

Community Response to Flooding

*A 10 Year
Vision for
the National
Sea Grant
Program*

*September
2018*



Every community served by a Sea Grant program is making locally relevant, science-based decisions to build resilience to floods, informed by Sea Grant's research, education, extension, and communication efforts.

**Sea Grant**

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About this vision

The ten-year vision for work by Sea Grant to address community response was led by the following individuals

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The vision was developed in 2017-18 through a comprehensive process working with and seeking the input of Sea Grant representatives from across the network. More information about the process used to create this vision can be found in the appendix of this report.

Community Response to Flooding

A 10 year vision for the National Sea Grant Program

VISION

Every community served by a Sea Grant program is making locally relevant, science-based decisions to build resilience to floods, informed by Sea Grant's research, education, extension, and communication efforts.

Introduction and background

Flooding is consistently the most expensive and destructive natural hazard affecting the United States. Floods cost the United States about \$984.5 billion from 1980 to 2017.¹ Increasing populations and infrastructure in hazardous areas combined with climate change and sea-level rise may increase the average annual loss to up to \$1 trillion per year by 2050.²

Due to the impacts of flooding and flood losses to our communities, Sea Grant programs around the country have engaged in this critical community issue in a myriad of ways.

For example, Sea Grant Programs:

- Help local governments assess their vulnerability to flooding and how that may change due to changing climate conditions and sea-level rise;
- Raise awareness of flood risks, flood causes, and how to mitigate flood damages;
- Help communities understand, participate in, and build money-saving resilience through the National Flood Insurance Program (NFIP) and Community Rating System (CRS) program;
- Work to increase civic engagement in addressing flooding and facilitate collaboration among local and regional entities to address flooding risks;
- Aid communities in understanding infrastructure options that can help reduce flood risk and flood losses;
- Assist local governments in understanding legal risks and policy options associated with flooding and adapting to sea-level rise.

¹ NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2018). <https://www.ncdc.noaa.gov/billions/> [including losses from flooding and tropical cyclones from 1980-2017; tropical cyclones were included in this estimate since flooding caused by such storms is separate from freshwater flooding data. See, e.g. *United States Flood Loss Report – Water Year 2013* : www.nws.noaa.gov/hic/summaries/WY2013.pdf

(stating that “The annual United States Flood Loss Report estimates direct damages from freshwater flooding only; it does not include storm surge or coastal flooding.”)].

² Climate Home News, Flooding could cost US\$1 trillion a year by 2050, published Aug. 19, 2013, available at www.climatechangenews.com/2013/08/19/flooding-could-cost-us1-trillion-a-year-by-2050/.

Sea Grant's niche in community response to flooding



Many organizations understand the impact of flooding and work on this critical issue. Sea Grant programs have some unique attributes that make them particularly well-suited to this effort and creates a particular niche for them to focus on research, outreach, and education to communities.

Sea Grant programs possess personal relationships with people at the local level, allowing Sea Grant programs to hear directly from communities and their stakeholders about their data, information, and tool needs, and take that feedback back to Sea Grant's academic and funding partners.

Sea Grant programs have proven themselves nimble and responsive to community needs. Sea Grant programs have world-class scientists and researchers available to respond to these needs with new information and solutions for communities.

Sea Grant programs have earned a place in local communities as a trusted source of unbiased information that assists local governments in addressing critical issues.

Sea Grant programs often serve as a neutral convener and facilitator when communities confront contentious issues fostering dialogue between many individuals and organizations. While Sea Grant programs are tuned into and part of local communities, they also are part of a nation-wide network that helps bring a broader perspective and new ideas and approaches for consideration into the communities we serve.

Sea Grant programs help bring funds to community-driven projects to address flooding.

Taken together, these attributes allow Sea Grant programs to effectively engage in workforce development, work with diverse stakeholders, provide technical assistance, bridge gaps between sectors, foster forward thinking, and ensure broad-based understanding of and support for effective community responses to flooding.

Purpose statement

The Community Response to Flooding Vision seeks to identify and target ways to enhance and strengthen the flood-specific niches and take advantage of them to ensure that Sea Grant programs around the country continue to assist their communities in making locally relevant, science-based decisions to build resilience to floods.

Strategic priority areas

Sea Grant is well positioned in its expertise, niche, and network to respond to issues related to community flooding. Sea Grant's research, extension, communication and outreach can provide solutions, convene stakeholders, and create deliberative dialogues

actions may span and influence efforts in others. These endeavors can lead to multiple short-, mid-, and long-range outcomes summarized later in this vision document. It is also important to recognize these strategic priority areas, actions, and outcomes may overlap with other vision initiatives across the Sea Grant Network, and subsequent work may

Those five strategic priority areas are:

- **Planning and Preparedness**
- **Permitting and Policy**
- **Green & Natural Community Assets**
- **Built Infrastructure**
- **Response and Recovery**

that help communities be more prepared to respond to flooding. The Sea Grant program can be made stronger with the prioritization and investment into five strategic priority areas distilled from work to articulate its vision for the next ten years.

