COASTAL ZONE MANAGEMENT

ADVANCING CRITICAL SOLUTIONS TO PROTECT COASTAL COMMUNITIES

Report prepared by: Bari Greenfeld, Coastal States Organization

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The Coastal States Organization represents the nation's coastal states, territories, and commonwealths on ocean, coastal, and Great Lakes issues.

CONTENTS

MESSAGE FROM CSO

Millions of Americans work, play, and live along our nation's beautiful shorelines. But life on the coast can be frequently disrupted by severe storms, earthquakes, chronic flooding, and erosion. In addition, fluctuating water levels pose challenges to communities on the Great Lakes. These hazards cause major economic harm to businesses, natural areas, and public infrastructure. America is searching for better ways to protect coasts, but there is no "one size fits all" solution. Each coastal community has its own physical, social, legal, and political characteristics, so solutions need to be tailored to their unique conditions. However, the resources and expertise required for this work are rarely available at the local level.

Luckily, we have an effective way to equip communities with those resources and expertise: the proven and successful Coastal Zone Management Act (CZMA). We urge Congress and the Administration to take greater advantage of this valuable tool.

The CZMA is a federal law with bipartisan support that empowers states to achieve national coastal goals at the local scale. The CZMA puts states in the driver's seat to decide how to manage their own coasts, while partnering with NOAA's Office for Coastal Management and coordinating with other federal agencies for information, training, and strategic guidance. It is a way to leverage partnerships, which are critical to building resilient coastal communities.

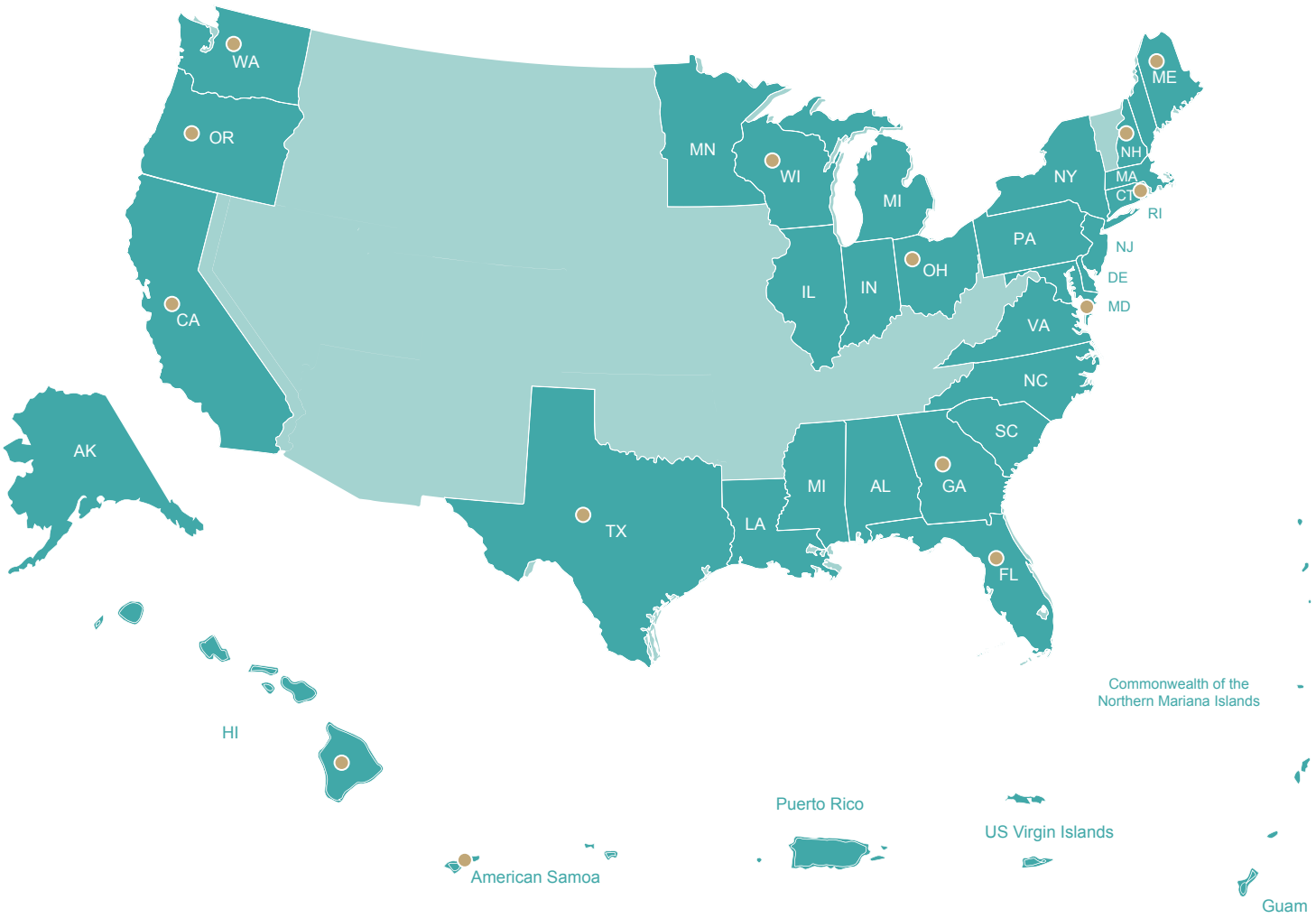
The state programs established under the CZMA help communities address their coastal threats. This report illustrates the CZMA's successful approach with 14 stories from communities across the country. These examples are just a small selection—our website at www.coastalstates.org contains many more. Strong statewide coastal management creates resilient shorelines. The CZMA generates that strength. Thus, greater investment in this program will have national benefits. The CZMA must be central to America's strategy for protecting coastal communities.

Mary Munson
Executive Director

Michael Friis
Chair

COASTAL STATES AND TERRITORIES

States featured in this report are represented below.



- New Hampshire: Coastal Adaptation Work Group
- Washington: Coastal Hazards Resilience Network
- Maine: Coastal Hazards Resiliency Tools
- Maryland: CoastSmart Communities
- Wisconsin: Gikinoo'wizhiwe Onji Waaban Discovery Center
- American Samoa: Fautasi Coastal Challenge
- California: Relocation of Highway 1 in San Luis Obispo County
- Texas: Barrier Island Restoration
- Oregon: Land Use Guide for Tsunami Preparedness
- Hawaii: High-Wind Building Codes
- Florida: Post-Disaster Redevelopment Planning Guide
- Georgia: Disaster Recovery and Redevelopment Plan
- Connecticut: Sentinel Monitoring in Long Island Sound
- Ohio: Coastal Design Manual

COASTAL MANAGEMENT PROGRAMS
FOSTER LOCAL RESILIENCE TO COASTAL HAZARDS

Coastal Management Programs are Experienced and Effective

For more than 40 years, the Coastal Zone Management Act has enabled states to address some of the nation's most pressing coastal issues. This innovative federal and state partnership established Coastal Management Programs in 34 states and territories, including the Great Lakes. Coastal Management Programs ensure responsible use of coastal resources by encouraging a balance of economic development and environmental conservation. They achieve this by working across programs with different but complementary missions, such as land use planning, emergency management, and habitat protection. Coastal Management Programs help local communities advance specific priorities by providing technical, financial, and planning assistance.

