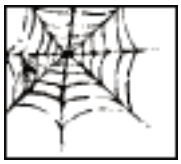

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Coastlines 7.3 Summer Issue

Rethinking Coastal Management

In the 1970s, the nature of environmental management changed dramatically. Major pieces of legislation were passed by Congress, including the Clean Water Act, the Coastal Zone Management Act, and the Clean Air Act. These were implemented by the creation of federal agencies such as the Environmental Protection Agency and what is now NOAA's Office of Ocean and Coastal Resource Management. Similarly, states passed legislation and created agencies. This led, initially, to a "top-down" approach to management where decisions were made at the federal or state level because that is where the authority and expertise were.

Over the intervening decades, coastal resource management and the expertise to support it have filtered to the local level. The EPA's National Estuary Program is an example of how environmental problems are defined and solved by local stakeholders and managers, in conjunction with state and federal agencies very much a "bottom-up" approach.

This sort of rethinking of coastal management techniques will be a major theme of the upcoming Coastal Management 97, a conference in Boston, MA, on July 21-25. This issue of *Coastlines* is dedicated to this theme. Many of the articles on the following pages are excerpted from papers to be presented at CZ 97.

For additional information about Coastal Zone 97
see their web site at www.infinitefaculty.com/cz97
Phone: (617) 287-5576 or E-mail: lefebvre@umbsky.cc.umb.edu

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Coastlines 7.3 Summer Issue

Nature Article Estimates the Value of Ecosystems

A thought-provoking article on the value of the world's ecosystems was published in the May 15, 1997, issue of the science journal *Nature*. Ecologists and economists combined their talents to place dollar values on the functions and services provided by various ecosystems worldwide. In performing this exercise, they hoped to bring to the forefront the true values that ecosystem functions perform for our society.

The grand total of benefits provided by natural systems was estimated to be $33 trillion per year at a minimum. For reference, the total global Gross National Product equals $18 trillion.

Most of the big-ticket items stem from aquatic ecosystems, including those of oceans, coastal waters, and wetlands. Almost two-thirds of the value or $20.9 trillion of global ecosystems are provided by marine systems; $10.6 trillion per year of this is derived from estuarine and coastal systems. Benefits from wetlands were valued at $4.9 trillion per year. The most valuable service item? Nutrient cycling in ocean and coastal waters estimated to be worth $17 trillion per year.

These figures support what many have held to be true for years that natural systems provide services at

far cheaper costs than if we had to provide them for ourselves. In other words, it costs us far more to "fix" a broken ecosystem than to protect and maintain it in the first place.

The full *Nature* article can be viewed on the web at http://www.nature.com.

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Clean Water and Resource Conservation Rank as Top Concerns for Local Government in NOAA Study

A study recently released by the National Oceanic and Atmospheric Administration (NOAA) found that safe, clean water is the number one concern among critical national issues for coastal county and city managers across the country.

After clean water, the conservation of natural resources ranked second, over energy supplies, infrastructure development, and waste disposal. The study compared the importance of coastal resources such as clean water to other local issues. Well over half (58%) of city managers in the study ranked clean water equal in importance to health care and 25% ranked clean water more important than health care.

Sixty-eight percent of city managers rated the protection of ocean and other water bodies from pollution more important than reforming product liability laws. Ecosystem conservation rated more important than increasing the minimum wage for 54% of study participants and equal in importance for 28%.

City managers felt that population growth was the primary factor adversely affecting the health of the nation's coasts. Over 79% reported that their local population has increased in the past ten years.

Fifty-seven percent of managers in the study indicated that population growth had some adverse effect on coastal water quality. A full 50% of city managers reported that population growth had some adverse effect on coastal wildlife, and 58% indicated that population growth had adversely affected the entire ecosystem.

The survey also gauged local awareness levels of a state's coastal program. Of city managers 63% said their state had been very or somewhat effective in managing coastal resources, and the majority of managers indicated that coastal management policies had been effective in helping them manage coastal resources. Another 58% of the managers in the study said their state had been "very" or "somewhat effective" in establishing partnerships between levels of government.

For additional information contact:
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Volunteer Training for Estuary Monitoring

EPA is offering a two and a half day workshop, titled Train-the-Trainer Volunteer Estuary Monitoring, to encourage such activities. Upcoming workshops will be held on the west coast and along the Gulf of Mexico and more are in the works. Lodging, meals, and mileage will be provided for 20-30 non-federal participants. For further information contact Joe Hall at (202)260-9082, E-mail: hall.joe@epamail.epa.gov or Laurie Halperin, Center for Marine Conservation at (757)851-6734.

Interested in Estuaries? Attend ERF 97!

Anybody that is interested in estuarine science and management should attend the 1997 Estuarine Research Federation 14th International Conference. ERF 97, will be held at the Rhode Island Convention Center in Providence on October 12-16, 1997. This year's program is aimed at assessing the state of the world's estuaries and estuarine resources. Further information on attending can be obtained on the website at www.cbl.cees.edu/erf/meetings.html or by calling 1-800-321-4267 x 4143.

Celebrate, Educate, and Participate: COASTWEEKS 97

The 1997 COASTWEEKS celebration runs from Sept. 20 through Oct. 11. This is an opportunity for people all over America to celebrate, educate, and participate in valuing our coastlines. Beach cleanups in coastal communities are the main event associated with COASTWEEKS. Last year alone 151,502 people picked up 2.9 million pounds of trash from our nations' beaches. For further information on how you can participate locally call 1-800-CMC-BEACH, or check out The Center for Marine Conservation's web site at www.cmc-ocean.org/cleanupbro/coastwee.html. A significant part of Coastweeks is Estuaries Day when attention is focused on these critical coastal waters. For details on Estuaries Day activities contact the National Estuarine Research Reserve nearest you.

