

A CONCEPT PAPER BY THE SEA GRANT ASSOCIATION

Sea Grant's Resilient Coasts Initiative

OCTOBER 2020



THE VISION Coastal communities are more resilient to weather and climate hazards with Sea Grant support to improve planning and risk assessment, disaster preparedness and recovery, resilience design and project implementation, and long-standing economic and social inequities.





The Challenge: Changing Conditions

Over 126 million residents — 40% of the population of the United States — live in coastal counties. These counties employ 56 million people, resulting in \$3.4 trillion in wages annually, and produce more than \$8.3 trillion in goods and services.¹ Weather- and climate-related hazards, and the resulting loss of life as well as environmental and economic impacts, have increased at an alarming rate. Since 1980, the cost of 76 billion-dollar flooding and hurricane events averaged \$4.6B and \$21.5B respectively. The total cost of all U.S. billion-dollar disasters over just the last 5 years (2015–2019) exceeds \$525 billion.²

Weather and climate risks are also deeply connected to economic, geopolitical, societal and technological trends. These include threats to critical infrastructure, water and food supplies, social instability, unemployment, and governance challenges.³ Most recently, we are seeing these types of interdependencies play out as the COVID-19 pandemic and resultant economic crisis have clearly exacerbated impacts to coastal communities. Disadvantaged communities — particularly communities composed predominantly of Black, Indigenous, and people of color (BIPOC) — are being disproportionately impacted by weather and climate impacts, COVID-19 and the economic crisis we are facing.⁴

The increasing physical and economic damages, social justice implications, and community devastation is testing governments at all levels, and have left many unanswered questions regarding our level of preparedness to deal with and respond to major episodic and chronic weather and climate threats. Hurricanes, typhoons and tsunamis are compounded by chronic challenges including coastal inundation (due to rising sea levels and

The acute and chronic threats facing our nation's coasts underscore the need to enhance Sea Grant's efforts through the establishment of a dedicated national effort to generate and provide science-based information to reduce the social, economic and environmental costs of natural hazards, both chronic and episodic, to our coastal communities.

land subsidence), increasing storm intensity, uneven enforcement of building codes, lack of adequate zoning ordinances, poor planning and construction, continued development in high risk areas, and the inexperience of coastal dwellers to prepare for and recover from these events.

The frequency of “sunny day” flooding alone has doubled since 2000 in the United States. Also known as tidal flooding, these high tide events are now exacerbated due to sea level rise.⁵ For example, Charleston, SC experienced 89 tidal flood events in 2019.⁶ Tidal flooding overwhelms sewage treatment plants and public utilities, disrupts transportation corridors, reduces property values of homes and businesses and threatens public health. Fluctuating water levels in the Great Lakes have resulted in millions of dollars of damages and economic impacts.⁷ In addition, many regions may be at increased risk of anthropogenic disasters such as oil or chemical spills that could occur alone or be exacerbated by other hazardous events.





RESPONDING TO CHANGE

Proximity to cultural centers, professional opportunities and natural beauty have made the coasts highly desirable places to live. However, at the interface between land and water, coastal dynamics are constantly in flux, bringing a unique set of challenges such as hurricanes to floods that can make coastal living incredibly difficult if not dangerous. Especially as the populations of coastal areas continue to grow, residents will urgently and increasingly need reliable, understandable information to inform their decision-making to deal with these threats.

The resilience of our coastal and Great Lakes communities — their very safety, security and survival — depends on how well prepared they are for these threats. Community-level preparedness includes a number of considerations, from how individuals prepare to where and how critical infrastructure and buildings are constructed. Resilient communities have residents, businesses and infrastructure that are positioned to reduce the impacts of a myriad of risks to their lives and property, which allows people to return to their homes and businesses much more quickly after an event than in communities that are not as prepared. Resilient communities also have thriving living coastal resources such as mangroves, oyster reefs, barrier dunes and salt marshes that naturally buffer waves and coastal storms and protect the shoreline from erosion during storms. Only through knowledge, understanding, preparation and partnerships will coastal communities be able to prepare for and respond to the hazards that are uniquely concentrated in these coastal counties.

“The Washington Sea Grant team has been instrumental in helping Metro Parks Tacoma forecast sea level rise, open a dialogue with the public around climate change, and incorporate the emerging scientific data into our planning and construction projects.”

