



Monitoring Change

Long Island's coast is a dynamic environment, constantly changing in response to natural processes and human activities. The 125 miles of ocean coast stretching across its densely populated south shore from Coney Island to Montauk is of particular interest due to the high level of development in this area. For example, Long Beach, seen in the aerial photo above, is a barrier island with a year round population of 50,000. "Coastal erosion along the south shore is a significant problem for all levels of government," says NYSG coastal processes and facilities specialist Jay Tanski. "Historical maps and aerial photos show that the patterns of

shoreline change are highly variable in this area. Some areas appear to be stable or even gaining sand over the last century while others are eroding at tens of feet per year."

The key to sound coastal management is having a good understanding of how the shoreline is behaving and what is causing these changes. "In addition to natural processes such as storms and sea level rise," Tanski says, "human activities—primarily those associated with stabilizing and dredging the inlets for navigation purposes—have impacted the patterns and rates of erosion in the area."

Continued on page 4



Monitoring Change

Mapping the future with technology
by Paul C. Focazio and Jay Tanski *page 1*

CoastWatch on Lake Ontario

"Sweeping" the Lake
by Barbara A. Branca *page 8*

Lower Lake Levels

An analysis of Lakes Ontario and Erie
by Chuck O'Neill *page 11*

Currents

Sea Grant Fellows from New York
to the Nation's Capital
by Barbara A. Branca *page 12*

COASTAL LIVES

Monitoring

Continued from front cover

In recent years, Long Island's south shore has been impacted by a number of major storms that have resulted in serious flooding and erosion in many communities. Estimates of the value of public and private structures and property in these erosion and flood prone south shore areas alone are upwards of \$10 billion.

To help local and state governments better respond to this growing issue, the New York Sea Grant Extension Program worked closely with the Long Island Regional Planning Board (LIRPB) and the New York State Department of State's (NYS DOS) Division of Coastal Resources to develop a coastal hazard management program for the area.

With funding from NYS DOS, Sea Grant brought together some of the country's top coastal scientists and engineers to participate in a series of initial workshops for state and local officials. Starting in 1990, the workshops focused on identifying what was known about the specific erosion problems occurring in the area and the best approaches for dealing with them from a technical perspective.

The resultant reports served as the technical basis for the LIRPB's and the NYS DOS's plan and were incorporated directly into the final report, "Proposed Long Island South Shore Hazard Management Plan." This report provided a framework for guiding future coastal management and policy decisions. From this effort it was clear that state and local officials did not have adequate scientific-based information to make technically-sound decisions regarding erosion management and coastal development. Acting on a recommendation made in the report, the two agencies again asked for Sea Grant's help in developing a program that would fill this information gap.

Working with Henry Bokuniewicz, a researcher at the State University of New York (SUNY) at Stony Brook's Marine Sciences Research Center (MSRC), Tanski developed a model monitoring program based on the experiences of similar programs across the country and input from local officials.

This resulting monitoring program, specifically designed to provide managers, planners and their coastal users with information they could use to make better decisions regarding erosion management along the south shore, incorporates six different elements. They include periodic aerial photography of the shoreline, measurements of the condition of the beach twice a year and measurements of the waves causing shoreline changes.

"Although the program provides a wealth of information of interest to scientists and researchers, the focus was always on providing practical information for managers. We didn't want it to become a scientific or theoretical exercise," says Tanski. The program was specifically designed to provide information that would help decision makers and others identify and quantify erosion problems, evaluate the effectiveness and impacts of existing and proposed erosion measures and develop a better understanding of coastal processes and their effect on shoreline behavior.

//
The focus was always on providing practical information for managers.

—Jay Tanski

//

Photo by Jack Mattice



Along a boardwalk on a south shore beach, NYSG's Jay Tanski (r.) explains the importance of coastal processes planning techniques to Tom Doheny, former Director of Conservation and Waterways for LI's Town of Hempstead (l.), and National Sea Grant Director Ron Baird.

Change

Using the information and materials from Sea Grant's efforts, the NYS DOS Division of Coastal Resources worked with the U.S. Army Corps of Engineers New York District to begin implementing the program. With the support of both federal and state legislators, a \$1.4 million annual appropriation to fund the Atlantic Coast of New York Monitoring Program (ACNYMP) was included in the Federal Water Resources Development Act.

The monitoring program, which is administered by the Planning Division of the Corps New York District, is a cooperative effort with overall program guidance and direction provided by a "study team." This group is comprised of representatives from the Corps, the NYS DOS Division of Coastal Resources and New York Sea Grant.

Although lapses in the funding stream have prevented full implementation of the program, a considerable amount of data has been collected from some 348 locations along the shore. In addition to

taking measurements of beach volume and elevation, aerial photographs of the entire shoreline have been taken twice a year since 1995. Supplemental funds provided by the State of New York are used by the NYS DOS to address additional data gathering needs. "We want to be sure that we are getting all the data needed by local governments and regulators to facilitate wise management of our coastal resources," says Fred Anders, of the State's Division of Coastal Resources.

"Previous data collection in this field has been limited to specific coastal events or geographic areas," says Tanski. "This program provides a more comprehensive basis for improved decision making by treating the coastal system as a whole, both in space and time, rather than in isolated parts."

Each of the cooperating agencies in the program presently serves as a repository for data products, enhancing dissemination of the information generated by ACNYMP to the widest range of audiences—

Mapping Our Future

The coastline inundation map below depicts portions of the Town of Islip, including the Hamlet of Bay Shore and shows how the position of the shoreline and the extent of flooding might change over the next 50 to 100 years in response to potential changes in the rate at which sea level is rising. These mapping efforts are a part of an ongoing project Tanski is working on to use the computer-based tools of a Geographic Information System to provide decision-makers with information about coastal conditions and processes at a scale they can use.