By 2025, nearly 75% of the U.S. population—over 250 million people—will live within 50 miles of the coast. Coastal communities are vibrant and productive, supporting approximately 51 million jobs and $2.8 trillion in wages. However, their economies and landscapes are threatened by hazards including severe storms, earthquakes, tsunamis, loss of land due to coastal erosion, and chronic flooding from rising sea levels. Using their proven resources and experience, Coastal Management Programs are essential to help communities meet these challenges and build resilience—the ability to withstand a natural disaster and bounce back even stronger.

Coastal Management Programs are Leaders and Collaborators

Coastal Management Programs around the country lead collaborative partnerships to build local resilience. They combine forces with other programs from the National Oceanic and Atmospheric Administration (NOAA), including the National Estuarine Research Reserves, Integrated Ocean Observing System, National Marine Sanctuaries, Sea Grant College Program and Digital Coast. They regularly engage with federal agencies, such as the U.S. Army Corps of Engineers and Federal Emergency Management Agency. They are a valued presence in coastal communities, connecting with local governments, regional planners, academic institutions, non-profit organizations, businesses, and private citizens. With strong relationships, Coastal Management Programs and their partners maximize ideas, expertise, and funding. Coastal Management Programs advance community resilience because they align the efforts of federal, state, and local initiatives. In this role, Coastal Management Programs reduce duplication among projects, generate successful grant proposals, and nurture trust with community members.

Coastal Management Programs Meet the Needs of Local Communities

Coastal Management Programs are on the ground to support communities at every step along the path to resilience. They have the flexibility to operate across multiple levels of government, supporting projects at the state, county, and local scales. They are uniquely positioned to link cutting-edge federal data and tools with community programs that are best suited to take action. Communities rely on Coastal Management Programs to connect the dots among resources that allow them to address coastal hazards.

Coastal Management Programs are valuable and effective because they assist communities with a wide range of solutions. They directly fund local resilience activities and inform plans to prepare, respond, and recover from natural disasters. They offer technical expertise to improve coastal infrastructure, restore habitat, and monitor and preserve vital ecosystems. They conduct robust training programs and outreach events that honor and respect local cultures. They deliver sound science and practical tools, while helping local planners and decision-makers apply that information to meet a community's specific needs. With insight and creativity, Coastal Management Programs empower communities to invest in a resilient coast today, leading to less damage from environmental threats tomorrow.

NEW HAMPSHIRE'S COASTAL ADAPTATION WORK GROUP

The New Hampshire Coastal Program cultivated a successful regional partnership that supports local communities through trainings, technical assistance, and leveraging funds.

During a "king tide" in Portsmouth, New Hampshire, a restaurant parking lot turns into a pond. Farther south in the town of Hampton, some residents are forced to move cars to higher ground as the ocean seeps into their yards and driveways. King tides are extra-high tides that occur when the moon and sun align and combine their gravitational pull. Within reach of these tides are popular historic neighborhoods with homes that once hosted George Washington. While king tides only happen twice a year, they can cause widespread damage due to flooding and erosion. However, extreme flooding like this is being experienced more frequently. Rising sea levels intensify normal high tides, mirroring king tide impacts on a more regular basis. That, combined with more severe winter storms, threatens New Hampshire's vibrant coastal communities.

In 2009, the New Hampshire Department of Environmental Services Coastal Program (NHCP), Great Bay National Estuarine Research Reserve, New Hampshire Sea Grant, Piscataqua Region Estuaries Partnership, and the Natural Resources Outreach Coalition came together to address a specific need. They held a workshop on preparing coastal New Hampshire for risks and hazards related to storm surge and sea-level rise. This meeting catalyzed the New Hampshire Coastal Adaptation Workgroup (NHCAW), which has leveraged more than $5 million in grant funds and hosted 16 workshops attended by over 700 participants. "The New Hampshire Coastal Program supports the NHCAW because it's hands down the best collaborative entity I've ever worked with in my 16 years of government service," said Program Manager Steve Couture. NHCAW is now made up of 21 members, including the City of Portsmouth, the Towns of Newington and Seabrook, Regional Planning Commissions, the University of New Hampshire, engineering firms, and the investment firm Pax World Management. "It just keeps building and building and building," said Sherry Godlewski, NHCAW co-chair.

The NHCP has been pivotal to the growth and success of NHCAW. In 2010, the NHCP began providing small grants to enable more communities to participate. Using priorities identified through NHCAW activities, NHCP supplied dedicated resilience planning and technical assistance to the small towns of Newfields and Rye. In 2013, NHCP leadership resulted in a $200,000 grant for NHCAW to establish a web-based coastal data viewer, marsh sediment monitoring, and workshops to engage local businesses. Another group of NHCAW partners, coordinated by NHCP, was awarded a grant in 2015 to conduct

NHCP Coastal Resilience Specialist Kirsten Howard facilitates a workshop discussion.

10 local vulnerability assessments. They will consider risks to community assets like critical infrastructure, transportation networks, and natural and cultural resources.

In addition to education, scientific advancement, and direct assistance to communities, NHCAW coordinates the region's many ongoing projects so that people know where to go with questions about coastal resilience. With veteran practitioners leading the group, resource-tapped local officials trust them and are willing to give some of their limited time to attend workshops and partner on small grant projects and planning efforts. Through discourse with member organizations, the group is able to build on each other's projects. NHCAW's continued effectiveness results from the fact that all participants are dedicated to open communication and a shared vision for creating more resilient coastal communities.

WASHINGTON'S COASTAL HAZARDS RESILIENCE NETWORK

The Washington Coastal Program developed a strong regional partnership that supports vulnerable communities by advising local planners and connecting them to tools for disaster response and recovery.

Washaway Beach lives up to its name. On the edge of a misty bay in southwest Washington, Washaway Beach residents experience the most rapid erosion on the U.S. Pacific coast. For the past century, the shoreline has eroded an average of 100 feet per year. In recent decades, erosion has destroyed over 20 homes, other private property, and part of the Willapa Bay Wildlife Refuge. Farther north in Ocean Shores, severe winter storms are eating away a peninsula protected by 100-year-old jetties. Despite repeated emergency repairs, houses and public facilities continue to sustain damage. All along the coast of Washington, which is home to 4.6 million people, hazards such as erosion, storm surge, and flooding affect both the built and natural environment. The impact of coastal hazards is expected to grow with sea-level rise, threatening critical systems that support Washington's economy and well-being.