ANDREW AUSTIN, CITY OF TACOMA, METRO PARKS TACOMA

THE SOLUTION

The National Sea Grant College Program is a network of research, education and outreach professionals who work in partnership with universities, communities and partners. The program’s goal is to enhance the use and conservation of coastal, marine and Great Lakes resources to create a sustainable economy and environment. The program has a proven track record of doing this at local, state, regional and national levels. With increased capacity, Sea Grant can be the nation’s “go to” program with the resources needed to help all of our coastal and Great Lakes communities become more resilient.

Sea Grant is uniquely poised to help coastal and Great Lakes communities become more resilient through its activities that strengthen the ability of communities to effectively prepare and plan for environmental and economic challenges.

The program will protect lives, sustain critical infrastructure, protect and restore critical natural resources, enhance economic opportunity, adapt to these ever-increasing threats, and support more rapid economic recovery after events.

Sea Grant is a demonstrated leader in developing locally relevant solutions to build coastal community resilience.⁸ Sea Grant’s strength lies in its ability to work effectively at the local government and community level. There is no “one size fits all” solution to community resilience. Our value proposition is that the Sea Grant network effectively engages and serves constituents in every coastal and Great Lakes community in the country with tailored information, guidance and support. Sea Grant’s efforts can be improved and enhanced by building additional capacity that is needed to reach more communities.

Sea Grant Association Request

The Sea Grant Association is grateful for the increasing support that Congress has provided to the National Sea Grant College Program within the National Oceanic and Atmospheric Administration (NOAA) in recent years. Building on this strong foundation, a more substantial contribution of new funds targeted at a focused national resilience initiative — *Sea Grant’s Resilient Coasts Initiative* — is needed to implement an effective, consistent, science and engineering-based approach for all of our coastal communities.

The Sea Grant network supports almost 2,500 scientists, engineers, educators, students and outreach experts. More than 500 Sea Grant staff are full-time research, outreach and education professionals. These staff have their “boots on the ground” in coastal communities around the nation and have the trust and support of local communities. With its partnerships and affiliations with universities and colleges across the nation, Sea Grant leverages the extensive research expertise at America’s finest institutions to develop innovative solutions to environmental risks. All of these individuals contribute to the research, outreach and education that is needed to implement this initiative.

Sea Grant is a unique federal program in which 95% of Congressionally-appropriated funds leave Washington and go directly to the state programs that will implement this initiative. Furthermore, every federal dollar appropriated to Sea Grant has historically been matched with non-federal dollars, ultimately leveraging \$3 for every \$1 appropriated from Congress. Sea Grant intends to follow this commitment with its Resilient Coast initiative.

To fully implement this new initiative, an increase in funding of approximately \$25M per year is needed for the National Sea Grant College Program. This investment would focus on two major areas:

- ◆ **Capacity building (\$10M):** These funds will support recruitment of additional resilience extension, communication or education staff in each state Sea Grant program and support a national coordinator.
- ◆ **Research, engagement, decision support, implementation (\$15M):** These funds will be directly allocated to state Sea Grant programs to support local state-based research, training, technical assistance and coordination that enhance community resilience.

There are differing needs in the different Sea Grant programs to be responsive to their coastal communities. Some programs need extension specialists trained specifically in building resilience. Other programs need additional investments in education and public awareness (communications) programs at the state and local levels, in mapping technologies and engineering solutions, and in place-based science. Sea Grant needs these investments to coordinate its resilience efforts at different scales (i.e., local, regional and national), and ensure that a cohesive national initiative is implemented in a cost-effective manner and results in tangible benefits for coastal communities in both the short and long-term.



Sea Grant Rising to the Challenge

PRIORITY ACTION 1

Build capacity at the local level to assess and reduce risk to coastal and Great Lakes communities

Sea Grant’s niche is its local, place-based approach to devising solutions to the environmental and economic issues faced by America’s coastal and Great Lakes communities.

- ◆ There is a wealth of scientific and technical information and related decision-making tools available to address weather and climate hazards, from both the public and private sectors. However, many communities lack the knowledge or understanding of these resources, and ways in which they can effectively use these resources to meet their local planning and policy needs. In addition, many communities are struggling to understand the threats they face and the implications of inaction or lack of planning.
- ◆ For over fifty years, Sea Grant has assisted coastal communities navigate the aforementioned issues and have ensured that decision-making is grounded in the best available scientific knowledge and understanding. Sea Grant’s research, extension, communications and education staff have a proven track record of working directly with communities to use research-based science and innovative cross-disciplinary approaches to address challenges. Many coastal and Great Lakes communities that are tribal, Indigenous, or economically disadvantaged are highly vulnerable and can be isolated due to impacts from hazards such as landslides, infrastructure failure, or severe storm conditions. In addition, many coastal and Great Lakes communities simply do not have the capacity to prepare for long term resilience on their own.