The vision for these efforts is the result of input in 2017-18 from individual Sea Grant programs through surveys, webinars, and an in-person visioning workshop. Each of the strategic priority areas includes actions in research, extension and education, and other efforts that the program could pursue to fulfill the vision. These actions should recognize and leverage existing efforts where possible. To avoid repetition, each unique action is only listed under one strategic priority area though

look at how these may complement each other. One in particular, *diversity, equity and inclusion* is included and woven throughout these priority areas.

As a vision document, parts of this vision are aspirational. Not every state Sea Grant program will necessarily have the need or the financial or staff resources to implement activities listed for each of the strategic priority areas. At the same time, the vision seeks to be broad enough to encourage consideration of a large range of current and potential Sea Grant activities. For Sea Grant programs lacking current expertise to pursue actions listed below, each strategic priority area contains a section on "Building Sea Grant Capacity."

Planning and Preparedness

Statement of strategic priority

Sea Grant will assist community decision-makers, business leaders, and residents in planning for and preparing for floods.

Background

Sea Grant has a unique role in helping communities prepare and plan for floods before they occur and impact the community. Sea Grant can increase and enhance its role to share, communicate, and show stakeholders, including decision-makers, business owners, and residents, various existing maps and mapping tools that can be used to help them visualize, plan for, and prepare for flooding scenarios. Sea Grant assesses and takes advantage of existing maps and resources before considering investing in the creation of new maps or tools. Using visualization maps and tools, Sea Grant facilitates conversations with stakeholders and connects them with other audiences and representatives that may be underrepresented or under-served in the

processes of community planning and preparation for flooding.



Actions for Sea Grant

Extension and education

- Disseminate identified tools both internally to Sea Grant staff and externally to community decision-makers, stakeholders and professionals.
- Provide placed-based training to build understanding of how to design and execute situational vulnerability needs assessments for a variety of audiences.
- Intentionally convene diverse groups in planning, paying attention to location, timing, process and accessibility to ensure all members of the community are represented.
- Invest in or increase effort into providing communities, businesses and individuals guidance and engaging them in pre-disaster planning for post-disaster redevelopment.

SNAPSHOT: Current efforts of Sea Grant Programs Creating innovative tools

The Gulf Tools for Resilience Exploration Engine (Gulf TREE) is a new website where users can walk through a series of questions that help them identify the best climate tool for their needs. Stakeholders have identified guidance in climate tool and model selection as a critical need - it can be difficult to find the right tool and overwhelming to know which tool to select.

SNAPSHOT: Current efforts of Sea Grant Programs Creating innovative tools

Hawai'i Sea Grant has developed a Homeowner's Handbook to Prepare for Natural Hazards which informs homeowners of hazard risks in their area and offers practical, relevant, cost-effective options for reducing those risks. To date the Homeowner's Handbook has been regionally adapted by seven other Sea Grant programs, with multiple print runs in multiple languages.

Research

- Conduct needs assessments to identify gaps in knowledge and inventory and compile existing mapping tools.
- Develop and share a report on processes and lessons learned that incorporates regional and cultural sensitivities and nuances.
- Identify and address flooding-related knowledge gaps through Sea Grant RFPs and ensure that all research incorporates extension activities.
- Incorporate good communication and solutions-focused risk communication practices in all training efforts and education programs.
- Partner with other organizations as trusted messengers for communities that are challenging to reach and/or include sensitive subjects/vulnerable populations.

Build Sea Grant capacity

- Build Network capacity by establishing a sustainable community of practice around assisting communities with planning and preparedness.
- Develop a synthesis of best practices, processes and lessons learned that Sea Grant uses to engage with communities around planning and preparing for flooding.
- Include practices and lessons learned at multiple scales (national and regional) that include regional and cultural sensitivities and nuances.
- Engage and connect Sea Grant and Land-Grant Extension faculty and staff in the USDA EDEN Network (Emergency Disaster Extension Network).
- Provide training for Extension and program staff on best methods for risk communication practices, and where appropriate, how to work with constituents who disagree with science.

***SNAPSHOT: Current efforts of Sea Grant Programs
Mentoring teams of engineering students addressing
community needs.***

MIT Sea Grant mentors teams of undergraduate engineering students addressing community needs. In 2014, a team conducted an assessment of flooding vulnerability and adaptation options for municipal properties in Chelsea, MA, a densely populated, highly vulnerable coastal city with a high proportion of environmental justice communities.