Bluff erosion destroys a house on Washaway Beach.

Washington has a rich history of progressive policies that promote balanced shoreline management. However, the state's diverse programs were not optimized to help local planners develop long-term strategies for coastal hazards. Recognizing the need for better coordination among the state's coastal practitioners, Washington's Coastal Management Program and Washington Sea Grant took initiative through a NOAA CRest Grant to develop the Coastal Hazards Resilience Network (Network). The Washington Coastal Program and Washington Sea Grant have worked in partnership since 2013, developing the Network to focus on Washington's critical need for multi-hazard planning, preparedness, response, and recovery. The Network brings together key experts in coastal hazard management for Washington's marine shorelines. This multidisciplinary group now includes over 50 members from state and federal agencies, nonprofit organizations, and academic institutions. Through strong collaboration, they work together to improve regional coordination and make Washington's coastal communities more resilient to natural hazards.

Information sharing is one of the Network's primary functions, advanced through meetings and online resources such as a website, e-mail list, and regularly updated social media platforms. Among the many benefits to members, increased communication has resulted in greater awareness and discussion about existing projects, transfer of technical knowledge, identification of statewide priorities, and partnerships on funding opportunities that leverage expertise and resources. Due to effective leadership, the Network has become an important point of contact for anyone interested in coastal resilience issues. "The Coastal Hazards Resilience Network provides the forum for practitioners to coordinate and collectively improve state programs, strengthening assistance to coastal communities in Washington State," said Bobbak Talebi, Coastal Program Planner and Co-Manager of the Network.

The Network actively supports local communities by collecting and distributing technical information, helping local planners incorporate best management practices, and facilitating greater awareness of coastal hazards. The Coastal Program's role as Network coordinator is critical in this effort to put planning into action. While communities desire to prepare for coastal hazards, they lack the specialized knowledge and financial resources. The Network bridges that gap by helping communities understand their options for shoreline management and obtain the funding to pursue projects. Ocean Shores and North Cove, which contains Washaway Beach, were two of the first communities to receive direct assistance from the Network and are actively on their way to becoming more resilient.

MAINE'S COASTAL HAZARD RESILIENCY TOOLS

The Maine Coastal Program supports municipalities every step of the way, advancing a range of local policy changes that reduce risks to coastal hazards.

During a nor'easter, the sandy beaches of Saco, Maine are pounded by ice-laden waves. Homes and roads are routinely damaged. Critical facilities, such as water and sewage treatment plants, can become impaired. Over the past decade, a sharp rise in sea level has made both winter and summer storms more severe—a trend that is expected to continue. The majority of Maine's population resides in the coastal zone, where thriving ports and idyllic landscapes form the backbone of the economy. In York County alone, 260 businesses representing $41.6 million in wages are vulnerable to coastal flooding and the ensuing property destruction and high insurance costs.

The Maine Coastal Program, armed with good data and techniques for mapping coastal hazards, began searching for the best way to help communities understand their risks from storm surge and sea-level rise. "Being a Home Rule state where communities are responsible for land use planning and zoning, we knew that we had to approach this issue from the ground up in each municipality," said Pete Slovinsky, a marine geologist whose position at the Maine Geological Survey is funded by the Maine Coastal Program. With funding from Section 309 of the CZMA, the Maine Coastal Program and Southern Maine Planning & Development Commission launched the first regional working group on sea-level rise in Saco Bay.

They began a discussion about local strategies to address coastal hazards, and developed a transferable methodology that can be used in coastal communities across the state. The resulting Coastal Hazard Resiliency Tools (CHRT) project provides high quality data on coastal hazards, technical assistance to help municipalities use the data effectively, and funding to support community-driven conversations about building resilience. Through CHRT, communities receive data about flooding and storm surge risks that are at the appropriate scale and tailored to their needs. The Maine Coastal Program team works with local planners, using the data to identify a community's most vulnerable areas. And together, Maine Coastal Program staff and local planners develop strategies to make those areas more resilient to coastal hazards. The process often involves public meetings, where community leaders engage with each other to identify priority issues. To help communities take the next step and update their plans and policies, the Maine Coastal Program provides additional funding through competitive Coastal Community Grants.

Reconstructed homes along the beach in Saco, Maine.

By supporting municipalities every step of the way, CHRT has led to a range of local policy changes that reduce risks to coastal hazards. The solutions include amended comprehensive plans, ordinance changes, and site design improvements. For example, the City of Saco became the first municipality in Maine to require that new or reconstructed buildings elevate their lowest floor by an additional three feet. And the town of Cape Elizabeth amended their Shoreland Zoning Ordinance to ensure that new or reconstructed buildings are set back farther from the high tide line, protecting them from future sea-level rise and storm surge. These changes helped both communities ensure that coastal zone residents are less vulnerable to damage in the years to come. "CHRT created the process of engagement at the municipal level - we like to call it the tree trunk from which many other municipal resiliency efforts have branched out," said Slovinsky. To date, the CHRT team has successfully worked with 39 of Maine's coastal communities.

DIRECTLY FUND COMMUNITY ACTIONS.

MARYLAND'S COASTSMART COMMUNITIES

The Maryland Coastal Program delivers essential data, tools, training, and financial assistance to help local governments prepare for the next big storm.

The residents of Broomes Island, Maryland are no strangers to standing in water. Like many Chesapeake Bay communities, the elevation of Broomes Island is barely seven feet above sea level. A heavy rainstorm is enough to inundate the roads. During Hurricane Isabel in 2003, a nine-foot storm surge destroyed many homes and businesses. The water was so high that a vending machine floated from one side of the island to the other. While the local population is accustomed to periodic flooding, they recognize that severe weather events have become worse and more frequent. However, small communities like Broomes Island are understaffed and often lack the resources to take action on their own.

Recognizing this need, the Chesapeake & Coastal Service (Maryland's Coastal Management Program) launched their CoastSmart Communities program in 2009. CoastSmart Communities provides local governments with the information and resources they need to protect lives, property, public infrastructure, and important coastal habitats. CoastSmart Communities couples direct technical assistance with a competitive grant program that helps communities implement projects to reduce their vulnerability to coastal hazards. Tools such as the Coastal Atlas and Community Scorecard deliver essential coastal mapping data and a template for risk assessment. To help community leaders use the data and assess their risks effectively, Chesapeake & Coastal Service staff conduct regular trainings and workshops. The Coastal Service also provides financial support—the CoastSmart Communities Grant (CCG)—so that local governments can dedicate the time and staff needed to make changes.

To date, the Chesapeake & Coastal Service has provided over $1.5 million to 23 of Maryland's coastal counties, cities, and towns. In 2014, Calvert County used a CCG to develop local flood mitigation plans for Broomes Island and Cove Point, its two most flood-prone communities. With these plans in place, Calvert County was able to leverage additional funding from FEMA's Pre-Disaster Mitigation Grant Program to elevate the most vulnerable homes in both communities. "The Chesapeake & Coastal Service deserves a lot of credit for the success of our communities' flood mitigation efforts," said Tay Harris, Environmental Planner at the Calvert County Department of Community Planning and Building. "Their office has been instrumental in reaching out to us to see what our needs are and how they could best help."