DIAL 1-800-ASK FISH

The U.S. Fish and Wildlife Service has established a national telephone hot line for the public to use to find the locations of pumpout and dump stations and to report any nonfunctional pumpouts in their states. Started in 1996, the hot line began with the State of Florida pumpout list, and has been added to by other states as locations become available. The hot line is a simple, yet effective way for boaters find their nearest pumpout station - just dial 1-800-ASK-FISH!

Bay-Friendly Landscaping Videos

"Bayscapes" offers natural, bay-friendly landscaping techniques for homeowners interested in decreasing their impact on their watershed. Although the video focuses on homeowners in the Chesapeake Bay watershed these environmentally friendly landscaping tips are translatable to anyone with a yard! Copies of the 25-minute BayScapes video are available for $15 from the Alliance for the Chesapeake Bay, 6600 York Road, Suite 100, Baltimore, MD 21212, or by calling (410)377-6270.

"Riparian Forest Buffers: The Link Between Land and Water" is designed to inform the public about the benefits of riparian forest buffers. The 21-minute videotape describes the buffers, their functions, values, and how landowners can create one for themselves, as well as who to contact for additional assistance. Copies can be ordered for $15 through the Wye Research and Education Center at (410) 827-8056.

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National CZM Effectiveness Study

How Well Has the Federal Coastal Zone Management Act Worked?

In 1972, Congress passed the federal Coastal Zone Management Act. This provided authorization and funding for states to develop and implement their own coastal management programs. Now, on the 25th anniversary of the Act, NOAA's Office of Ocean and Coastal Resource Management, in cooperation with the National Sea Grant Office and the Sea Grant programs at the Universities of Washington, Rhode Island, and Oregon State are reviewing how effective the resultant system has been.

The present study is an attempt to assess the individual and collective contributions of the 29 coastal management programs in achieving some of the most important objectives of the Act:

- protection of beaches, dunes, bluffs, and rocky shores;
- protection of wetlands and estuaries;
- providing public access to the coast;
- promotion of seaports; and
- revitalization of urban waterfronts.

To the extent that data are available, the study assesses the effectiveness of the policies, processes, and tools that state coastal programs use to accomplish the above five objectives. Researchers built a profile of each of the 29 state coastal management programs through a review of available program literature, questionnaires, and phone surveys. The profiles include information on the program elements and tools used by each state and available measurable indicators of performance, such as number of acres of wetlands restored. The results of the study reported here are preliminary and currently undergoing peer review.

The basic finding of the study is that state programs are effective based on the tools that they use, case examples, and the available data. The case examples illustrate on-the-ground effectiveness of CZM policies and tools. Collectively, these examples demonstrate the positive contributions and innovations of state CZM programs in managing our coasts.

However, the study found there are insufficient nationally-compatible outcome data available in order to provide a definitive national evaluation. As a result, the study includes recommendations to improve outcome monitoring of programs and develop better means of data collection.

Protection of Beaches, Dunes, Bluffs, and Rocky Shores

State coastal programs around the country have developed a variety of effective tools to protect beaches and other natural shorelines. These include shoreline setbacks and regulation of shoreline development, acquisition and stewardship of state lands, and research and public education about shoreline processes and human impacts. The primary tools employed are regulatory. Twenty-four states use setbacks to force development back from sensitive shorefront areas.

The systematic planning provided by state coastal management programs and review of projects along the shoreline have minimized the impacts of improper development and erosion on both natural systems and adjacent properties and structures. They have also allowed greater attention to cumulative effects of individual permit decisions. The use of scientifically-established, long-term erosion rates to establish construction setbacks, a better understanding of the adverse impacts of shoreline armoring on natural beach sand transport, and the implementation of non-structural solutions to coastal erosion have all shown beneficial outcomes.

Protection of Estuaries and Coastal Wetlands

Protection of estuaries and coastal wetlands is a high priority issue for the great majority of state CZM programs. Based on state policies, most programs rated relatively high in "potential effectiveness". Sufficient data were available for determinations for about one-third of the states and the great majority of these received relatively high marks.

The study also identified the "most important processes and tools" nationally for protecting estuaries and

coastal wetlands. Regulatory tools dominated the list, but local planning, acquisition, education, and mapping also made the top ten. With notable exceptions, the most under-utilized management strategy, especially considering high coastal wetland loss historically, was wetland restoration.

Provision of Public Access to the Shore

State programs give significant attention to the need to provide public access to the shore and use a variety of effective tools. All states are involved in establishing and maintaining access sites, plan for future access, and provide public outreach about the importance of safeguarding public access to our coasts. Notable accomplishments include the expenditure of more than $16 million in federal funds for low-cost shorefront acquisition and improvement projects around the country and, at the state level, acquisition of 2,300 new public access sites in California and; the completion of a comprehensive access system in North Carolina which includes neighborhood, local, and regional facilities designed to meet the characteristics of each site.

Traditionally, acquisition and regulatory programs were the most effective means of providing public access. These tools are now used less frequently due to decreases in public funding and increased societal concern over the protection of private property rights. As a result, coastal states have been very inventive in developing new tools and approaches. Examples include providing legal assistance to secure public rights-of-way and developing partnerships with public and private institutions.

Redevelopment of Deteriorating Urban Waterfronts and Ports

The study identified 304 urban waterfront districts in the nation's coastal zone that benefit from state coastal management programs. Revitalization plans have been developed with coastal program assistance or funding in 200 waterfronts, and are currently underway in 42 others. Revitalization is "complete" in only 10% of the districts identified in this study but, in more than one third, infrastructure has been improved and specific projects undertaken. The most common waterfront improvements are those which enhance important national coastal program goals, i.e., increasing public access, fostering water-dependent uses and activities, conserving important cultural and historic resources, and restoring degraded urban coastal environments. Environmental cleanup has taken place in at least 55 sites, over half of the revitalizing districts have developed shore-side parks, and approximately one third have built fishing piers or boardwalks.

Five particular approaches stand out as distinctive and effective strategies for revitalization:

- marketing state assistance programs,
- targeting specific waterfronts and ports for revitalization,
- delegating responsibility for revitalization to a networked agency,
- responding to revitalization initiatives from local communities, and
- reacting to redevelopment activity through the regulatory process.

