Marine Sciences Research Center

NEWSLETTER

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IN THIS ISSUE

Long Island press, MSRC panelists discuss Long Island's environmental trends

Members of the New York Press Association from Long Island spent an afternoon with MSRC scientists learning about environmental issues in the Island's future. They departed with new insights on trends to watch for, and an overwhelmingly positive response to the two panels presented.

The panels tackled several issues that have provoked repeated discussion, debate, and articles: Long Island's environment and waste management, and when scientists should and when they should not interfere with nature.

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Advisory Committee looks at MSRC'S future

"We take MSRC apart every now and again and put it back together in a different way," Dean and Director J. R. Schubel told MSRC's chief advisory group, the 20 community and business leaders of the Visiting Committee. "And that is why we keep improving."

The occasion was the committee's latest visit to the Center, and they came to learn about MSRC's most recent initiatives and future goals. The agenda for the early December meeting included a number of

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Environmental Panel (continued from page 1)

▲ *Panelists (from r.): Vincent Breslin, Larry Swanson, and Frank Roethel of MSRC's Waste Management Institute; Roger Stone, author and environmentalist; Raymond Cowen, Region 1 Director of NY Department of Environmental Conservation; and J.R. Schubel, Director of MSRC.*

The panel led by MSRC Dean and Director J. R. Schubel, tackled the first set of issues, covering the phenomena of NIMBY (Not in My Back Yard), NIMEY (Not in My Election Year); NIMTOO (Not in My Term of Office); and BANANA (Build Absolutely Nothing Anywhere Near Anyone).

The panel asked the press members to identify the Island's most severe environmental problems. Garbage won, hands down, with development and habitat destruction running as close seconds.

Reduction, followed by reuse and recycling are the keys to handling our wastes, but the remainder is still a problem. Management options are now limited to incineration and export since passage of the Landfill Law, which prohibited opening new landfills in many parts of Long Island after 1992.

Panelist Roger Stone, author of a number of books and articles addressing sustainable development, emphasized the importance of ensuring, and even insisting, that any further development of Long Island be sustainable. Sustainable development allows the present generation to meet its needs without compromising the ability of future generations to meet their needs.

▲ *Director of the Marine Sciences Research Center, J.R. Schubel*

According to Stone, Long Island should give priority to preserving its unspoiled environments. And one suggestion to do that, offered by panel leader J. R. Schubel, is for Long Island to guide relocating and expanding businesses into previously developed and degraded areas and to offer incentives to remediate that degradation.

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East-West (continued from page 4)

as a focus: the Danube River and Dnieper River estuaries, and coastal regions of the northwestern Black Sea.

Two programs are already on the docket, according to Fisher. One is a "mussel watch" program, monitoring shellfish to quantify contamination by toxic metals. The other program aims to develop Eastern expertise by holding short, very focused, on-site training courses on specific problems of the country where the course is held.

"Romania is the most promising country to begin the cooperative program with," Bokuniewicz said, "because it is situated near the Danube River delta." The program will incorporate Romania's marine lab and Bucharest University for the education counterpart to MSRC. Western scientists will work with the University of Bucharest to help them develop their own expertise for the future.

With the Bucharest Declaration, countries bordering the Danube will collectively be gathering data and monitoring pollution. "Their budget for these types of programs is very small [less than half a million dollars]," said Bokuniewicz. "So, a small amount of effort on our part will result in a great deal of difference."

Information center of the future

Several physical changes are in process at MSRC. The reference room is being transformed into an experimental library of the future—a computerized information center. The facilities have been moved to Challenger Hall and expanded in space, holdings, and accessible network systems and databases. The new facility is named MASIC for Marine and Atmospheric Sciences Information Center.■

Cess Honored (continued from page 3)

"A key to understanding Bob is his desire to understand how things work," said Schubel. "Through most of his life, it seems, he has taken this trait and applied it to many different disciplines, from truck mechanic to climate modeler."

In his first professional career as mechanical engineer, Cess won a number of awards for his heat transfer work. But he began shifting his attention and his expertise to heat transfer in planetary atmospheres, and eventually to the climate of planet Earth.

For his work in this new career, he has received many awards, including two NASA Langley Group Achievement Awards, as part of the Earth Radiation Budget Experiment, and in 1989 he received the prestigious NASA Exceptional Scientific Achievement Medal.

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Environmental Panel (continued from page 2)

The other panel, led by geological oceanographer Henry Bokuniewicz, explored the precarious situation scientists constantly face in trying to separate natural from human-induced changes and acute from chronic changes. Consequently, it is difficult for scientists to know when it is best to let nature take her course.

One example of chronic change given by Bokuniewicz was the threat of sea level rise. Sea level is rising along New York's coast at about one inch every eight years, and will continue to rise faster in the future.

"There are many uncertainties about the future of sea level rise that require more research," said Bokuniewicz. "But the potential risks are so high, the costs so great, and the time required to implement a response so long that the problem deserves attention now, even while research continues."

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Spring phytoplankton blooms are examples of acute changes, on the other hand. These are the changes that appear without warning and often, almost as suddenly, disappear.

"While politicians and the public often expect scientists to respond with all their scientific tools to these apparently dramatic changes, some may best be left to run their course," said Bokuniewicz.■

FACULTY AND ALUMNI NOTES

MSRC's Robert Cess honored as Distinguished Professor

Distinguished Professorships, honoring outstanding teachers and researchers, are difficult to attain at the State University of New York. But 16 of the University at Stony Brook's

faculty have been singled out for this prestigious award. And MSRC's Robert Cess is the latest.

At a ceremony to honor his accomplishments that earned Cess this award, MSRC Director J. R. Schubel recounted some of his many accomplishments, awards, honors, and titles.