A flooded yard on Broomes Island, Maryland.

On Maryland's Eastern Shore, a CCG helped local planners in Talbot County update their floodplain ordinance to require that new and reconstructed buildings be elevated by an additional two feet. Talbot County also enrolled in the National Flood Insurance Program's Community Rating System, saving each county resident an average of $114 per year on their flood insurance premiums. Urban areas also benefit from the CoastSmart Communities program. In 2013, Baltimore City used a CCG to establish its Disaster Preparedness and Planning Project, a comprehensive program that integrates hazard mitigation planning with floodplain mapping and actions to address sea-level rise. Some of the funding has been used to incorporate resilience measures into Baltimore's existing capital improvement projects.

WISCONSIN'S GIKINOO'WIZHIWE ONJI WAABAN DISCOVERY CENTER

The Wisconsin Coastal Program funded an education program that raises awareness about the impacts of coastal hazards on tribal communities and promotes actions to build resilience.

For hundreds of years, the Lake Superior Ojibwe thrived in the place we call Wisconsin. Over time, the Ojibwe gained special knowledge about the land and water, and the many plants and animals living alongside them. They learned the best way to gather wild rice and collect fish from the lake, passing techniques from generation to generation. These traditional lifeways illustrate a long relationship between the Ojibwe and Lake Superior's natural systems, offering strong insight into how the coastal region is changing. Since 2007, the unprecedented loss of wild rice due to flooding, high temperatures, drought, and disease has disrupted traditional tribal harvests. The impact on tribal resources has been so severe that the Great Lakes Indian Fish and Wildlife Commission cites these extreme conditions, and the increased risk of them in the future, as a threat to Ojibwe treaty rights.

During efforts to raise awareness, the Wisconsin Coastal Management Program (WCMP) and University of Wisconsin-Extension realized that science-only models of environmental education were not resonating with audiences in coastal communities. A new approach was needed to engage people on this issue. Funding from the WCMP enabled federal, state, and tribal partners to develop the Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) "Changing Climate, Changing Culture Initiative," nicknamed G-WOW. G-WOW is a new model of environmental education that links tribal culture with science to prompt actions that mitigate the impacts of extreme conditions. The G-WOW model helps people understand how key plant and animal species—those that support cultural and economic practices important to coastal communities—will be affected by a changing climate. It integrates scientific research with real world evidence of how changing coastal conditions are affecting traditional Ojibwe lifeways and people of all cultures.

In 2010, the WCMP funded the G-WOW Changing Climate, Changing Culture Discovery Center at the Northern Great Lakes Visitor Center in Ashland, Wisconsin. This 200 sq. ft. interpretive exhibit explores the impact of extreme conditions on Ojibwe wild rice harvesting, allowing visitors to interact with maps and data along with Ojibwe language displays and a birch bark canoe. Approximately 33,000 visitors, community members, and students view the G-WOW Discovery Center annually. It is a focal point for environmental education programs at local schools.

Members of the Ojibwe tribe harvest wild rice.

With continued WCMP funding and support, G-WOW developed a robust web-based curriculum featuring four seasonal units that study the Ojibwe lifeways of maple sugaring, birch bark harvesting, fishing, wild ricing, and respecting culture. Students test hypotheses about changing coastal conditions and develop a service learning project based on their results. G-WOW has gained recognition over the past several years, leading to the installation of more exhibits in the Great Lakes region, a professional development institute, and leveraging additional grants to deliver the curriculum to more communities. The G-WOW model is successful because it makes science accessible. By focusing on plant and animal species that are essential to a cultural practice, information about changing coastal conditions becomes more relatable. This type of program is transferable to other cultures and locations as well.

HONOR AND RESPECT LOCAL CULTURES.

AMERICAN SAMOA'S FAUTASI COASTAL CHALLENGE

The American Samoa Coastal Program connects local traditions to environmental stewardship, inspiring villages to take actions that improve and protect their coastal resources.

Three thousand years ago, ancestors of the Samoan people sailed into the bay of Pago Pago with large, wooden canoes. They settled on these islands after a 6000-mile journey across the Pacific from Southeast Asia, carrying strength of spirit and a connection to the sea that is still evident in Samoan culture today. Many centuries later, the people of American Samoa remain united by their deep traditions of family and faith. However, population growth on the islands challenges the traditional ways of life. Dense coastal villages comprised of open, thatched-roof homes are highly vulnerable to damage from cyclones and tsunamis. In addition, waste and agricultural chemicals combine with marine debris to pollute American Samoa's clear sandy beaches and vibrant coral reefs.

To inspire action and awareness about these coastal hazards, the American Samoa Coastal Management Program (ASCMP) needed to resonate with the islands' tightly-knit culture. In 2011, ASCMP established the Fautasi Coastal Challenge (FCC)—a celebratory canoe race that leads to a series of local coastal clean-ups and resource management projects. By honoring a beloved ritual, the ASCMP has harnessed the unity and pride of coastal villages and directed that drive toward environmental stewardship. The FCC begins in the water, where each participating village sends a team to compete in the fautasi race. Fautasi are traditional Samoan canoes, holding 50 strong rowers in lines of two. In order to qualify for the competition, each village commits to organize regular coastal clean-ups within their watershed and participate in ASCMP's education programs. ASCMP works with village leaders to select workshops and trainings, which cover topics such as cyclone and tsunami preparedness, land management, resource conservation, and youth engagement. This program combines the best indigenous and scientific practices for resilience. In addition, each village must designate at least two faith-based groups to adopt a coastal area and monitor it throughout the year. The village's fautasi crew is responsible for keeping the adopted area clean, while the faith-based groups submit progress reports to ASCMP.

The FCC has led to a number of local activities that enhance and protect the coastline. In 2014, the village of Fagaalu conducted two coastal clean-ups that collected 7,580 pounds of trash and debris. Volunteers included the fautasi crew, village police, church leaders, and entire extended families. Other village clean-ups produced similar results, triggering a larger regional discussion about waste management and prevention. In partnership with the U.S. Department of Homeland Security, ASCMP also conducted a workshop for village leaders about tsunami preparedness, coastal mapping, and the benefit of wetlands as a buffer against storm surge.

Competitors in a traditional fautasi (canoe) race.

ASCMP's approach is successful because it connects with local values and engages with key community leaders, such as the faith-based groups. The FCC empowers villages to take responsibility for their coastline and feel proud of their strength as athletes as well as environmental stewards. Participation in the FCC has increased every year, from four villages in 2011 to nine in 2014. ASCMP also partners with private companies, such as Hawaiian Airlines, who sponsor the fautasi race and provide additional funds to support village projects.