Continued on page 6

Courtesy of Jay Tanski

Key

Extent of Flooding

- Present 50 Yr Storm
- Projected 2050 50 Yr Storm
- Projected 2100 50 Yr Storm

Shorelines

- Present
- Projected 2050
- Projected 2100



Monitoring Change *continued from page 5*

local governments, regulatory agencies, scientists, engineers and other interested parties.

Data from the monitoring program has already been used in an array of applications. Sea Grant has used the sequential sets of aerial photographs and profile data to help government officials better understand changes occurring along this coast and how best to deal with them. The information has been used to address problems ranging from dealing with oceanfront erosion to evaluating habitat for endangered species. In addition, several SUNY researchers such as Daniel Conley (*page 7*) are using the monitoring data in projects looking at coastal processes and shoreline change.

According to Steve Couch, project planner at the Corps of Engineers, "The data collected under the monitoring program have proved extremely valuable in the planning and design of our coastal projects." This information has been used to refine and improve the design and analysis of 11 Corps projects. "With this extensive data set, we are able to better quantify what is happening in this complex environment." This improved understanding has translated to a potential cost savings of some \$6 million for two projects alone. The NYS DOS has used the monitoring information to prepare management plans for the south shore estuaries and to evaluate permit applications.

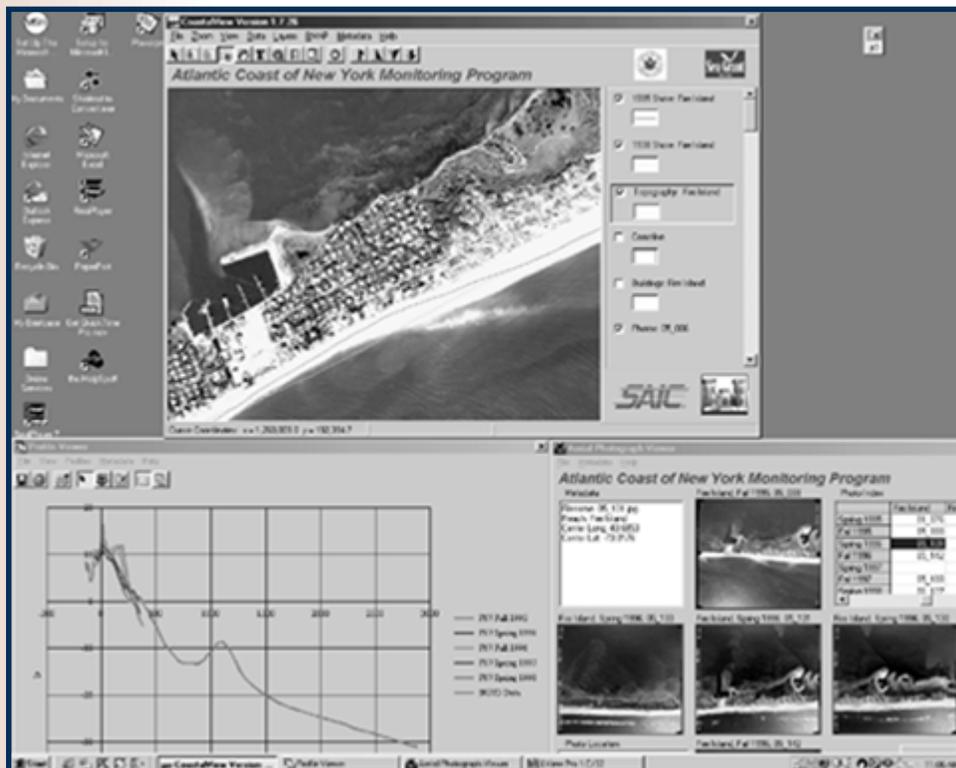
This could be your desktop...

Information from the monitoring program is being transferred to CD-ROMs with a special viewer allowing the user to access and retrieve a wealth of coastal data on a personal computer.

To further improve the accessibility and distribution of this important information, the study team has been developing a comprehensive database utilizing Geographic Information System technology. Based on the results of a user needs analysis conducted by Sea Grant, the database contains information collected as part of ACNYMP as well as existing coastal data from other sources. Included are historical shoreline positions, topographical data, building locations and flood zone designations.

All this information has been digitized and placed on compact disks. For easy viewing and retrieval, a program called *CoastalView* was developed in conjunction with a consulting firm and is included on the CDs. *CoastalView* includes features that allow the user to view the program's aerial photographs, manipulate the profiles, overlay various data sets and perform simple analyses. (See the desktop image below.) Currently, a draft of the two-CD-ROM "*CoastalView*" software (its beta version) is being tested by study team members and is expected to be ready for wider distribution shortly.

"What is really exciting about this application is that it brings all this information together in one place and allows the user to tailor it to his or her specific needs," says Tanski. According to Couch, "The CD-ROM application is an excellent tool to make these data accessible and usable by local decision makers and the coastal community."



Tanski says that another goal of the ACNYMP is to eventually have the data and information collected available on the World Wide Web. "Our objective is to put the information in a format that is usable by as diverse an audience as possible. The intent in eventually getting this data posted on the Internet is so people will have ready access to information they need to make informed coastal decisions." Realizing that achieving this one of many objectives mapped out for the project may take time, Tanski says, "Solutions to complex issues don't come quickly."

— Paul C. Focazio and Jay Tanski