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Participants at MSRC's Sunday Breakfast Series. The first two discussions held in February were "Our Coastal Environment — the land-sea connection" and "Polluted Waters — what do we do?" ▲

MSRC's future (continued from page 1)

exciting events and projects to celebrate the Center's 25th anniversary in 1993.

Associates of MSRC

The Center is committed to strengthening ties to the community, and one way to achieve this in the past was through the MSRC Associates. These were area residents deeply concerned about the marine environment, who were instrumental in helping the Center carry out its goals.

Nissequogue resident Anne Sayre is reestablishing the MSRC Associates with a kick-off program, "Sea Coast Sunday Breakfast Series." These are informal Sunday breakfast gatherings with the public and scientists from MSRC and the University exploring current local and regional coastal issues together. The schedule is the following Sundays from 10 am to 12 pm. at Endeavour Hall:.

- **March 14**--A Coast in Action-- the natural processes and man-made structures that shape a coast.
- **March 28**--Living in Harmony with Your Coast-- individual actions on the home front that can make a difference.

Writers' festival

Also on the agenda to celebrate MSRC's 25th birthday is a Writers' Festival scheduled for October. The Festival will focus on authors and poets who write about Long Island's environment. A number of outstanding writers have already signed on for this event.

East-West environmental collaboration

Professors Nicholas Fisher and Henry Bokuniewicz reported on the progress of the East-West environmental remediation projects and what next steps will be taken (see Spring 1992 Newsletter).

Of the enormous number of problem areas presented at the first meeting, the scientists chose several

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MARY SCRANTON

Fermentative Bacteria and Fatty Acids: An Important Link in the Carbon Cycle

A major thrust of oceanographic research is to find out how the carbon cycle works: how, where, and how fast carbon is incorporated into new organic material and converted back into inorganic forms, such as carbon dioxide, and what portion gets to the sediments and remains there indefinitely.

MSRC chemical oceanographer Mary Scranton is currently investigating the role in the carbon cycle of low molecular weight fatty acids, small molecules produced and consumed in the final stages of decomposition of organic matter. Fermentative bacteria produce fatty acids during metabolism, and manganese reducing bacteria; methanogenic (methane producing) bacteria; sulfate reducing bacteria; and photosynthetic sulfur oxidizing bacteria, as well as other organisms, consume fatty acids to obtain energy and carbon for new cells.

Much previous work focused on the importance of bacteria in cycling inorganic elements such as manganese, iron, and sulfur, but rates of fatty acid metabolism by bacteria have not been directly investigated in the field. This is partly because researchers could not make sensitive enough measurements needed to detect very low concentrations of such small molecules.

Scranton's most recent work, with University of Rhode Island colleagues Percy Donaghay and Al Hanson, focuses on one particular fatty acid—acetic acid—in the permanently anoxic Pettaquamscutt River estuary in Rhode Island. Both methanogenesis and sulfide production, as well as perhaps other metabolic reactions, may be linked specifically to acetic acid. Scranton believes it may be a key precursor in the conversion of organic carbon to inorganic carbon, and once she understands the rate of cycling of acetic acid in this basin, she can better understand the methane and carbon cycling rates.

In a typical anoxic water column, the surface of the water is well oxygenated. Oxygen drops off sharply below the surface mixed layer and falls to zero, at which point hydrogen sulfide immediately starts increasing. But in the Pettaquamscutt estuary, the oxygen profile is quite different. There is a gap where neither oxygen nor sulfide is present; then at greater depths, hydrogen sulfide starts to increase. Light penetrates into the sulfide zone in this basin, and at this depth are photosynthetic sulfur bacteria that use light to oxidize hydrogen sulfide and simultaneously metabolize fatty acids.

Although this oxygen-sulfide gap is only rarely reported in the oceanographic literature, it may be more common than previously thought, according to Scranton, but just may not have been observed. She and her colleagues have been able to resolve this peculiar profile because they are able to take samples on a much finer scale than previously possible by using a high-resolution profiler designed by Donaghay. The profiler has a number of sensors along a horizontal plane a few centimeters thick, allowing the team to collect water samples and analyze them for oxygen, light, and pigment measurements at fine resolution. Scranton is also able to collect samples for sensitive analysis of fatty acids, using a technique developed together with MSRC colleague Cindy Lee and graduate student Xiaohua Yang.

The no oxygen-no sulfide gap is proving to be a site of very interesting and dynamic reactions. Donaghay and his colleagues detected a sharp peak of organisms in this zone, and found that these are predominately the photosynthetic protozoa, *Euglena proxima*, which are producing oxygen during the day, but not at night.

In this same zone, Scranton has found high concentrations of methane at night, but not in the day when methane is cycled very rapidly. And her student Hanguo Wu found lower acetic acid concentrations and higher uptake rates at several depths during the day.

"There may be some link between higher daytime oxygen concentrations and the cycling of acetate and methane," said Scranton. "When oxygen is present, methane can potentially be oxidized. But at night, oxygen is used up, so methane oxidation may slow down or stop altogether." And since there is evidence that acetic acid may be a key precursor to methane production in this basin, daily fluctuations in acetic acid cycling rates may be related to the variations in methane cycling rates.

"The acetic acid cycling rate is very fast—up to six times per hour—in the *Euglena* maxima zone," said Scranton. "In fact, the integrated rate of acetic acid cycling over the entire water column is comparable to the rate of primary production." Primary production, or the incorporation of carbon into new phytoplankton cells from photosynthesis, accounts for one of the largest reservoirs of total organic carbon available in the water column.

Now that Scranton has a better understanding of the importance of fatty acids in the carbon cycle, one of her next goals is to return to the Pettaquamscutt and look more specifically at which of these populations of organisms are really the controlling ones and where in the water column these processes are occurring.