COASTAL MANAGEMENT PROGRAMS IMPROVE

CALIFORNIA'S RELOCATION OF HIGHWAY 1 IN SAN LUIS OBISPO COUNTY

The California Coastal Commission worked extensively with other state and local agencies, as well as stakeholders from the general public, to develop a project that everyone could support.

North of the Piedras Blancas Light Station, California Highway 1 touches the sea. Decades of coastal erosion, exacerbated by rising sea levels, have brought segments of shoreline to the highway's edge. Where bluffs have receded most severely, only an artificial rock embankment and low concrete wall separate the ocean from the asphalt. Waves break over these barriers during periods of high swells, saturating the pavement and creating dangerous conditions.

For years, the California Coastal Commission authorized emergency repairs, but damage continued to occur. "Everyone agreed that something more had to be done over the long run," said Tami Grove, Coastal Program Manager at the Coastal Commission. Grove and her colleagues worked closely with the California Department of Transportation (Caltrans), California State Parks, and San Luis Obispo County officials to design a plan for relocating the highway inland and avoiding costly repairs.

Planning was a challenge, as this part of the coast contains sensitive ecological resources and the adjacent land is privately-owned. The final realignment project, approved by the Coastal Commission, sets the stage for Caltrans to relocate nearly three miles of Highway 1 beyond the estimated 100-year erosion line. Through an agreement with private landowners and non-governmental organizations, the area between the coast and relocated highway will add 73 acres to Hearst San Simeon State Park. This opens new opportunities for beach access and affordable visitor facilities, such as a public campground. The project will also build 3.5 new miles of the California Coastal Trail. As a condition of approval, the Coastal Commission requires Caltrans to mitigate construction impacts by restoring more than eight acres of coastal wetland and 21 acres of coastal prairie, a grassland plant community that provides habitat for many rare and endangered species. Once construction is complete, the old concrete barriers will be removed to re-establish natural coastal processes.

Cooperation was a key to this success. The Coastal Commission worked extensively with other state and local agencies, as well as stakeholders from the general public, to assist in the development of a viable project. As part of this collaboration, the Coastal Commission used its coastal management authority to administer a single development permit for all aspects of the project, streamlining the overall regulatory review. This increased the efficiency of obtaining project approval and eased the administrative burden for the Coastal Commission's partners.

High swells on California Highway 1.

This project reduces risk from coastal hazards and advances California's other coastal management goals, including environmental protection, coordination among government agencies, public engagement, equitable access to the coast, and responsible development. "The approach we used at Piedras Blancas has become a model for similarly situated projects in other parts of the State," said Grove. For example, the Coastal Commission recently approved a project at Surfer's Beach in San Mateo County for temporary protection of Highway 1 and a long-term development plan for that shoreline. The Commission is also collaborating with Caltrans in Santa Cruz County, where the replacement of a deteriorated bridge will help respond to erosion threats and restore critical spawning grounds for Coho salmon.

BARRIER ISLAND RESTORATION IN TEXAS

The Texas Coastal Program partnered with other federal, state, and local agencies to leverage funding for crucial habitat restoration projects.

Barrier islands aren't just for beach vacations. All along the Texas coast, these sandy strips of land are the first line of defense against tropical storms and hurricanes – a common and destructive occurrence in the Gulf of Mexico. Without barrier islands to absorb the force of storms, many communities on the Texas mainland would be in much greater danger from wind, waves, and flooding. In addition to their protective function, barrier islands provide essential habitat for fish and wildlife. The shallow, sheltered bays and estuaries located behind barrier islands are one of the planet's richest aquatic environments. In Texas, these waters harbor a seafood industry that generates $846 million in sales and supports over 14,000 jobs. However, dense coastal development and rising sea levels have caused significant coastal erosion and wetland loss on many Texas barrier islands, degrading the important functions they perform.

To strengthen the barrier islands' vital natural resources, the Texas Coastal Management Program (TCMP) partnered with other federal, state, and local agencies to leverage funding for habitat restoration projects at South Padre Island and Goose Island Marsh. On South Padre Island, the scenic beach shoreline erodes at a rate of up to 10 feet each year. Since 2012, TCMP has provided grants to the City of South Padre Island (City) to restore a healthy beach dune system through the planting of native grasses. Using the grant funds, the City organized a volunteer program to engage coastal residents in the dune planting process. The City has hosted 21 volunteer events, where a total of 1,791 participants installed 192,000 plants to stabilize nearly six acres of the island's dunes. This program protects beaches that support a thriving tourist economy, restores important habitat, and encourages coastal stewardship. At each planting event, volunteers are educated about the importance of dune restoration. "Having seen this program evolve over the last five years, I realize now we're not only doing restoration on the ground, we're educating our future beachgoers and decision-makers and that's going to have a bigger impact than anything else," said Reuben Trevino, South Padre Island Coastal Resources Manager.

Goose Island Marsh, a popular site for wildlife viewing and recreational fishing on Aransas Bay, lost 24 acres of coastal wetland to erosion between 1969 and 2002. At the time, less than half of the original marsh habitat remained. In 2005, TCMP partnered with the Texas Parks and Wildlife Department

Proud volunteers pose in front of their dune planting on South Padre Island.

(TPWD) to develop a plan for restoring and stabilizing the Goose Island shoreline. By working together, TCMP and TPWD combined and leveraged their own funds to obtain additional grants from NOAA's National Marine Fisheries Service, the EPA Gulf of Mexico Program, the U.S. Fish and Wildlife Service, the non-profit Coastal Bend Bays and Estuaries Program, and several private donations.

The Goose Island restoration project was completed in three phases. In 2005, a 4,400-foot-long offshore rock breakwater was constructed to stabilize the island's southern shoreline. On-site material was used to outline a 24-acre marsh restoration site with levees. One year later, the restoration area was filled with dredged material from a nearby site to prepare for marsh plantings. TPWD staff, school groups, Boy Scouts, and other community volunteers successfully transplanted over 11,000 cordgrasses from other parts of the island. During the final phase, a boardwalk was constructed to provide public access to the restored marsh. The boardwalk includes interpretive signs that help visitors understand the values and functions of a healthy coastal ecosystem.

OREGON'S LAND USE GUIDE FOR TSUNAMI PREPAREDNESS

The Oregon Coastal Program helps communities understand their tsunami risks and implement policies that will protect property and save lives.

A sleeping dragon lies 50 miles off the coast of Oregon. At least, that's how it feels to the 22,000 residents living within the tsunami inundation area. The Cascadia Subduction Zone, where one tectonic plate is sliding beneath another, can produce earthquakes of magnitude 9.0 and higher. If a major earthquake occurs along this fault line, the resulting tsunami would strike the Oregon coast within 15 minutes. Prolonged ground shaking, landslides, and extreme flooding could devastate the region. Geologic evidence shows that the largest Cascadia Subduction Zone earthquakes occur every 300-600 years. The last major earthquake struck on the evening of January 26, 1700—meaning that Oregon is within the time window for the next one. According to geologists at Oregon State University, the chance of a major earthquake and tsunami within the next 50 years is one in three.