OUTCOMES IN COMMUNITY PLANNING AND PREPAREDNESS

Short-term

- 1) Local decision-makers have knowledge of flooding impacts and actions to reduce them.
- 2) Decision-makers and residents know how to access and use maps and other flood resilience tools.
- 3) Constituents understand flood risk and impacts, and have more knowledge of how they can influence decision-making.
- 4) Communities and decision-makers have access to information about changing and future flood risk.
- 5) Local, state, and federal agencies and organizations develop coordinated methods of planning and preparedness.

Mid-term

- 1) Elected and appointed officials have allocated resources and inspired collaborative partnerships to promote flood management and mitigation.
- 2) Decision-makers are using accessible maps with local information including current and future conditions.
- 3) Constituents are effectively advocating decision-makers for better flood planning and solution implementation strategies.
- 4) Communities have new or updated comprehensive plans, hazard mitigation plans, and land development plans that include changing flood risk, sea level rise, precipitation and storms.
- 5) Communities use tools and have increased capacity for effective decision-making.
- 6) Business and property owners have tools available to plan and prepare for acute and chronic impacts.
- 7) Homeowners implement adaptation strategies learned from adaptation resources (e.g. Homeowner's Handbook to Prepare for Natural Hazards).
- 8) Decision-makers engage with diverse perspectives, knowledge and values.
- 9) Resources are allocated to socially vulnerable populations and communities.
- 10) Increased stability and sustainability of storm water systems with fewer interruptions such as plumbing system backups or mandatory sewage discharge.
- 11) Residents will understand the risk associated with driving through, playing in, and otherwise interacting with flood waters.

Long-term

- 1) Communities implement plans to reduce flood impacts and increase resilience.
- 2) New development in communities incorporates changing flood risk and climate change patterns, and communities adapt their developed areas for future flood risk.
- 3) Exposure to flood risk is reduced and disaster recovery costs decline.

Permitting and Policy

Statement of strategic priority

Sea Grant assists communities to design, evaluate, adopt, and implement policy revisions that reduce risks from flooding.

Background

Sea Grant recognizes that policies at the national, state, watershed, and local scale often drive how communities prepare and respond to flooding as well as the risk of flooding. Policies play an integral role in directing resources to prevent or address community flooding. Permitting through regulations and ordinances is often the mechanism through which these policies are implemented at the local scale. Policies and permitting procedures can act both as barriers and opportunities to communities, impacting their resilience to flooding.

Sea Grant provides current research upon which state and local policies and ordinances may be founded as well as example policies which integrate scientific and legal research. Existing work across multiple Sea Grant programs illustrates communities also need guidance and assistance in reviewing existing policies; with such assistance, communities can more easily recognize opportunities and barriers, and can be most effective in taking steps to minimize, prevent or respond to flooding. Sea Grant's niche in this arena lies in

its expertise and capacity to facilitate community conversations with leaders, citizens, and businesses. Such conversations serve as an opportunity to help stakeholders and communities be better prepared to address flooding events. Sea Grant also serves as a provider of unbiased scientific research and legal policy analysis supporting policy review, development, and implementation.

SNAPSHOT: Current efforts of Sea Grant Programs Engaging with community leaders

LCSG's Green Infrastructure Collaborative is focused on promoting GI and LID for municipalities, state agencies, planners, designers, engineers, students and homeowners.



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Actions for Sea Grant

Extension and education

- Conduct needs and knowledge assessment of local leaders.
- Collect existing research on green infrastructure, living shorelines, stormwater and flooding policy and use it in programming for communities, leaders, and professionals.
- Lead forums to facilitate conversations with local officials and stakeholders.
- Provide policy and legal analysis professional development training for local government officials and consultants on floodplain management, living shorelines, resilience building, and other areas of policy relating to community flooding.
- Develop policy review tools and methods to assist communities in reviewing ordinances.

***SNAPSHOT: Current efforts of Sea Grant Programs
Engaging with community leaders***

RISG's PREP-RI online module series aims to increase the capacity of municipal decision-makers to make effective choices supporting resilience to the impacts from climate change. Considering current and future impacts helps shape decisions that enhance the health, safety, and welfare of Rhode Island's communities.

- Assist communities in reviewing and auditing policies.
- Provide model ordinances that prevent or minimize community flooding and its impact, based on research.
- Deliver public outreach regarding flood issues.

Research

- Elevate a priority for green infrastructure and stormwater policy research through Sea Grant research programs (i.e., SG RFPs).
- Work with research coordinators to ensure Sea Grant programs include law and policy analysis as applicable projects within their research programs (research RFPs).
- Advance the legal research by Sea Grant on flooding-related policies.