Promotion of Seaport Development

For the purposes of this study, seaport development was defined as major commercial deepwater ports important to international trade. Using this definition, 12 state coastal programs were intensively reviewed because they were considered "port-active", i.e., they gave port development a "high" rating in perceived importance to other issues and they had a port relatively active in international trade.

These states use management tools such as planning and regulatory criteria specific to ports to delineate areas for port development. The tools include "no-sprawl" policies, and regional or port master planning programs. They further facilitate port development by providing financial and engineering /environmental support to ports.

For more information contact: Bill Millhouser
NOAA Office of Ocean & Coastal Resource Management
1305 East-West Highway (N/ORM4), Silver Spring, MD 20910
Phone: (301) 713-3121 ext: 189, Fax: (301) 713-4009
E-mail: bmillhouser@coasts.nos.noaa.gov

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National Estuary Program Key Management Issues Workshop

What are the most common problems facing the 28 estuaries in the National Estuary Program, and what should the public and decision-makers know about those problems? These questions were the focus of the NEP Key Management Issues Workshop held in San Francisco, CA, on February 26-28 of this year. Co-sponsored by the Environmental Protection Agency and the Association of National Estuary Programs, the purpose of the workshop was to begin a national dialogue to define key issues and identify themes that should be conveyed in an upcoming "Citizen's Report to the Nation."

Over 125 representatives from the local National Estuary Programs and EPA convened to exchange ideas and experiences regarding the issues they face. Attendees included program directors, scientists, outreach coordinators, citizens, business representatives, local government officials, and EPA Headquarters and Regional managers and staff.

Although each of the 28 estuaries in the program is unique, they all face similar environmental problems and challenges that can be addressed collectively. These common problems, which were the focus of

breakout sessions for the body of the workshop, include:

- over-enrichment of nutrients,
- pathogen contamination,
- toxic chemicals,
- alteration of freshwater inflow,
- loss of habitat,
- declines in fish and wildlife,
- introduction of invasive species, and
- natural resource valuation.

Discussions focused on the current conditions in each estuary, management approaches being used to address the particular condition, and obstacles to successful implementation of those approaches.

While no national or regional conclusions were drawn about the overall health of the program's estuaries, participants confirmed that the eight problems listed above are indeed common to their programs, and are most likely common to estuaries throughout the United States. The workshop participants noted that these problems arise from many sources and can be seen through a number of visible impacts. For example, problems with pathogens have resulted in a large number of shellfish bed closures. Habitats are being lost, altered, or degraded due to land use changes and pollutants. Over-enrichment of nutrients is contributing to lower dissolved oxygen levels and loss of seagrasses. Introduction of invasive species is adversely affecting native species and their habitats. Workshop participants also noted that estuarine natural resources are typically undervalued and cited the need to examine the interdependence of the economy and the environment in connection with these impacts [see "*Nature* Article Estimates the Value of Ecosystems," also in this edition of *Coastlines*]. Other concerns included adverse effects on property values, public health costs, and loss of tourism, jobs, revenue, and tax base.

Although these challenges are being dealt with locally, management approaches have national implications and applicability. Collectively, the National Estuary Programs have a significant knowledge base and wealth of experience in dealing with the serious problems that threaten the health of these nationally significant estuaries. Attendees agreed, in general, that solutions to these common problems should be tiered or phased in order to be effective and efficient. That is, when employing management strategies, education should precede regulation, and prevention or source reduction should occur before treatment or remediation.

The workshop identified not only solutions, but also some of the obstacles to successful implementation of management actions. These include the need for: uniform standards and new indicators to distinguish between human and animal sources of pathogens; new technologies to treat contaminated sediments; a uniform measurement of habitat loss to measure success and better definitions of habitat types; and additional funds for enforcement of environmental regulations and effective public education.

A number of other messages were conveyed during the two-day workshop. First, the needs for long-term

commitment, support, and coordination at all levels of government and for strong public participation were identified as critical components for program success in developing and implementing management actions. Second, the National Estuary Program is a successful model of the consensus-based approach and collaborative decision-making process to address complex environmental problems.

Information from the workshop will be used by the Association of National Estuary Programs to develop a "Citizen's Report to the Nation". The Report will highlight achievements of the local programs, share lessons learned, and promote national awareness of these estuarine resources. EPA will also use this information for many purposes including an update to its National Water Quality Inventory Report (305b).

For further information about the workshop contact:
Darrell Brown, Chief, Coastal Management Branch, Environmental Protection Agency.
Phone: (202) 260-6426, E-mail: brown.darrell@epamail.epa.gov.

For information regarding the upcoming "Citizen's Report to the Nation" contact
Richard Volk, Chair, Association of National Estuary Programs
Phone: (512) 980-3420, E-mail: rvolk@tnrcc.state.tx.us.

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Dolphins at Risk from Tourists and Vice Versa?

Feeding wild dolphins has become an increasing and ongoing problem since the late 1980s in many warmercoastal areas, including Florida, Texas, and the Carolinas. Additionally, people are swimming with wild dolphins, which may put the people in danger (despite their television persona, dolphins are powerful, wild animals which can be very aggressive) and will harass the animals. Under the Marine Mammal Protection Act, it is illegal to feed or harass wild dolphins. Over the past several years, NOAA's National Marine Fisheries Service has posted warning signs, distributed educational materials, and produced a public service announcement to help educate the public and commercial operators about the harmful consequences of interactions with dolphins.

However, many people continue to feed and swim with dolphins, particularly in Florida's coastal areas around Ft. Walton Beach, Panama City, Sarasota, Melbourne, and Key West. The fisheries service and local authorities will be stepping up enforcement in those areas in collaboration with the Florida Marine Patrol. Officials will also be distributing new educational brochures and posters that explain why interactions with wild dolphins are harmful.

Fisheries service officials have received reports of people feeding dolphins beer, hot dogs, and candy

bars. Even more threatening is the danger that dolphins will become accustomed to people and lose the natural wariness that helps them survive as wild animals.