Cognizant of this increasing threat, the Oregon Coastal Management Program (OCMP) began working with coastal communities to reduce their risk of property damage and loss of life from a tsunami. OCMP engages with local government partners all along the Oregon coast, working together to educate both residents and visitors about coastal hazards. Their outreach efforts have not only raised awareness about tsunamis, but also generated local momentum for actions to increase resilience.

With that in mind, OCMP developed a comprehensive land use guide to assist local planners as they incorporate tsunami resilience measures into their community's policies. The land use guide was designed so that coastal communities can tailor the materials to address their individual locations and levels of tsunami risk. The guide focuses on three main themes: improving evacuation planning and infrastructure, reducing certain types of development in high-risk areas, and encouraging building techniques that decrease structural damage during an earthquake and tsunami event. Specific tools include sample text for local land use plans, a set of Tsunami Hazard Maps that define tsunami risk for the entire Oregon coast, model zoning regulations, and resources to help communities leverage additional funds for disaster preparedness.

Using the guidance, several coastal communities have worked with OCMP to implement land use policies that reduce tsunami impacts. In Coos County, local officials amended their

A warning sign along Oregon's Highway 101.

comprehensive land use plan and adopted Tsunami Hazard Maps for their region. OCMP continues to assist Coos County as they work to modify zoning regulations, develop incentives for homeowners to increase their tsunami preparedness, and improve evacuation facilities. In Clatsop County, the local planning commission is holding hearings to adopt a robust set of tsunami-related provisions for their development code. Clatsop County is also working with OCMP to improve their plans for an evacuation. Ten other communities, representing all seven of Oregon's coastal counties, signed letters of commitment to move forward with tsunami resilience measures when more funding becomes available.

By developing the guide, OCMP also improved coordination among the relevant state agencies. Now, these agencies collaborate more effectively to deliver the data and expertise that communities need. "This work is not easy," said Laren Woolley, Coastal Shores Specialist at OCMP. "It's a pretty heavy lift for local governments, and we are committed to do everything we can to help them.

HAWAII'S HIGH-WIND BUILDING CODES

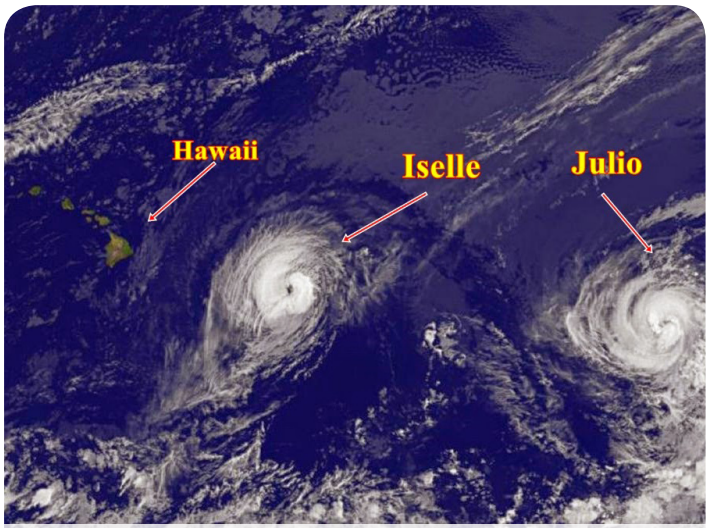
The Hawaii Coastal Program improved and implemented local building standards to help coastal communities stand strong against the wind.

In Maui's beachfront town of Lahaina, winds roar down from the mountains at more than 100 miles per hour. Once every few years, a violent outburst can demolish buildings, uproot trees, and flatten entire fields of sugarcane. Local and severe wind events are experienced throughout the Hawaiian Islands, where constant trade winds from the Pacific Ocean are funneled and distorted by peaks, hills, and valleys. Tropical storms and hurricanes present an additional threat to coastal communities—and extreme weather is predicted to become more frequent as sea levels rise.

Hawaii's unique topography makes it particularly challenging to protect against severe winds and storm surges. To help coastal communities become more prepared for these hazards, the Hawaii Coastal Management Program (HCMP) began a program to develop local hazard mitigation plans. In order for local governments to receive federal assistance in the event of a disaster, their hazard mitigation plans must be approved by the Federal Emergency Management Agency (FEMA). By establishing a plan, the local governments commit to carry out all of their listed mitigation activities. With HCMP leadership and funding from Section 309 of the CZMA, Hawaii's first statewide and county plans were approved and adopted in 2005.

In completing the initial plans, HCMP and their local partners discovered that building codes were only designed to absorb the impact of 80-mile-per-hour wind gusts—far lower than what coastal communities have experienced under extreme conditions. To address this issue, HCMP helped create and establish upgraded building standards with high-wind designs that are tailored to Hawaii's specific needs. The new standards were adopted as part of the hazard mitigation plans. In addition, HCMP partners with the Hawaii Chapter of the American Institute of Architects, engineering associations, and county planning and public works departments to provide training workshops on the upgraded wind standards. The workshops are well-attended by local engineers, architects, planners, and emergency managers.

HCMP's technical assistance generated the momentum needed to update and implement the local hazard mitigation plans. As a result, this project helped to reduce destructive wind impacts from hurricanes and tropical storms. The new high-wind standards have been adopted by all four counties in the state: Honolulu, Kauai, Maui, and Hawaii. "This project has and continues to provide benefits to the state and counties of Hawaii," said Leo Asuncion, Manager of the HCMP. "The technical assistance that HCMP provided regarding wind impacts laid the foundation for updates to other aspects of county building codes that may be affected by coastal hazards. Because of this project, the state, counties, and local stakeholders have stayed ahead of the curve on addressing the severe and increasing storm events that we are experiencing today—and we intend to remain ahead of future impacts."



Twin hurricanes Iselle and Julio take aim for Hawaii in 2014.

FLORIDA'S POST-DISASTER REDEVELOPMENT PLANNING GUIDE

The Florida Coastal Program funded a comprehensive set of tools and guidance to help coastal communities rebuild with resilience after a major disaster.

Since 1965, 17 hazard events in Manatee County, Florida have received Presidential Disaster Declarations. The events included six hurricanes, five tropical storms, and several outbreaks of tornadoes. Located on the Gulf of Mexico, Manatee County is particularly vulnerable to flooding and storm surge due to low elevation and the abundance of rivers and streams. High winds associated with severe weather also pose risks to homes and public infrastructure. These hazards are a concern for communities across the State of Florida, where the economy depends on tourism and industries that are linked to the coast. Rebuilding communities after a major disaster is a huge undertaking that places undue strain on local governments. However, if the community has planned ahead, they can recover more quickly and redevelop in a way that is resilient to future storms.