Build Sea Grant capacity

- Provide professional development and training for Sea Grant faculty and staff that will build their expertise and capacity to assist leaders, professionals, and community members to reduce risk and impacts from flooding through the examination and revision of policies.

OUTCOMES IN COMMUNITY PERMITTING AND POLICY

Short-term

- 1) Community leaders have increased knowledge and understanding of issues related to flooding.
- 2) Community leaders have access to model ordinances and best practices that reduce their risk from flooding.
- 3) Community leaders and staff develop the skills and language to have effective conversations about coastal and stormwater flooding.
- 4) Community leaders, decision makers, and the public has an increased knowledge and understanding of issues related to flooding and how various tools of policies and practices are used to reduce risk.

Mid-term

- 1) Local community leaders and staff will review existing policies related to flooding.
- 2) Local community leaders and staff will deliberate, discuss, and debate policy alternatives to reduce the risk and impact from flooding.
- 3) An informed citizenry will more broadly support policies adopted by communities to reduce the risk and impact from flooding.
- 4) Communities adopt and enforce policies that reduce the impact from coastal and stormwater flooding. For example, building and zoning codes are revised, adopted and enforced that reduce the impact from flood damage.

Long-term

- 1) Local communities decrease the impacts of coastal and stormwater flooding.

Green and Natural Community Assets and Infrastructure

Statement of strategic priority

Sea Grant will help communities use both existing natural areas and built green infrastructure to increase their resilience to flooding.

Background

Green and natural community assets include both existing natural areas such as forests, wetlands, natural shorelines, floodplains, and riparian areas, and built green infrastructure. The latter can be defined as both stormwater management practices designed to mimic natural areas in their filtration, infiltration, and evaporation of stormwater, including such practices as rain gardens, green roofs, tree trenches, and pervious pavement, as well as living shorelines to address erosion, water quality, and habitat challenges. These assets play an increasingly important role in mitigating flooding while also maintaining and improving water quality.

Communities benefit from existing natural areas but struggle with fully appreciating the value they provide in reducing or preventing damage from flooding. Many of these areas are desirable places for development because

of their proximity to water. At the same time, it's important to recognize that green and natural infrastructure practices have variable viability across the country. Without understanding the full value these natural areas provide, it becomes difficult to make development and land use decisions that maintain or even expand and improve the natural functions of these areas. Communities also have difficulty justifying building new green infrastructure because of lack of experience in designing, building, monitoring, and maintaining these projects, and uncertainty about the full value of the benefits provided.

Sea Grant research and extension can help communities recognize and prioritize natural areas that are providing significant protection from flooding and extreme rain events, address the concerns over green infrastructure policy and permitting, design, construction, and maintenance, and help communities understand the role and expand the use of green infrastructure to increase resilience to flooding. Existing Sea Grant efforts supporting green and natural community assets can be leveraged and expanded across the network.



Actions for Sea Grant

Extension and education

- Provide fundamental flood training for communities, to help them recognize their specific risks and vulnerabilities such as what type of flooding might occur, expected impacts, and resilience measures (e.g., who is impacted, and what capacity do they have to respond). This training must:
- Be place-based and specific to community entities (e.g., institutions, businesses, residents, governments).
- Incorporate best available data and information on climate trends and projections; tie to the Weather and Climate Enterprise visioning effort, FEMA, ASFPM and other important national partners.
- Help communities identify and prioritize existing natural assets and identify areas of sensitivity (e.g., headwaters, riparian, shoreline) where additional protection efforts are needed (informed by research).
- Provide assistance to communities, schools, and other institutions to implement green infrastructure practices in pilot and demonstration projects to familiarize communities and contractors with new practices and maintenance requirements.
- Educate K-12 and undergraduates students in hydrology, impacts of impervious surfaces, and the water cycle.

SNAPSHOT: Current efforts of Sea Grant Programs

Examining the use of green infrastructure policies to reduce local stormwater flooding and impacts to water quality

MNSG and WISG have been working with coastal and inland communities to audit existing local ordinances, examining what barriers prevent the adoption of green infrastructure for stormwater management. The Tackling Barriers to Green Infrastructure: An Audit of Municipal Codes and Ordinances workbook developed by WISG is being used as guide for facilitating forums of discussions with community leaders and professional staff.



Research

- Improve available information on flooding risks to communities, especially vulnerabilities of specific places and facilities, including climate change and sea level rise scenarios based on the best available science.
- Determine impacts of flooding and potential management strategies for vulnerable populations within the communities where we work.
- Identify and facilitate conversations about economic value of natural assets in communities, and prioritize their protection
- Improve our understanding of green infrastructure practices - specifically relating to design, maintenance, costs, and long-term function, including how these may vary across varied geographies and climates.