"When dolphins are begging for food, their natural behavior has been altered for the worse," said Trevor Spradlin, a fisheries service marine mammal biologist. "They will do dangerous things such as closely approaching moving boat propellers. There is a real concern that these dolphins are vulnerable to unsuspecting human abuse or shark attacks."

Dolphins fed by people are also in danger of being perceived as "nuisance" animals. Increasingly, recreational and commercial fishermen in Florida have complained that dolphins have learned to take fish off their lines. The fishermen are unable to catch the fish they want and the dolphins run the risk of ingesting baited hooks. Recently, two young dolphins were found dead with hooks and fishing line in their stomachs.

Scientists and conservationists are concerned that in the future, there will be public outcry to remove or even kill dolphins considered to be a nuisance. In the 1970s, similar public feeding of wild bears in Yellowstone National Park led to the destruction of some bears.

For additional information, contact Laurel Bryant, Constituent Affairs Officer, National Marine Fisheries at (301) 713-2263.

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Coastlines 7.3 Summer Issue

Towns Working Together

Cooperative Management of a Maine Estuary

In the past decade, estuary projects have sprung up along the coastal landscape like mushrooms after a fall rain. The coast of Maine is no exception. In recent years, the EPA's National Estuary Program sponsored an estuary project in Casco Bay, and Environment Canada and U.S. agencies sponsored the St. Croix Estuary Project on the Maine/New Brunswick border. These two activities included large watershed areas and required substantial public funding.

In 1992, the Maine Coastal Program saw a need for a streamlined estuary project model that could work with a relatively low budget– one that condensed the planning process and focused on consensus-building among the towns within the project area as a means to ensure long-term cooperative management of the resource. The Damariscotta River Estuary in midcoast Maine was chosen as the site for a two-year demonstration project supported with funds from the federal Coastal Zone Management Act.

Management of coastal resources in Maine is fragmented among more than 140 coastal municipalities as well as state and federal agencies. The many estuaries and bays along Maine's highly indented 3,500-mile shoreline often border several towns and estuary watersheds usually extend into other communities. Most land use decisions are controlled by municipalities, which historically have operated independently of their neighbors. The challenge of the Damariscotta River Estuary Project was to build commitment among the residents and officials of the seven estuary towns to work together long after the initial planning project was over.

The Damariscotta River watershed covers an area of 103 square miles. Centuries of intensive logging, farming activities, and residential development in the watershed have left a markedly varied landscape. Despite this, the Damariscotta is in good shape, relative to other coastal estuaries in Maine and New England. Conditions are probably better now than they were a century ago, when 5,000 cords of wood burned each year along the river to fire bricks; when sawmills, a match factory, and shipyards were discharging sawdust and chemicals into the estuary; and when runoff from farmland carried sediment and animal waste to the river. A sewage treatment plant, constructed in the mid-1980s, and the large volume of water exchanged with each tide are largely responsible for the relatively clean conditions today.

The initial phase of the estuary project focused on documenting the resource value of the estuary and threats from population growth and land development in the area. The Damariscotta River is a center for shellfish aquaculture in Maine and hosts two shellfish hatcheries and several marine laboratories. The river is fished for lobsters, elvers, crabs, shrimp, and soft shell clams. The value of marine resources and marine-related businesses in the estuary is estimated at $12 million annually. This high figure for the "worth of the river" was a surprise to many area residents and certainly brought attention and support to the project.

The two-year planning effort built on goals and strategies identified in previous comprehensive land use planning efforts and brought together a variety of existing community-based organizations from land trusts to chambers of commerce. At the conclusion of the Damariscotta Estuary Project in 1995, planning board members from the estuary towns enthusiastically committed to implement the Management Plan for the Damariscotta River Estuary and to sustain a municipal network by forming the Planning Alliance of the Damariscotta River Estuary or PADRE.

PADRE is comprised of planning board members of seven watershed communities. It formed as a nonprofit corporation and is working to implement many of the 50 recommendations contained in the Management Plan. Modest startup funding was provided by the Maine Coastal Program. Subsequently, financial contributions from estuary towns, together with grants, support the program's activities.

In its first year of operation, PADRE has moved a number of priority initiatives forward, including:

Improving Water Quality: PADRE secured a Clean Water Act Section 319 grant to work with marinas and boat owners in reducing nonpoint source contaminants. Marine facilities in the estuary will be surveyed, encouraged to visit a demonstration site, and offered technical assistance to make appropriate changes (i.e., reducing stormwater runoff, controlling petroleum). An educational campaign about nonpoint source pollution will be targeted at owners of boats and the more than 800 moorings in the estuary.

Staff members work closely with estuary towns and state agencies to eliminate remaining overboard discharges along the river. In addition, the program has successfully assisted one community with a sewer extension project. Public education materials related to water quality have been distributed to the seven towns.

Reducing Marine Debris: With grant funds from the Gulf of Maine Association, PADRE initiated a project to reduce the amount of polypropylene material entering the marine environment from fishermen and boaters. Funds will be used to install collection containers for polypropylene products at five marine facilities in the estuary and display boards and handbills on recycling will be available at all marine facilities.

Coordinating Land Use Management: Coordinated land use ordinance development among the river communities is a priority. PADRE, with assistance from a University of Vermont law school intern, is

working with three estuary towns to develop a detailed strategy aimed at protecting the headwaters of the estuary. It will include recommendations to improve ordinances that can affect the bay (i.e., construction standards, setbacks, densities).

Improving Municipal Cooperation and Understanding: PADRE circulates a newsletter to estuary towns and sponsors an annual planning forum for municipal officials. Press releases tracking water quality issues and the project's activities are distributed to local newspapers on a regular basis.