To help communities improve their planning for coastal hazards, the Florida Coastal Management Program (FCMP) partnered with the Florida Department of Economic Opportunity (FDEO) and Florida Division of Emergency Management (FDEM) to create the Florida Post-Disaster Redevelopment Planning Guide. The Guide contains resources that empower potentially vulnerable communities to plan for the long-term disaster recovery period. Through this process, communities can recover faster and more efficiently in the event of a disaster, maintain local control, and take advantage of opportunities to rebuild stronger. Through Section 309 of the CZMA, FCMP funded FDEO to lead the project and work with the Division of Emergency Management to leverage additional grants from FEMA's Hazard Mitigation Grant Program.

To develop the Guide, FDEO and the Division of Emergency Management researched redevelopment lessons learned during previous disasters and applied these lessons through a series of pilot projects. Six communities were chosen to be case studies: Manatee County, Panama City, Hillsborough County, Nassau County, Polk County, and Sarasota County. The case studies represent a wide range of communities and hazard risks, from the economic Gulf coast hub of Tampa Bay to the small, Atlantic beachside towns north of Jacksonville. The Guide documents how each of these six local governments successfully established a long-term Post-Disaster Redevelopment Plan, with suggestions for how to apply their experiences in other communities across Florida. This includes

Damage to the coastal City of Punta Gorda after Hurricane Charley in 2004.

important topics such as land use, housing, economic recovery, infrastructure, health and social services, and environmental impacts. The Guide also contains a comprehensive list of funding sources for redevelopment projects.

In response to this project, several communities created their own Post-Disaster Redevelopment Plans: the Cities of Kissimmee and Alachua; and Leon, Martin, Palm Beach, Pinellas and Walton Counties. To supplement the printed Guide, FCMP also funded a web-based training video that provides advanced tools and best practices to help communities implement the resilience activities in their Redevelopment Plans. FDEO, in partnership with the Division of Emergency Management, continues to update the Post-Disaster Redevelopment guidance.

GEORGIA'S DISASTER RECOVERY AND REDEVELOPMENT PLAN

The Georgia Coastal Program meets community needs for disaster preparedness by funding local plans, collaborating with other agencies, and providing technical assistance.

At high tide on a stormy day, waves wash over the road leading out to Tybee Island. Although Georgia has not been hit by a major hurricane in many years, it's a warning sign for coastal residents. Over the past few decades, the population of coastal Georgia has increased dramatically. More people and infrastructure are at risk than ever before, and there is no plan in place to guide coastal communities through recovery and redevelopment after a natural disaster.

Recognizing the need for greater preparedness, the Georgia Coastal Management Program (GCMP) partnered with the Georgia Emergency Management Agency (GEMA) to begin providing assistance to coastal communities. GCMP worked with GEMA to evaluate how the National Disaster Recovery Framework—a planning guide released by FEMA in 2011—could be applied along the Georgia coast. FEMA does not provide funding for communities to implement the National Disaster Recovery Framework, so GCMP stepped in with its own funds from Section 309 of the CZMA. These efforts caught the attention of Georgia's governor, who issued an executive order in 2013 that directs GCMP and GEMA to write a Disaster Recovery and Redevelopment Plan for the entire state.

GCMP and GEMA began with a pilot project in Chatham County, the most populated area of the Georgia coast. Chatham County is home to the Cities of Savannah and Tybee Island. In 2014, GCMP partnered with NOAA's Coastal Services Center to facilitate a workshop on disaster preparedness for Chatham County's major stakeholders. The workshop was attended by over 100 local participants, who were motivated by learning about their community's vulnerability to coastal hazards. Following the workshop, GCMP and GEMA worked closely with local government officials to develop a disaster recovery and redevelopment plan for Chatham County. The plan identifies measures to improve resilience to coastal storms, flooding from extreme rainfall, and severe wind events such as tornados. It also contains resources to help local governments finance recovery efforts after a disaster occurs. The plan will be finalized in December 2015.

GCMP and GEMA have started a second pilot project in Brantley County, a rural community that lies slightly inland but remains threatened by coastal hazards. GCMP and GEMA will use the same planning process, but tailor it to Brantley County's needs and priorities. For example, Brantley County has no zoning, and may need to consider ordinance changes to incentivize more resilient land uses. "GCMP has a good relationship with local governments," said Jennifer Kline, Coastal Hazards Specialist. "Small communities in Georgia don't have the capacity to use the major tools developed by federal agencies, so we can step in and help them run models or create local maps."

Kayakers explore low-lying river channels in Brantley County, Georgia.

The plans prepared by Chatham and Brantley Counties will serve as case studies for similar communities throughout Georgia. GCMP and GEMA will continue to provide training, outreach, and technical assistance as more coastal communities embark on the disaster planning process. The pilot projects also inform the statewide Disaster Recovery and Redevelopment Plan, which will address coastal storm impacts, sea-level rise, and shoreline change. GCMP is about to begin conducting regional damage assessments based on model scenarios for Category 3, 4, and 5 hurricanes. The statewide plan, scheduled for release in 2016, will evaluate state and local policies such as building codes, development restrictions in highly vulnerable areas, and permitting for shoreline protection structures.

CONNECTICUT'S SENTINEL MONITORING IN LONG ISLAND SOUND

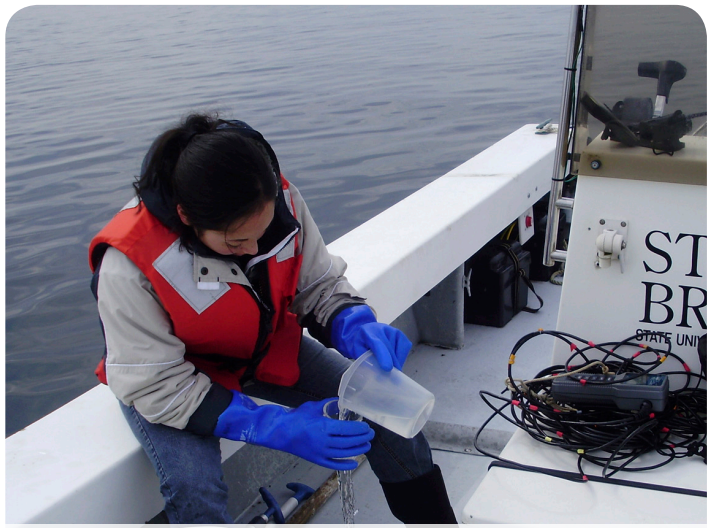
The Connecticut Coastal Program worked with federal, state, and local partners to craft an innovative scientific approach for monitoring the health of a vital ecosystem.