Build Sea Grant capacity

- Enhance capacity of Sea Grant staff on green and natural community assets through professional development opportunities, including trainings on green infrastructure (e.g., definitions of GI, implementation, costs and benefits).
- Share Sea Grant expertise across programs - provide sabbatical or exchange programs or other professional development opportunities so states can bring in and learn from expertise of other programs on issues relating to flooding, green infrastructure, and related topics, while providing enhanced opportunities for Sea Grant professionals.

OUTCOMES IN COMMUNITY GREEN AND NATURAL COMMUNITY ASSETS AND INFRASTRUCTURE

SHORT-TERM OUTCOMES:

- 1) Communities recognize benefits of green and natural community assets and how they fit with community goals (resilience, water quality, green space, habitat, recreation, beauty, etc.), help address flooding and other vulnerabilities, and meet CRS requirements.
- 2) Communities identify existing natural assets that are providing protection from floods.
- 3) Community members understand their roles in advancing/applying green infrastructure in their community.

MID-TERM OUTCOMES:

- 1) Communities use diversity of perspectives (including local knowledge) in planning, to understand specific vulnerabilities to flooding, map green and natural community assets, and identify opportunities for green infrastructure to provide multiple benefits.
- 2) Communities have the capacity and workforce to build and maintain green infrastructure.
- 3) Communities push for and support green and natural community assets.
- 4) Communities have implemented and are enforcing ordinances and policies that promote built green infrastructure and protect natural assets.
- 5) Communities, businesses and residents take voluntary steps to implement green infrastructure on their property.

LONG-TERM OUTCOMES:

- 1) Floods result in less damage to community infrastructure and natural habitats, with a faster recovery.
- 2) Stormwater impacts on community infrastructure, water quality, and coastal ecosystems are reduced.
- 3) Community costs are reduced, and benefits realized, through: less damage, lower insurance rates (CRS), reduced business losses, lower costs for drinking water treatment, maintained or increased recreation opportunities, and saved energy.

Built Community Assets and Infrastructure

Statement of strategic priority

Sea Grant will help communities protect existing built infrastructure from flooding, design more flood resilient infrastructure, and create future-ready drainage infrastructure.

Background

Built infrastructure refers to the human-made environment, facilities, and physical structures that are necessary to keep communities functioning. This includes buildings, roads, bridges, seawalls, tide gates, stormwater management systems, wastewater treatment plants, utility lines, pump stations, and any other human-made structure necessary for the regular operation of a community.

Built infrastructure is often vulnerable to flooding. To keep communities functioning and viable in the face of increased flooding now and in the future, built infrastructure needs to be resilient: roads and bridges need to remain passable; stormwater management systems need to continue managing rainfall to keep roads clear and avoid flooded buildings; seawalls and tide gates need to protect against wave damage and tidal flooding; and wastewater treatment plants need to keep untreated waste from entering surface and groundwater.

Addressing flooding issues related to existing and future built infrastructure is an essential role of Sea Grant because our communities depend on their built infrastructure. Without it, people can't access homes, offices, or stores; children can't get to school; restaurants and businesses can't make or receive shipments; and tourists can't enjoy the beaches, visit parks or museums, or frequent hotels, shops, or restaurants. Decisions about built infrastructure and flooding are tied to public policy and education as well as science and research, all of which are core capabilities of Sea Grant.

Built infrastructure and green infrastructure are often interdependent; destruction of green infrastructure can increase the need for and reliance on built infrastructure to manage flooding. Conversely, where practicable, green infrastructure can be used to replace some built infrastructure to pursue a more ecosystem-based approach to flood management. The Built Infrastructure Strategic Priority Area is also connected to the other SPAs because public policy and planning are involved in the creation of new infrastructure, and response and recovery rely on built infrastructure to either avoid the need for response or to enable response and recovery.



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from Noun Project



Actions for Sea Grant

Extension and education

- Identify socioeconomic indicators to include in a baseline vulnerability assessment.
- Facilitate the process for communities to identify and map their built infrastructure.
- Help communities create equitable processes that take all citizens' needs and capacities into account to identify and prioritize development of built infrastructure.
- Incorporate historic/local knowledge into engineered solutions; identify community leaders that can share that knowledge with local decision-makers.
- Perform regulatory/code reviews for best flood practices and standards.
- Engage the development community in discussions about flood-related vulnerabilities and flood protection practices.
- Educate planners, local decision-makers, and other stakeholders about flood-related vulnerabilities of built infrastructure and best flood protection practices.

