large inroads in solving some of the problems of Long Island and the region. They are solving these problems with waste disposal ideas and environmental assessment, with increased knowledge about the health and reproduction of finfish, shellfish and seaweeds, with usable information for planners and environmental agency heads to make sound decisions, and with education for the public. The next few years promise even more results from research and more information available for the public.



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