Sea Grant
Science Serving America's Coasts

Reducing the Nation's Vulnerability to Coastal Natural Hazards

"To enhance preparedness and reduce losses of human life, property and environmental resources from coastal natural hazards"

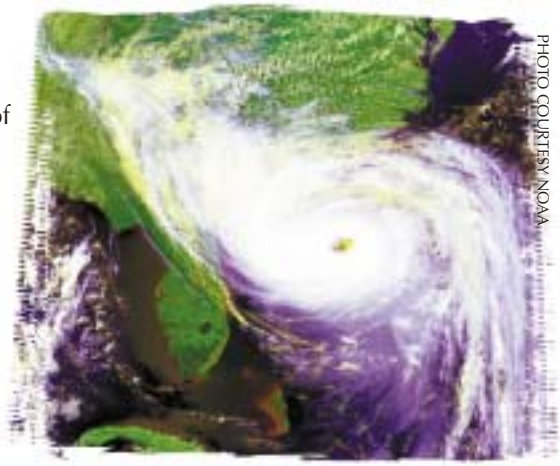
U.S. coastlines are at risk from coastal natural hazards—the winds, waves and floods generated by hurricanes and other major storms, the physical impacts caused by earthquakes and tsunamis, and the threats to coastal development due to short- and long-term shoreline change. Risks to life and property from these hazards will increase as the coastal population expands from 110 million people today to an estimated 177 million by the year 2010. Over the last few decades, property losses from coastal disasters have skyrocketed, reaching more than $150 billion in the 1990s. This upward trend is likely to continue as investments in vulnerable coastal property rapidly increase.

Risks associated with coastal natural hazards are compounded by sea level rise, land subsidence, unfamiliarity of coastal residents with local hazards and an increasingly valuable building stock along the nation's coastline. These observations underscore the need for a dedicated national effort to reduce the economic, social and environmental costs of natural hazards. Research and outreach programs are needed to help states and localities create an aware and prepared citizenry capable of employing the most effective means to reduce these risks. The nation's Sea Grant College Program and its network of universities, laboratories and outreach programs contribute considerable expertise and capability to the national coastal natural hazards mitigation effort.

Reducing the loss of life and property

The goal of Sea Grant's Coastal Natural Hazards program is to enhance preparedness and reduce losses of human life, property and environmental resources from coastal natural hazards in the United States. Sea Grant is united in this objective with many public and private interests, including NOAA's National Ocean Service and National Weather Service, the Federal Emergency Management Agency, U.S. Geological Survey, Institute for Business and Home Safety, and U.S. Army Corps of Engineers. Sea Grant's strong connections with its universities and coastal constituencies, along with its capabilities in the areas of basic and applied multidisciplinary research, education and technology transfer, enable it to contribute critical information and assistance to the national effort. Overall, Sea Grant will foster efforts to:

- Develop new technologies for remediation and disaster prevention;
- Develop methodologies and techniques for risk assessment and cost-benefit analysis;
- Generate methods for restoration of natural habitats (e.g., barrier islands, dunes, beaches, marshes) that play an important role in minimizing damage from coastal hazards;
- Maintain a clearinghouse of university-generated information on coastal hazard events and mitigation strategies;
- Transfer information and technologies to coastal constituents on the predicted risks, expected impacts and effective methods for pre-event preparation and post-event recovery, and
- Develop and transfer economic evaluation techniques to state and local officials seeking to develop more effective mitigation, evacuation and recovery plans.



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Weather-related hazards

Over the last 20 years, the United States was struck with 44 weather-related coastal disasters with overall damage costs exceeding $1 billion each. Thirty-eight of these occurred during the 1988-99 period, with total damage costs exceeding $170 billion. Insurance companies paid out more than $91.8 billion in losses from weather-related disasters in the 1990s—nearly four times the weather-related claims settled during

the 1980s. Even so, some $2 trillion in insured property currently lies within 20 miles of the Atlantic coastline alone and is exposed to damage from coastal weather events. Sea Grant will support efforts to:

- Develop hazard-resistant retrofit alternatives for existing buildings and structures;
- Evaluate and improve mitigation tools and techniques related to building construction and land use;
- Develop, refine and demonstrate community risk and vulnerability assessment methods and standards, leading to improved methods for cost-benefit analysis for use by local officials;
- Provide information for use in developing more effective building codes, and
- Improve hurricane management for ports and harbors.

Earthquakes and tsunamis

Earthquakes and tsunamis are infrequent but extremely dangerous natural hazards that threaten the coasts and inland waters of California, Oregon, Washington, Alaska, Hawaii and territories in the Pacific region, and Puerto Rico and the Virgin Islands in the Caribbean. The Cascadia Subduction Zone (CSZ) just offshore in the Pacific Northwest and the Aleutian Seismic Zone are of particular concern, given their potential for very large, destructive events. U.S. seismologists put the probability of a major Alaskan earthquake of magnitude 7.4 or greater in the next decade at 84 percent. Along the CSZ, the probability of a magnitude 8-9 event is 10 to 20 percent in the next 50 years. Tsunamis generated by such events will reach coastlines in as few as 15 minutes. Sea Grant, through public and private partnerships, will:

- Reconstruct historical earthquake/tsunami events and impacts through examination of the geological record;
- Contribute to more timely and accurate tsunami warnings and prediction of post-event flooding potential;
- Evaluate potential economic, social and environmental impacts and costs of earthquakes, tsunamis and other co-seismic hazards, and of evacuation and recovery strategies, and
- Develop tools to assist port and harbor communities in assessing earthquake/tsunami risk, vulnerability and mitigation options.

Shoreline change

Coastal erosion is responsible for about $500 million per year in property loss to coastal property owners nationwide, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spends an average of $150 million every year on beach nourishment and other shoreline erosion control measures. Despite these efforts, erosion over the next 60 years may claim one out of four houses within 500 feet of the U.S. shoreline, perhaps more with accelerated coastal erosion and property loss from the predicted sea level rise this century. Sea Grant activities will:

- Improve shoreline mapping and coastal change analysis methodologies;
- Document and evaluate the influence of the regional and local geological framework on current sedimentary processes;
- Examine beach and coastal ocean processes, particularly to establish sand "budgets;"
- Identify and evaluate sustainable erosion control techniques and technologies that take into account environmental considerations;
- Improve understanding and assessments of the relationship between shoreline change and environmental effects, and
- Assist local governments and developers in incorporating water availability limitations, erosion rates and setbacks, and coastal building codes into development activities.

Partnering for success

Sea Grant will join with federal and state agencies, coastal communities, and the private sector to accurately assess the threats to the coast from natural hazards, generate and modify technologies to minimize damage, and develop education and public awareness initiatives for transferring research information from the nation's universities to all who live, work and play along the nation's coasts. This proactive partnership can greatly reduce property damage and loss of life, saving the federal and state governments, taxpayers, business and industry, and the insurance community billions of dollars annually.

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Mission

The mission of the Coastal Natural Hazards Theme Team is to identify the most pressing needs regarding coastal, marine and Great Lakes natural hazards, and to develop and implement an integrated research and outreach agenda aimed at prioritizing and addressing those needs.

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