The Maine Coastal Program views the Damariscotta River Estuary Project as a success. Outcomes of planning projects are often a matter of good fortune—finding committed volunteers in the communities who believe in the mission of the project and avoidance of divisive controversy. In this case, success was made more likely by choosing a relatively small area (seven towns), actively encouraging involvement by town officials at the very beginning of the project, identifying and involving other key interested parties in the community, and allowing the planning process to be locally-driven and as much fun as possible.

For more information contact:
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Hawaii's Coral Reef Initiative

Coral reefs are among Hawaii's most valuable resources. State economists in 1992 estimated revenues from ocean recreation in excess of $745 million and noted that reefs are central to the recreation industry. They are of further value to the state for the protection they provide the coastline from wave and storm damage, are a major source of sand for Hawaii's beautiful beaches, and provide habitat to numerous nearshore fisheries. Estimates in 1997 of these fisheries place their value at $20 million annually.

Though coral reefs are a valuable resource, the state has not conducted a systematic assessment of the health of the coral reefs nor does it have a statewide monitoring program. The Hawaii Coral Reef Initiative is attempting to provide this information as well as education and outreach to the people of Hawaii.

Coral Reef Initiative

The Hawaii Coral Reef Initiative is part of a larger program begun in 1994. The coastal program managers of the American Flag Pacific Islands (Guam, Hawaii, Commonwealth of the Northern Marinas Islands, and American Samoa) met with federal officials to develop a coral reef initiative in each

jurisdiction.

Early in the process, it was clear that there would be little federal funding available to underwrite the program. The Hawaii coastal management program provided a grant of $13,500 for logistical support, but the initiative has relied primarily on donated time and funds. Having no ties to federal government and minimal ties to state government appears to be somewhat advantageous, as it helped secure support from elements of the community that are traditionally suspicious of government agencies.

Coral Reef Assessment

The first task to be undertaken in this initiative was an assessment of Hawaiian coral reefs. A working group, composed of representatives from the University of Hawaii, the coastal management program, and the Sierra Club formed to expedite this initial assessment. A group of local coral reef scientists made up an advisory panel to assist the working group in identifying key informants and to authenticate data received. Coral reef scientists gathered as a group to work towards assessing the condition of the state's coral reefs using a modified version of the Hawaii Environmental Risk Ranking methodology.

Coral reef ecosystems are unique. Consequently, scientists convened a series of meetings to bring together data related to specific islands. A 1995 meeting reviewed the reefs around Oahu, in 1997 a meeting discussed the reefs of Kahoolawe, Kauai, Maui, and Lanai, and a future meeting will cover the islands of Hawaii and Molokai.

In addition to gathering information from scientists, the working group began a series of meetings with the local, non-scientific marine community, including fishers, divers, and native Hawaiians. The working group asked this community to identify the reef sites important to them for recreational, cultural, and economic reasons. Participants also listed those sites that they felt were stressed. Their perceived threats include over-fishing, anchor damage, boat fuel spills, sedimentation, coastal construction, and pesticides. Community and scientist perceptions will be compared to determine where opinions diverge. Where perceptions of problems diverge, the working group will seek to determine if the area is in decline.

Coral Reef Monitoring

As the assessment nears completion, a monitoring program of those highly valued coral reef sites identified in the assessment will begin. Previous monitoring efforts have been catalogued by volunteers. Later this year a workshop will bring together university scientists, consultants, and agency personnel charged with managing water quality and marine resources to develop a coordinated approach to reef monitoring. This group will also define roles for volunteers interested in long-term monitoring.

Education and Outreach

A third role of the initiative is education and outreach. The working group developed a Comprehensive Involvement and Outreach Plan in conjunction with 1997's International Year of the Reef. The goal is to

broadly disseminate findings of the assessment phase of the initiative. An additional role is to coordinate efforts to incorporate findings into marine education and to respond to information requests from the volunteers involved in the effort.

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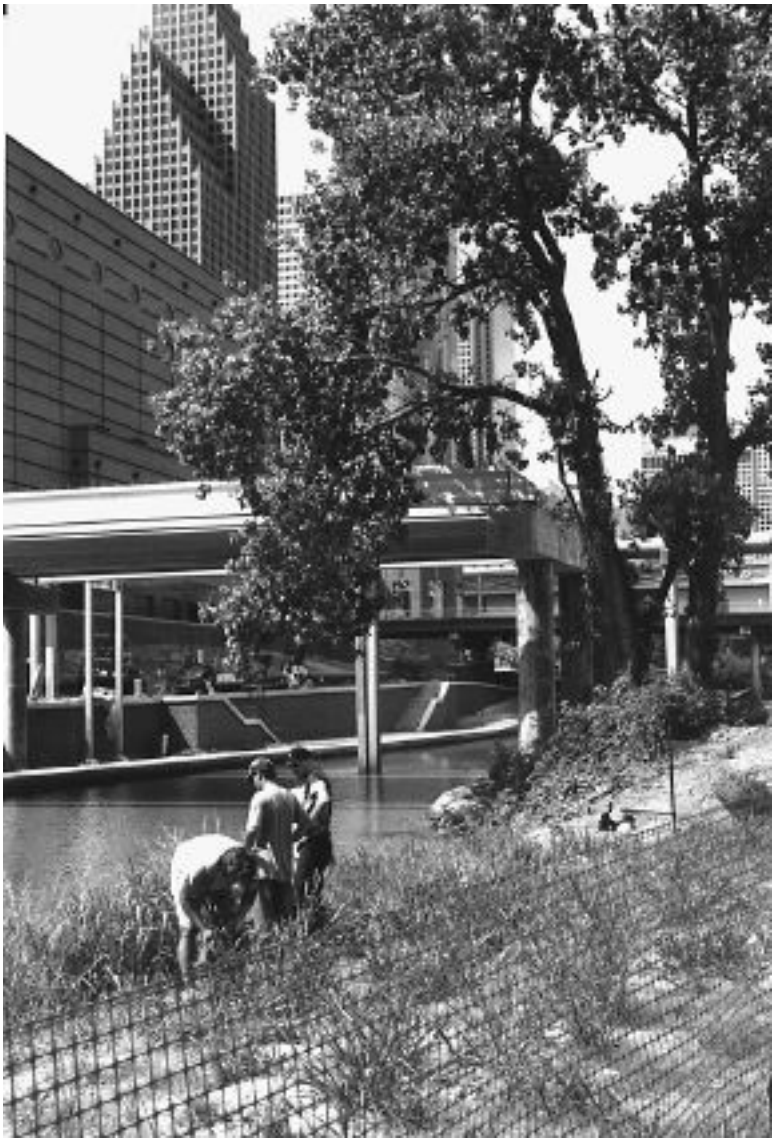
Coastlines 7.3 Summer Issue