Nearly nine million people live, work, and relax along the shores of Long Island Sound. The Sound contributes approximately $8 billion annually to the regional economy through commercial and recreational activities. However, there is clear evidence that this estuarine environment is changing. Despite significant progress in reducing wastewater pollution, Long Island Sound remains stressed by increasing population and development. Sea level and water temperatures in Long Island Sound are rising at rates higher than the global average. In addition, coastal waters are becoming more acidic. These conditions may cause long-term alteration of the Long Island Sound ecosystem, which is directly linked to the well-being of coastal communities.

Recognizing the need for better scientific understanding and monitoring of these changes, the Connecticut Coastal Management Program (CCMP) collaborated with federal, state, and local partners through the Long Island Sound Study (LISS). The LISS is a National Estuary Program partnership between the U.S. Environmental Protection Agency, the States of Connecticut and New York, Sea Grant, and other governmental and non-governmental organizations. It was established in 1985 with the purpose of restoring and improving the environmental quality of Long Island Sound. The LISS coalition realized that local data would be necessary to understand the health of Long Island Sound and how it is changing over time.

This gave rise to Sentinel Monitoring for Climate Change in Long Island Sound, a scientific approach to detect and measure the effects of environmental stressors on coastal and estuarine life. A "sentinel" is a measurable variable that can be monitored as a warning sign for changes in the health of the entire ecosystem. The size of marshes and presence of invasive species are examples of sentinels. For this study, a multidisciplinary work group of experts identified 37 different sentinels for Long Island Sound. CCMP was a key player in this process, along with Connecticut Sea Grant, New York Sea Grant, the New York Department of Environmental Conservation, EPA, and NOAA. CCMP staff provided scientific expertise, facilitated large work group discussions, and administered the project's funding.

In 2013, the work group collaborated with researchers at the University of Connecticut to pilot this monitoring strategy. The research team investigated three priority sentinels related to wildlife and ecosystem changes: the abundance of sensitive bird species, the number of different coastal tree and plant species, and the land area covered by salt marshes. The project gathered a wealth of data that can be used to inform resource management decisions and strategies for increasing the ecological resilience of Long Island Sound. The study's results were published in 2014. The Sentinel Monitoring program established the first protocol for quantifying climate change impacts on the Long Island Sound ecosystem. "This was a groundbreaking effort," said Brian Thompson, Coastal Program Director. "The Sentinel Monitoring program was extremely valuable as a model that can be scaled up to a larger region or transferred to other important estuaries." The Northeast Regional Ocean Council is currently using Connecticut's Sentinel Monitoring program as a template for an Integrated Sentinel Monitoring Network, an initiative that will span the entire coast of the Northeast U.S.



A researcher collects field samples on Long Island Sound.

OHIO'S COASTAL DESIGN MANUAL

The Ohio Coastal Program helps communities design resilient and effective shoreline protection structures through high-quality coastal data, published guidance, and site visits.

The shoreline of Lake Erie is constantly shifting. On a stormy day, strong waves carve away the base of steep clay bluffs. Erosion weakens the bluffs over time, causing the land above to become unstable and collapse into the lake. Collapses occur quickly and without warning, severely damaging homes and property. In Lake County, Ohio, coastal bluffs can recede as much as 12 feet annually. This isn't a rare problem—there are thousands of homes on the Lake Erie waterfront, and nearly half are within 50 feet of the edge of a bluff. Many of them are much closer. And, this hazard affects more than lakefront homeowners. Public parks, boat launches, fishing areas, utilities, and critical infrastructure owned by the State of Ohio also suffer the damage and resulting costs of coastal erosion. All taxpayers bear the burden of reduced property tax revenue and increased insurance costs, even those who don't live on the coast. The economic losses caused by coastal erosion can exceed tens of millions of dollars each year.

To help coastal communities become more resilient to erosion, the Ohio Coastal Management Program (OCMP) developed a Coastal Design Manual in 2011. The manual demonstrates the best design principles for shoreline protection structures along Lake Erie. OCMP created the manual to guide local planners toward a balance between erosion control, public access to the water, and the need to protect and maintain Lake Erie's natural resources. The manual is also valuable to engineers and contractors, who will find resources for planning shoreline protection projects and working with landowners. Landowners themselves can use the manual to gain a better understanding of the design, surveying, and construction process. Overall, the manual establishes a clear standard for evaluating projects based on their stability, effectiveness, and impact to the coastal environment.

OCMP developed a second edition of the Design Manual in 2014, focused on natural shoreline features such as dunes and beaches. These features provide erosion control as well as coastal habitat and water quality benefits. With that in mind, the manual's second edition includes innovative resources for beach nourishment, maintenance of coastal dune systems, and wetland restoration projects. Hundreds of copies of the manual have been distributed to coastal landowners, local governments, contractors, engineering firms, landscape architects, and other stakeholders.

Bluff erosion destroys a car in Lake County, Ohio.

In addition to the manual, OCMP produced a set of tools to help coastal communities manage their sand resources—a crucial component of reducing erosion risks. The tools identify natural sources of sediment, estimate sediment transport rates, and assess the long-term impacts of shoreline construction on natural sediment processes. OCMP staff use these tools to directly assist local shoreline protection efforts at all levels, from county planning agencies to individual municipalities and private landowners. OCMP's coastal engineers also conduct site visits and evaluations at no cost, saving communities a considerable amount of time and money. OCMP staff have completed nearly 200 of these site visits since the Design Manual was published, providing expert advice on design options and reviewing project plans.

COASTAL MANAGEMENT PROGRAMS
ARE ESSENTIAL TO PROTECTING
COASTAL COMMUNITIES

America's coastal communities are threatened by hazards that range from chronic flooding and erosion to widespread damage caused by natural disasters. To sustain our nation's vibrant coastal economies and ecosystems, building resilience is not an option—it is a necessity. This presents a challenge, as no single solution fits the range of cultures, habitats, and land use practices along America's shorelines. The diversity of coastal communities illustrates the need for strategies that are tailored to local conditions. However, the resources and expertise required for this work are rarely available at the local level.

With over 40 years of experience, Coastal Management Programs possess the knowledge and ability to make smart investments in the face of environmental threats. They have established partnerships and networks that foster effective actions to make our communities resilient. Coastal Management Programs are unique because they connect federal, state, and local agencies while working directly with community stakeholders. Coastal Management Programs are critical because they deliver technical and planning expertise while helping local decision-makers fund and implement solutions.

To strengthen our communities against coastal hazards, America must increase its investment in the Coastal Management Programs. The CZMA enables Coastal Management Programs to address national coastal issues at the local scale. These state and territory-based programs understand and successfully meet community needs to build coastal resilience. It is time for Congress and the Administration to recognize the accomplishments of Coastal Management Programs and maximize their positive impact. The CZMA's national framework for local solutions should be central to confronting coastal threats now and in the future.

COASTAL STATES ORGANIZATION
444 North Capitol St NW, Suite 638
Washington, DC 20001
202.508.3860 | www.coastalstates.org