Sea Grant is positioned to address these challenges, but currently lacks the human capacity and resources to meet the increasing need for technical information, assistance, facilitation and engagement to support these communities.

“It would not have happened, this community would not have an emergency access road, without the help of the Oregon Sea Grant coastal Extension agent. I don’t know how you can measure that, you can measure it in terms of the amount of the cost for the road, but you can measure it in terms of if we had ever had an earthquake and tsunami, and that bridge failed, we’ve got children, grandchildren, grandparents, people that would not be able to get out of that community, it would be a disaster of major proportions.”

MARK LABHART (FORMER TILLAMOOK COUNTY COMMISSIONER)



SPECIFIC ACTIONS THAT SEA GRANT CAN TAKE

- ◆ *Community-based* specialists provide technical assistance and training that integrates locally-focused applied research and education.
- ◆ Develop and implement targeted research and engagement programs that integrate local experts who can help decision-makers apply the most current and relevant science. This approach will help coastal communities expand their capabilities in using weather and climate information, develop mitigation and adaptation strategies, and incorporate improved building codes and zoning ordinances into local plans and policies.
- ◆ Develop, enhance and apply new and existing decision-making protocols and practices to build community resilience to weather and climate risks.
- ◆ Support workforce development by providing training and professional development opportunities to students. These opportunities will provide students with on-the-ground and hands-on practical experience that is needed to build resilience to weather and climate hazards in communities.
- ◆ Assist local, county and state governments to develop and implement action plans and guidance for pre-disaster planning and post disaster recovery.
- ◆ Provide leadership, networking and collaborative support among agencies, organizations and communities that must strategically leverage complementary capacities to build coastal resiliency.

"The City of Charleston's partnership with the S.C. Sea Grant Consortium has been invaluable, consistent, and steady. They have provided leadership and outreach for the City's Sea Level Rise Strategy, Dutch Dialogues, and flood modeling and mapping. Thank you, S.C. Sea Grant!"

MAYOR JOHN TECKLENBURG

PRIORITY ACTION 2

Support research and capacity building that helps coastal communities implement resilience initiatives

Sea Grant's niche lies in supporting community-driven research needs and engaging communities in the co-production of knowledge.

Sea Grant is well known for building and sustaining partnerships across government, universities, the public (including citizen scientists), and the private sector, all of whom are needed to strengthen the country's resilience research. For example, Sea Grant and NOAA's Office for Coastal Management co-funded positions to coordinate sea level rise information across several "sentinel sites" associated with National Estuarine Research Reserves. The Sentinel Site Coordinators, as a part of the Sea Grant network, engaged with communities across their region to share these resources and assets. As the pilot program ended, Sea Grant transitioned the coordinator positions to be a part of the growing cadre of Resilience Extensions Specialists across the network, bringing with them their connections to NOAA and community partners.

Sea Grant is also building and strengthening its National Federal Partnership Liaison program. The liaisons are funded by the National Sea Grant Office, a federal partner agency or program, and the host Sea Grant program. This program adds capacity to work with Sea Grant and federal partner(s) to identify needs and products on key national concerns (e.g. hurricanes, flooding, and coastal storms, marine, aquatic, and coastal hazards, fishing communities) and to harness the Sea Grant network and its expertise to share federal partner research results, information products, and services with stakeholders and research end-users at the community, state or regional level.



SPECIFIC ACTIONS THAT SEA GRANT CAN TAKE MOVING FORWARD

Support research that produces breakthrough technologies and solutions that increase the resilience of natural and built infrastructure to coastal hazards.