SNAPSHOT: Current efforts of Sea Grant Programs

Site-specific flood risks

The City of Satellite Beach on Florida's east coast, through a Florida Sea Grant funded project, worked with Stetson University researcher Dr. Jason Evans to better understand their current and future flood risks under scenarios of sea level rise. As part of the review, the City became concerned about flooding of its aging fire station. Based on work by Dr. Evans and his team, the City identified a more flood-resilient location and will construct a new fire station safer from flooding.

Research

- Acquire data for a baseline vulnerability assessment using identified socioeconomic indicators.

Build Sea Grant capacity

- Foster internal Sea Grant discussion about successes, lessons learned, etc. regarding built infrastructure community engagement efforts.
- Utilize Sea Grant communicators to tell success stories about how Sea Grant has assisted communities in protecting their built infrastructure from the impacts of flooding and developing new infrastructure that is resilient to flood impacts or decreases flood risk.

OUTCOMES IN COMMUNITY BUILT COMMUNITY ASSETS AND INFRASTRUCTURE

SHORT-TERM OUTCOMES:

- 1) Local leaders understand the value of built infrastructure in protecting community assets.
- 2) Property owners understand vulnerability and how to mitigate their flood risk.
- 3) Communities understand which assets they deem valuable and worth protecting. Local leaders utilize equitable process to prioritize those assets.
- 4) Local leaders accept the upfront costs of flood-resilient built infrastructure to protect community assets. Communities develop just, equitable plans to fund infrastructure improvements.
- 5) Local leaders are aware of flood protection standards through local training.
- 6) Local leaders understand and seek to address storm pathways.
- 7) Local leaders engage diverse audiences.

MID-TERM OUTCOMES:

- 1) Local leaders use a combination of gray and green infrastructure to protect critical assets from flooding at local and state levels.
- 2) Regulations encourage and do not prevent flood mitigation practices.
- 3) More buildings adhere to flood protection standards as building stock is brought up to code through substantial improvement/new construction.
- 4) Flood barriers and re-routing mitigation practices are implemented using historic and local knowledge.

LONG-TERM OUTCOMES:

- 1) During and after flood events, more business remain open, more neighborhoods are not flooded, more people are safe to stay at home, and more properties remain dry.
- 2) More flood mitigation best practices are implemented.
- 3) More properties are protected from flood events.
- 4) Hydrologic processes are restored.
- 5) Critical facilities and transport systems remain functional after flooding (for future conditions).

Response and Recovery

Statement of strategic priority

Sea Grant efforts allow communities to effectively address both response and recovery needs following flooding.

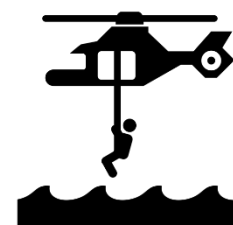
Background

Response needs are defined as those needs during and immediately following a flood (e.g., saving lives, getting public works and water systems up and running, moving individuals back into dwellings), which generally happen from the time a flood occurs until about a month afterwards. Sea Grant may support communities in response, but typically is less involved in emergency response including rescues and saving lives. Recovery needs are those focused on rebuilding a community to allow it to function at or above the level at which it had functioned prior to the flood. This also includes the transition period from recovery to preparedness for future floods (see Planning and Preparedness SPA).

Sea Grant has not had a consistent role in flooding response and recovery across its network. A few SG programs take an active approach to engage communities in response preparedness activities (e.g. preparing to respond; efforts to prepare for flooding are covered under the Planning and Preparedness SPA) and to facilitate communications between agencies and communities following storm events. Others have responded to

community needs for coordination and information. For the remaining programs, Sea Grant Extension has had limited engagement in educating about or facilitating community response and recovery activities. An opportunity exists for Sea Grant Extension staff to engage throughout the network to aid individuals, businesses and communities in proactive, pre-disaster response and recovery planning, and to share available resources from multiple agencies and organizations. These actions will improve community resilience following flood events.

Sea Grant has key strengths that position it to be an effective participant and leader in flooding response and recovery outreach. Of critical importance is the well-developed network of stakeholder groups in local communities. Sea Grant will catalyze on these place-based networks to reach a broad suite of specific, targeted audiences with education and technical assistance. Ultimately, Sea Grant will foster and inspire communities to think and effectively plan ahead to be most resilient to future conditions. Our efforts will be primarily focused on helping communities plan for inevitable response and recovery efforts, and may include supporting roles during and immediately after flooding, depending on specific program capacities and community needs.



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Actions for Sea Grant

Extension and education:

- Compile and share flooding response and recovery materials from across agencies with communities and with other organizations and agencies involved in response and recovery efforts.
- Offer technical assistance to communities so they can better plan and prepare for response and recovery before it is needed.
- Convene local officials, NGOs, private sector industries and businesses, and community leaders to provide them knowledge and skills that allow them to make forward-thinking resilience decisions.
- Assist stakeholders in response by being flexible to needs (e.g., After Katrina, LASG provided ice to fishermen so they could get to fishing again).

