

SCIENCE SERVING THE URBAN COAST

More than half of the U.S. population is concentrated in coastal areas accounting for only 10 percent of the nation's land mass. Economic growth since World War II has increased the urbanization of coastal areas—with corresponding rises in pollution and environmental degradation.

In an urban setting, a shoreline has significant appeal, shown in the demand for recreational, business and residential developments near the water. Communities and states must decide how to balance economic and environmental values, manage the impacts of runoff and waste disposal, and consider transportation, recreation and commerce needs—all while maintaining the integrity of coastal ecosystems that provide critical habitat and nurseries for countless species. When based on solid scientific data, these crucial decisions can produce positive results for the nation's economy and environment.

Resolving urban dilemmas

From gene probes that track harmful algae to satellite technology that monitors coastal changes, Sea Grant has demonstrated expertise in sound-science solutions to difficult local and national coastal policy decisions.

A national network of 30 university-based programs, Sea Grant combines research and outreach to help residents, business leaders and government officials cope with urban issues in coastal settings.

Sea Grant outreach facilitates the rapid transfer of research and new technologies valuable to coastal communities. For example, sea level rise models

developed by Sea Grant for low-lying coastal communities in Ventura County, Calif., form the basis for local land-use plans. The same models are used in coastal Maine to assess sea rise risks and develop appropriate mitigation and planning strategies.



As an honest broker of information, Sea Grant facilitates open discussion of coastal issues—defining immediate and potential problems, assessing risks and helping develop action plans. Sea Grant has identified several crucial urban-coast issues—aging infrastructure, loss and changes in ocean-related industries, potable water technology and transportation needs—but three areas require immediate attention.

Reducing nonpoint-source pollution

Urban pollutants degrade watersheds nationwide, overloading bays and coastal waters with contaminants and nutrients for which sources are difficult to identify and control.

In Hawaii, a Sea Grant project that traced the flux of toxic heavy metals in nearshore waters prompted the U.S. Geological Survey to evaluate the effect of land use on water quality. In Louisiana, Sea Grant is working with state officials to remove heavy metals from runoff pouring into estuaries from highway bridges and numerous causeways.

In a comprehensive study of nonpoint-source pollution in Southern California's Santa Monica Bay, Sea Grant researchers mapped the stormwater plume, identifying toxic elements posing threats to human and marine life. Los Angeles County and city officials and stormwater managers are using this information to reduce the effects of urban runoff on public beaches and marine ecosystems.

Sea Grant uses scientific information to encourage cooperation within watersheds among business/industry leaders, local government officials and landowners, enabling them to collaborate on comprehensive strategies to reduce runoff.

Immediate needs vary, but all urban watersheds should be mapped to identify sources of biological and chemical



contaminants. Specific pollutants—metals, pathogens and nutrients—in urban runoff must be tracked. The role of wetlands and other natural means to reduce runoff's effects on streams, bays and nearshore waters must be explored. Models that can assess the impacts and effectiveness of proposed mitigation efforts need to be developed.

Enhancing port and harbor operations

The vitality of American commerce depends on the nation's 150 deepwater commercial seaports and disparate harbors and marinas, which struggle with environmental quality issues amid pressures for expanded service.

Ports and local harbors often dredge to deepen channels, improve navigation and increase capacity, but such expansions may threaten adjacent fragile wetlands or compete with fishing, development and other community needs. While clean sediments may be beneficial for beach nourishment and coastal development, the dredging and disposal of sediments containing toxic metals, PCBs and petroleum products poses a serious challenge.

Sea Grant is a leader in assessing the risks of contaminants in dredged materials and identifying disposal options. For example, Sea Grant experts served on a Boston Harbor technical advisory team that recommended burying sediments in underwater trenches, a process now used by the U.S. Army Corps of Engineers in projects nationwide.

Aquatic nuisance species (ANS) are transported from one geographic region to another when ships take on ballast water in one port and discharge it in another—along with a host of often microscopic plant and

animal hitchhikers. Sea Grant research and outreach efforts are developing education and remediation strategies for this worldwide problem, often in regional projects involving several states and Canada and Mexico. Sea Grant developed an ANS risk-assessment guide for seaport managers that is widely used.

Many of the nation's 500 shallow and deepwater ports provide diverse—and sometimes incompatible—services, from handling cargo shipments to accommodating small-craft and tourism vessels. Sea Grant experts have worked for 30 years with such groups as the Pacific Coast Congress of Harbormasters and Port Managers to address operation and management issues, and with marina associations, coastal businesses and recreational interests to foster environmentally sustainable marinas.

Port managers throughout the nation call upon Sea Grant for help in improving infrastructure while preserving coastal resources. Sea Grant scientists evaluate marine ecology and water quality in major urban ports to assess cumulative effects. Sea Grant has hired additional extension professionals to assist industry and government officials on environmental, navigation and economic issues.

Managing coastal resources

Sea Grant brings diverse and sometimes divergent interests to the table to tackle critical coastal planning issues. In Connecticut, regional water officials used Sea Grant's satellite-based analysis to identify lands to be acquired or otherwise restricted to low-



intensity uses—thus reducing runoff while avoiding the expense of new filtration systems. In North Carolina's fast-growing coastal counties, a series of Sea Grant guides commissioned by state officials is teaching developers, landowners and local officials the principles of shoreline erosion, water quality and coastal planning.

Coastal policymakers and resource managers nationwide face increasing conflicts over existing and proposed uses of limited coastal space and resources, and they need accurate, unbiased scientific data to help them prioritize the allocation of these scarce resources.

Moving forward

Sea Grant leads the nation in solving problems and recognizing opportunities along our urban coasts. Sea Grant's federal-state partnership combines multidisciplinary scientific research with public education and outreach, which endows it with a unique capability to provide policymakers, managers, users and the public with understandable scientific explanations of coastal processes and the value and risks involved in coastal activities and change.

These efforts address significant threats to extremely valuable coastal resources in urban areas—creating new knowledge that is shared and applied along waterfronts nationwide.

Sea Grant

Mission

The mission of the Urban Coasts Theme Team is to identify the most pressing research needs related to urban coasts along U.S. marine and Great Lakes waters and to develop a research and outreach agenda that prioritizes and addresses those needs.

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