Planting Green Links in Our Urban Areas

Cities embody the essential ingredients for creating and sustaining the social, economic, and technological centers that are pivotal to our existence. They are the heart of nearly all human activity and are growing and multiplying. Previously rural areas are now being urbanized. Current urban areas are sprawling. These urban areas, although tenacious and productive, do have social, economic, and environmental vulnerabilities and dilemmas. Many urban areas, big and small, face a battle with stormwater runoff, the transporter of nonpoint source pollution. When it rains, water runs off our yards, driveways, streets, and parking lots carrying excess nutrients, pesticides, and sediment from our lawns and hydrocarbons from leaking cars. While carrying these pollutants from the land to our streams, rivers, and estuaries, stormwater also erodes the soils which support the banks of those waterways.



Nonpoint source pollution is not only a major contributor to degraded water quality in our urban areas, but is also a difficult problem to handle. Because it originates from a multitude of sources, reducing the impacts to our local waterways must be a task tackled by everyone. The Galveston Bay Watershed area has come together to demonstrate that partnerships and working together are beneficial for all citizens. In downtown Houston, ecological corridors or green links are being created and are making a difference.

The Harris County Soil and Water Conservation District, Natural Resources Conservation Service, Harris County Flood Control District, Buffalo Bayou Partnership, Houston AmeriCorps, Brown and Root, and the Galveston Bay Estuary Program (part of the National Estuary Program) joined forces to attack the problem of balancing urbanization with nature. It was demonstrated that simple things can make a difference when several native grasses and plants were planted along the banks of Buffalo Bayou in downtown Houston. These plants and grasses not only stabilize the eroding banks, but also act as filter strips for stormwater draining to the bayou. The landscape which resulted from this partnership provides an aesthetic environment through the creation of native habitat within the shadow of the Houston skyline, while also acting as a buffer to nonpoint source pollutants entering the local waterway.

This one-acre restoration, located in the heart of downtown Houston, is part of a plan to develop the banks with hike and bike trails along many of the Houston area bayous while providing a pleasing environment and a mechanism for controlling streambank erosion. This heart-of-Houston project proves that cities, although growing and unlikely to decrease the amounts of impervious cover, can still be green and enhance the quality of our urban ecology.

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Coastlines 7.3 Summer Issue

Farmland Protection in the Coastal Zone

The Importance of Incorporating Farmland Protection Policies into Successful Coastal Zone Management

Across the country, prime and unique farmland is disappearing into development and other non-agricultural uses. Much of this prime farmland lies within the coastal zone and is situated in ecologically fragile and high development areas. Despite the daunting economic and development pressures, resource managers nationwide are taking proactive efforts to conserve coastal farmland. Initially, states had taken the lead in protecting America's most valuable agricultural lands, but recently Congress has bolstered their efforts by enacting the *Farmland Protection Program* (FPP). While farmland measures can, and increasingly will, become part of a typical coastal management program, farmland protection programs are gaining attention and support nationwide on their own merits. These dual efforts offer the opportunity for a holistic approach to growth management: one which works to the advantage of both farmland protection advocates as well as coastal zone managers. As the pool for available funds shrink, serving two objectives with the same funding dollar could be a good selling point.

Demographics of Coastal Farmland

It would be difficult, and undesirable, to imagine any coastal area in the U.S. without scenes of working farms. Some of the nation's most productive soils are in the coastal zone, in many cases directly along the shore. The scope of farmland in the coastal zone, however, has not been well documented. (We do know that nationally, since 1960, an average of 1.5 million acres of farmland per year has been converted to other uses.) While coastal areas have much to lose with continued conversion of farmland, conversely, these same areas also receive the greatest benefits when farmland protection programs are successfully implemented.

Benefits of Farmland in the Coastal Zone

Farmland enhances the environmental quality of the coastal zone in numerous ways:

- Coastal farmland provides uncluttered landscapes with great scenic views and acts as a buffer against encroaching development and increasing population pressures.

- Coastal farmland is among the nation's most productive and, in order to ensure a stable domestic food supply for the U.S., it is in the national interest to preserve these lands. In addition, certain types of specialty produce require the specific soil conditions and microclimates found in coastal areas.

- Productive farmland contributes more to local tax coffers than it requires in services while, in developed areas, the "costs of community services" often outweigh the financial benefits. Additionally, agriculture can provide rural communities with an economic base necessary for their survival.

- A certain "critical mass" of agricultural production is needed in a region in order for support industries to survive. Eventually, the loss of farmland can reach a point where the agricultural economy within an entire region collapses, taking with it support services as well as the remaining farming community and culture.

- Farmland can be habitat for certain wildlife species, such as the endangered Florida Panther, that would find it impossible to survive in an urbanized environment.

Not all that surrounds agriculture on the coastal zone is necessarily beneficial. Agricultural activities can be a significant source of nonpoint source pollution a primary cause of coastal water degradation. While there are negatives associated with agriculture, those impacts are generally more easily corrected (and at a lower cost) than those associated with development.

Emerging Trends

Economic pressures are what typically drive farms to non-agricultural use. Farms located in metropolitan-influenced counties (where, incidentally, most of the nation's crops are produced) are worth many times more than what they once were. Farmers are finding it increasingly difficult to resist the temptation to sell to high-bidding developers. Estate taxes also encourage the dissolution and conversion of farmland. These pressures are only increased on prime locations in the coastal zone.