Research:

- Include adaptation research into existing Sea Grant RFPs
- Conduct research to inform well-coordinated flood response and recovery efforts in communities.

Build Sea Grant capacity:

- Participate in response and recovery trainings offered by other agencies to build preparedness expertise.
- Conduct a comprehensive needs assessment, including:
 - Assess ongoing response and recovery efforts in which Sea Grant is involved, and that other agencies and organizations provide.
 - Meet with municipalities and organizations engaged in response and recovery.
 - Develop a white paper that outlines existing services and gaps in those services that are offered by Sea Grant and other agencies and organizations.
 - Describe lessons learned from Sea Grant programs that have engaged in response and recovery activities.
 - Make research-based recommendations of key roles Sea Grant Extension can play in flooding response and recovery.
 - Identify specific niches Sea Grant can play to fill gaps in available services.
 - Identify needed response and recovery-focused professional development training for Sea Grant Extension staff.
 - Establish MOUs with a variety of response and recovery agencies to define the role of Sea Grant in these processes.

OUTCOMES IN COMMUNITY RESPONSE AND RECOVERY

SHORT-TERM OUTCOMES:

- 1) The emergency management community has knowledge of Sea Grant resources to inform response and recovery.
- 2) Local communities understand federal needs for disaster response and recovery.
- 3) Communities are aware of and have access to flood research and information that predicts future conditions.
- 4) Communities are aware of available response and recovery tools.
- 5) Stakeholders have the necessary information to acquire financial resources to rebuild and recover.

MID-TERM OUTCOMES:

- 1) Local and elected officials adopt and enforce higher regulatory standards for rebuilding and recovering.
- 2) Homeowners rebuild to higher standards.
- 3) Decision-makers and homeowners integrate the best available science and future conditions into recovery and rebuilding.
- 4) Community officials use the latest research and science to inform resilience planning and hazard mitigation projects.
- 5) The public and private sector are involved in developing community flood resilience visions for future.

LONG-TERM OUTCOMES:

- 1) Individuals and communities impacted by floods do not rebuild in locations that were identified in pre-disaster plans as being vulnerable to flooding.
- 2) Communities are rebuilt to withstand future disaster.

Cross-cutting ideas, concepts, issues and connections to other Sea Grant Visions

Linkages exist between the *Community Response to Flooding* visioning effort and a number of other visioning initiatives. Issues of environmental justice and a need to address diversity, equity and inclusion (DEI) affect all Sea Grant visioning efforts; still, these issues carry special import in community needs for flooding response and recovery. As such, members of our planning team that met in person in late February developed a series of outcomes ranging from short- to mid- to long-term that addressed these areas. We then reached out to the leaders of the DEI visioning effort to review and offer feedback to allow us to better frame these outcomes within this visioning document. Environmental justice and DEI outcomes have been included in each of the focus areas of this document as a result.

We also recognize that there are linkages between this initiative and the Local Knowledge visioning team, namely, as related to the environmental justice, DEI outcomes and terminology, and changing environmental conditions. Further, there are close linkages with the Weather and Climate Enterprise visioning effort. We have asked each of these teams to specifically review the draft visioning plan to identify and incorporate appropriate linkages with those efforts as seamlessly as possible.

SNAPSHOT: Current efforts of Sea Grant Programs

Community Resilience Collaborative

In response to Hurricane Harvey and its impact on Houston and surrounding coastal areas, Texas Sea Grant and Texas A&M University partnered to form the Community Resilience Collaborative (CRC). The CRC provides services to communities that lack resources to hire planners, helping them to develop disaster recovery plans. It also introduces resources and best planning practices to local decision-makers and staff. Such knowledge and resources aid them in developing strong recovery plans and enable them to be better prepared ahead of storms yet to come.



Environmental Justice and Diversity, Equity and Inclusion

Statement of integrated priority

In its efforts to address community response to flooding, Sea Grant reaches diverse populations, including those who are socially, economically, or otherwise marginalized.

Background

Sea Grant recognizes that communities represent a multitude and diverse set of unique populations, including those that are particularly vulnerable to flooding and lack the capacity to prepare for or respond to flooding. To address this, we developed specific short-, mid- and long-term outcomes in an effort to reach a broad audience, including marginalized populations.

Actions for Sea Grant

Extension and education

- Offer community flood hazards planning training and resources to the identified vulnerable and marginalized communities. This may include sharing information about flood-related risks, available critical services, evacuation routes, sample bylaws, and building awareness of (and thereby providing access to) available legal resources.