- ◆ Support the development of tools that incorporate the latest science and long-term datasets as well as real-time data to improve decision-making that protects human health and safety and ecosystem services.
- ◆ Conduct socioeconomic analysis of different adaptation and resilience actions for diverse communities, and address barriers that prevent the adoption of adaptation, mitigation and resilience strategies.
- ◆ Predict socioeconomic impacts of climate and sea and Great Lake level change on human population trends, community infrastructure, short- and long-term community demographic shifts, social capital, and commerce centers for county and community planners and local governments.
- ◆ Develop and/or evaluate the effectiveness of innovative approaches to increase public understanding of risks associated with coastal hazards and sea level rise and to encourage adaptive behaviors.
- ◆ Collaborate with other federal agencies, industries and programs [like Climate and Ocean: Variability, Predictability and Change (US CLIVAR), National Weather Service, National Aeronautics and Space Administration (NASA), The Weather Channel, Accuweather, etc.] to improve the assessment of weather and climate risks on local and regional scales, and tailor products to meet the needs of diverse coastal residents and stakeholders.
- ◆ Determine linkages between human actions (e.g., physical alterations to coasts, groundwater depletion) and natural systems that can either increase or compromise ecological integrity and community resilience to weather events and climate change.
- ◆ Foster leadership, knowledge and capacity among community leaders and residents for increased success at tackling issues beyond the scope of individual researchers or extension specialists actions (e.g., climate communication training, leadership training, grant writing training). This should focus on individuals and groups outside of the traditional professional sphere such as church leaders, fisheries coalitions and community groups.
- ◆ Connect, engage and educate the research community to prepare them to participate in applied research that will help build coastal resiliency.
- ◆ Train the professionals (e.g., consultants, engineers) who often provide the technical support to resilience activities with the latest science concepts, research and tools.



Expected Outcomes from Enhanced Sea Grant Support

- ◆ Communities are more resilient and financially robust as economic and social benefits are gained from adaptation and mitigation actions.
- ◆ Communities have increased baseline knowledge of weather and climate risks and have incorporated what they have learned in their formal planning efforts to enhance their resilience.
- ◆ Communities have direct access to an inventory of weather and climate information resources and decision-support tools which are applicable to their situation.
- ◆ Communities have the capability to share weather and climate information resources and localized tools to residents, property owners, business owners, and other decision-makers.
- ◆ Communities and states have access to increased capacity through a cohort of trained students with relevant professional development experience.
- ◆ Communities understand the risks and hazards related to changing weather patterns and climate change.
- ◆ Communities include adaptive management strategies to learn from failures in local plans and policies and have pathways to acquire funds to implement their strategies.
- ◆ Local, county and state government agencies have detailed plans ready for execution during and following hazard events and disasters that include guidance for communities to proceed with recovery.
- ◆ Communities have foundational information to inform policy and planning options under different weather and climate scenarios.
- ◆ Decision-makers understand trade-offs in future planning as it relates to coastal community and ecosystem resilience options.
- ◆ Communities have access to building and engineering design innovations that consider adaptation, mitigation and liveability under changing coastal conditions.
- ◆ Communities can determine the current and future extent of impacts from SLR and groundwater intrusion, including impacts to water supplies, septic and sewer systems, storm water discharge, treatment, and storage infrastructure.



ENDNOTES

1. Bureau of Labor Statistics and Bureau of Economic Analysis. Statistics are for 2016 and are compiled at <https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html>
2. NOAA National Centers for Environmental Information. <https://www.ncdc.noaa.gov/billions/>
3. The Global Risks Report 2020. World Economic Forum https://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf
4. United Nations COVID-19 Response <https://www.un.org/en/un-coronavirus-communications-team/un-working-ensure-vulnerable-groups-not-left-behind-covid-19>
5. Sweet, W., Dusek, G., Marcy, D., Carbin, G., and Marra, J., (2019) 2018 U.S. State of High Tide Flooding with a 2019 Outlook. NOAA Technical Report NOS/CO-OPS 090. https://tidesandcurrents.noaa.gov/publications/Techrpt_090_2018_State_of_US_HighTideFlooding_with_a_2019_Outlook_Final.pdf
6. NOAA National Weather Service Coastal Flood Event Database. <https://www.weather.gov/chs/coastalflood>
7. An Assessment of the Impacts of Climate Change on the Great Lakes, (2019) Environmental Law and Policy Center. <http://elpc.org/wp-content/uploads/2019/03/Great-Lakes-Climate-Change-Report.pdf>
8. <https://toolkit.climate.gov/tool/national-sea-grant-resilience-toolkit>

FOR MORE INFORMATION

Russell Callender, Director
wrc4@uw.edu
206.685.9215

Washington Sea Grant
College of the Environment
University of Washington
3716 Brooklyn Ave. NE
Seattle, Wa 98105



Produced by Washington Sea Grant WSG-AS 20-02 • 10/20