Several emerging nationwide trends are making it easier for farmers to thrive on smaller parcels of farmland. Specialty crops are commanding higher prices at the market, due to an increase in demand for organic produce and ethnic foods. (Many of these specialty crops, such as Brussels sprouts or sour cherries, need the microclimate found in particular coastal areas to thrive.) A second aspect has been a boom in farmers' markets which reduce transport costs.

Such factors serve to counter the underlying causes of coastal farmland development. Congressional actions, such as the passage of the Farmland Protection Program and efforts to repeal the estate tax, will provide additional options.

The *Farmland Protection Program*

The *Farmland Protection Program* became law on April 4, 1996 as Section 388 of the *Federal Agriculture Improvement and Reform Act of 1996* (commonly referred to as the 1996 Farm Bill). This program enables the Secretary of Agriculture to purchase conservation easements or other interests in highly erodible or other unique farmlands in order to limit non-agricultural uses of the land. Funds from this program leverage state and local government moneys to purchase development rights (PDRs) also known as conservation easements.

In this process, the government will pay a farmer for the rights to develop his or her land with the understanding that these rights will never be exercised and that the land will remain agricultural. The PDR price is the difference between the fair market value of the land without the easement and the fair market value of the land with the attached conservation easement. PDRs have become extremely popular because they are voluntary for the farmers and utilize market forces to accomplish conservation goals. The farmer retains all other rights and generally continues farming. Depending on the location of the property, such purchases can be quite expensive. Hence the need for programs such as the FPP which can provide needed cost-sharing.

Conclusion

Protecting coastal farmland is, in the long term, a wise endeavor for both the health of the coast and for the sake of farmland preservation. Coastal managers should capitalize on programs enacted to address farmland loss and, as most coastal managers are well aware, only through a holistic approach to growth management can developmental impacts be mitigated. Such an approach will, of necessity, include farmland management and the Farmland Protection Program can provide one major tool to accomplish those ends.

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Setting the Stage for Salt Marsh Restoration in Narragansett Bay

Investing in habitat restoration for the sake of restoration, not as part of a mitigation or enforcement package has become a popular theme in Rhode Island as its citizens recognize the impact that over 200 years of settlement has had on the state's coastal wetlands. The Narragansett Bay Estuary Program has initiated a pilot project establishing reference marsh sites and working with communities to develop a ranking process for determining the "restoration potential" of coastal marshes. This project is also part of an concerted effort by the Narragansett Bay Estuary Program to provide the technical and planning tools required for developing bay-wide habitat restoration plans.

Reference marshes will be used to determine the factors that characterize "reasonably healthy marshes" in Narragansett Bay. Study sites will be located in three areas to account for salinity and land use gradients present in the bay. By returning to these marshes over time, the parameters of normal fluctuations in the ecosystems will be identified. A long-term database will illuminate broad trends relating to climatic change or regional phenomena, such as declines in a given fish species.

Specific, measurable goals for future restoration projects can be set by using data from reference sites. An assessment of the sites will include mapping of vegetation zones, mosquito production/control features, and permanent sample plots using global positioning (GPS) and geographic information (GIS) systems. In addition, reference site vegetation, fish, and bird populations will be measured for species composition, percent cover, biomass, and other pertinent characteristics. Budget and staff constraints have limited the survey to plants and vertebrates, but the initial gathering of baseline data should encourage other researchers to conduct complementary research at these sites.

The second portion of the salt marsh restoration project involves assisting local communities in ranking coastal wetlands for "restoration potential". The initial process is to re-examine qualitative evaluations conducted by volunteers from Save The Bay, Inc. (a major RI advocacy group and a partner in this effort). Save The Bay volunteers and staff evaluated approximately 1,885 of the estimated 3,100 acres of existing salt marsh in Narragansett Bay. Their conclusions indicate 62% (by area) of the evaluated marshlands are affected by invasive species (typified by extensive coverage of *Phragmites*), 70% experience tidal restrictions, 32% exhibit severely restricted flows, 56% were impacted by ditching, and 63% by filling.

While these factors indicate the relative damage to a marsh, a slightly different approach is needed to determine restoration potential. In addition to damages, it is necessary to evaluate site history, nature and degree of disturbance, connectivity to other natural habitats, presence/absence of rare species, surrounding land uses, available finances, and other ecological and social factors. By working with communities and other partners, the program hopes to build a consensus plan for ranking restoration sites.

This particular pilot project dovetails with a number of other efforts being carried out by the Narragansett Bay Estuary Program and other agencies, including the US Fish and Wildlife Service, Army Corps of Engineers, the USDA Natural Resource Conservation Service, and local land trusts.

The initial steps outlined above have been welcomed enthusiastically by academic researchers and by members of coastal communities. The use of technical tools, such as aerial photographic and GIS analysis, as well as the support from numerous project partners, will provide a means for optimizing future restoration opportunities and ensuring high-quality results.

Because habitat restoration has become so popular, it has become important to establish a common understanding of philosophical values held by restoration professionals. The following themes reoccur in scientific literature:

- Preservation is the critical first step toward restoration, or "An ounce of prevention is worth a pound of cure."

- Do not let "restoration" efforts make an area worse off than it was before.

- A site's history is important in determining restoration goals because it illuminates the long-term driving functions such as climate, hydrology, and natural disturbance regimes experienced by that site.

- Recognize that restoration goals are constrained by current circumstances (ownership, surrounding landuses, changes in climate, etc.).

- Proceed with humility and caution. A 1996 article by Hobbes and Norton noted "We are still a long way from being able to predict the outcome of adding species in particular combinations and orders." It is best to build contingency plans into restoration budgets for the times when things go wrong and they will go wrong. If your restoration efforts fail, you cannot simply walk away.

- Pre- and post-project monitoring is essential to project success. Leading researchers indicate a monitoring plan should cover a minimum of 5 years to assess whether basic ecosystem attributes meet predetermined goals.

- Restored habitats should be self-sustaining and natural disturbance events such as hurricanes and 100-year storm events should be taken into account.

While many or all of these themes may seem to be simply common sense, they are often times overlooked. It is vitally important that they be discussed and consensus reached on these issues prior to initiating any restoration projects.

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Coquina BayWalk at Leffis Key

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

Characteristics:

- The Sarasota Bay watershed comprises about 150 square miles of land and 52 square miles of water surface.
- Nearly 500,000 people live in the Sarasota Bay area.
- Land use in the watershed is 42 percent residential, 10 percent commercial, 8 percent agricultural, and 40 percent open space.

The Problem:

- Wetland loss, including encroachment of non-native plant species, is one of the major problems threatening Sarasota Bay.
- Since 1950, the Sarasota Bay watershed has lost 39% of its intertidal habitat. Freshwater and non-forested wetlands have also declined dramatically, more than 45% in the past 20 years.
- Only 20 percent of the shoreline remains in its natural state.
- Non-native plants have invaded 66% of mangrove wetlands in the bay.

The Project:

The Coquina BayWalk at Leffis Key Restoration Project was designed to create native habitat on 30 acres of public land. Project objectives also included improving water quality, increasing public access to the bay, and providing opportunities for public education and participation.

Production to Sarasota Bay

Sarasota Bay is located on Florida's fast-growing southwest coast. Although bay resources have been significantly affected by habitat modifications over the past 50 years, Sarasota Bay still supports an abundance of aquatic life.

Rapid residential development has caused major changes in the bay's ecosystem. Natural shorelines have been replaced by seawalls, bulkheads, and riprap. Large-scale dredge and fill projects, completed during the 1950s, dramatically altered the bay's shoreline and bottom habitat.

The Sarasota Bay National Estuary Program has focused habitat restoration efforts on bettering both intertidal and bottom habitats through improvements in water quality, restoration of wetlands, and creation of artificial reefs for juvenile fish. The Leffis Key project is one of many restoration projects completed in the bay to restore lost wetland habitat. And many more are planned or under construction.

Overview of the Coquina BayWalk at Leffis Key

Leffis Key is a 30-acre site, owned by Manatee County, located along the Sarasota Bay shoreline on the southeast tip of Anna Maria Island, just north of Longboat Pass. The site is directly adjacent to Coquina Beach. It is estimated that more than two million people visit Coquina Beach annually, making it one of the most heavily utilized recreational areas in the Manatee-Sarasota county region.

The disposal of material from the dredging of the Intracoastal Waterway during the 1950s covered a small mangrove island and created the peninsula known as Leffis Key. The site had become vegetated by non-native plant species such as Australian pine and Brazilian pepper. Seagrass beds were also covered during dredged material disposal in the 1950s.

Since the site was in public ownership and was heavily modified, it became a prime candidate for restoration.

Project Objectives

The objectives of the Coquina BayWalk project were to:

- restore one of many dredged material disposal sites in Sarasota Bay as a model for other projects;
- increase the area of functional mangrove, wetland, and shallow water habitats;
- improve bay circulation;
- increase levels of managed access to the northern sections of Sarasota Bay and its resources;
- increase available spawning and juvenile fish habitat; and
- increase bay educational and interpretive facilities available to both local residents and tourists.

Implementing the Project

The Sarasota Bay National Estuary Program drafted the initial proposal for funding in concert with the Florida Department of Environmental Protection and Manatee County. The project design was initially developed by the staff members of the Florida Department of Environmental Protection and reviewed and influenced by the Sarasota Bay National Estuary Program Technical Advisory Committee. Manatee County Public Works staff members also participated in surveying, topographic mapping, and final design of the site, as well as constructing the project.

During construction, the first step was to remove exotic species. This was followed by excavation of intertidal pools and tidal inlets and construction of boardwalks and walkways for public access.

The overall plan was to recreate the island through excavation of a channel through the peninsula, thus re-establishing tidal circulation around the area. A footbridge was installed to provide visitor access to the BayWalk. Fill material from the key and adjacent north and south shorelines was used to create dunes to serve as visual and sound barriers to road traffic. Volunteers planted more than 50,000 native saltmarsh, intertidal, and upland plants and trees. Interpretive signage was installed, and an educational brochure was produced to inform visitors to the site about the ecological importance and interdependence of the mangrove forest and other surrounding habitats.

The site is monitored regularly for plant survival. Maintenance is provided by the Manatee County Department of Recreation and Parks.

Success Stories

The project re-established over 30 acres of wetland habitat previously disrupted by human activities. As such, it becomes a significant part of the larger program to restore intertidal and freshwater wetlands in Sarasota Bay.

The project has received positive media reviews. It won an Environmental Excellence Award from the Florida Marine Research Institute, was featured in Good Housekeeping magazine, and is now included in the Florida Wildlife Viewing Guide.

The project made it possible to draw together a wide range of active participants and funding sources directed toward a common goal. These included Manatee County, Florida Department of Environmental Protection, the City of Bradenton Beach, Florida Sea Grant, and the US Environmental Protection Agency. The Sarasota Bay National Estuary Program provided technical assistance and citizen input to the project. The US Environmental Protection Agency provided $75,000 as Early Action Demonstration Project Funds. Manatee County provided significant in-kind services including design, site preparation, and excavation, as well as $9,000 from the county pollution-recovery account. The Florida Department of Environmental Protection provided approximately $250,000 and the Florida Department of Natural Resources provided native plants. Overall cost of the Coquina BayWalk project totaled approximately $350,000.

Lessons Learned

The Sarasota Bay National Estuary Program has identified areas throughout the region which are suitable for wetland restoration and is working hard to meet goals established as part of their planning process.

Specific lessons include:

- Dredged material disposal areas can be successfully restored into productive habitats with recreational and educational value.
- Tourists and local residents have been attracted to the site in significant numbers.
- Volunteers are more than willing to participate in planting. They indicate that it is fun and rewarding.

- Restoration efforts are excellent media events.
- Funds are generally available for habitat restoration.

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