- Ensure that all work, whether education, extension, or research, conducted as part of the Community Response to Flooding vision integrates awareness of environmental justice and diversity, equity, and inclusion in project design and execution.

Research

- Conduct assessments to identify vulnerable and marginalized populations in their programming areas, and understand their abilities to prepare for, respond to, and recover from flooding.

Other

- Attend cultural competency training to most effectively and respectfully work with these populations.
- Identify and engage community leaders outside our Sea Grant office to provide the insight we need in order to approach these audiences.
- SG recruits and retains workforce with an ethos of DEI such that staff and advisory boards represent the diversity of the communities that they serve.

OUTCOMES IN ENVIRONMENTAL JUSTICE AND DIVERSITY, EQUITY, AND INCLUSION ACHIVED THROUGH WORK IN COMMUNITY RESPONSE TO FLOODING

A [Logic Model](#) was developed to identify short-, mid- and long-term environmental justice and diversity, equity and inclusion outcomes related to community flooding. These include that Sea Grant staff:

- communicate with the DEI visioning team and use DEI visioning team resources;
- have knowledge/understanding of the communities who need to be reached (e.g., by conducting vulnerability assessments);
- gain knowledge of marginalized populations and their leaders;
- be able to effectively work with marginalized populations (e.g., cultural sensitivity training, appropriate terminology/language to use to speak non-offensively and effectively with marginalized communities);
- understand the systemic inequities that are in place that have contributed to existing conditions (e.g., what has made certain communities live in places that are so vulnerable to flooding? What level of income does the Army Corps need to be able to address a known flooding problem?).

SHORT-TERM OUTCOMES:

- 1) Marginalized communities³ understand the risks that are associated with living in flood prone areas and options for reducing risk;
- 2) Marginalized communities are aware of critical services and evacuation routes;
- 3) Marginalized communities are aware of green and natural infrastructure options to reduce flood risk;
- 4) Marginalized communities are aware of policies and permitting procedures they can implement to reduce flooding risk.

MID-TERM OUTCOMES:

- 1) Sea Grant staff are a diverse and trained workforce able to communicate with a broad and diverse audience and build relationships with community leaders of vulnerable and marginalized populations.

³ We recognize that marginalized communities may not be distinct entities or identifiable within distinct political or governmental boundaries. This term is used to represent a broad variety of possible populations, some of which may be represented by only a few individuals, while others may have broader representation.

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- 2) Marginalized communities will understand green infrastructure, natural community assets, and the role that both can play in reducing current and future flooding, increasing resilience to floods, and providing additional community benefits;
 - 3) Marginalized communities will actively participate in community educational and decision-making forums on issues related to community response to flooding;
 - 4) Marginalized communities will take hazard mitigation actions;
 - 5) Marginalized communities will have emergency preparedness, response and recovery plans, and have the knowledge and skills to implement those plans;
 - 6) Marginalized communities will adopt & enforce policies that reduce impact from coastal & stormwater flooding.

LONG-TERM OUTCOMES:

- 1) Marginalized communities do not build or rebuild homes in areas prone to flooding;
- 2) Marginalized communities have standards or bylaws that protect from floodplain development and encroachment, and do not live in floodplain or flood prone areas;
- 3) Marginalized communities have access to resources after flooding to rebuild to be more resilient;
- 4) Marginalized communities have power and knowledge to advocate for themselves;
- 5) Marginalized communities are protected and safe from flooding hazards;
- 6) Marginalized communities have less damage to community infrastructure and natural habitats, and faster recovery.

Implementation Plan - Next Steps

The strategic priority areas describe within in this vision provide a wide variety of actions Sea Grant can pursue in research, extension, education, and in other areas of investment. These are essential to taking full advantage of Sea Grant’s unique strengths and niche in responding to community needs related to flooding. These strategic priority area actions require a significant investment in capacity, financial resources, leadership and partner collaboration. Building the capacity of Sea Grant staff to engage with communities on flooding issues was a common theme within every strategic priority area and should be the immediate focus; development of a community of practice is recommended to organize and coordinate capacity-building efforts. In light of that, actions may be considered in the following priority:

Years 1-3

- Identify synergies and collaborate with other Visioning and Community of Practice efforts (e.g., Weather and Climate Enterprise, Diversity Equity and Inclusion)
- Create a Sea Grant “Community Response to Flooding” Community of Practice to collaborate, share current efforts, develop capacity-building opportunities, and maintain open lines of communication regarding flood-related efforts by Sea Grant programs:
 - Host regular meeting at NOAA’s biennial Social Coast conference or the Association of State Floodplain Managers annual conference
 - Host biennial conference calls
 - Form regional and/or topic-based connections
- Build organizational capacity of Sea Grant staff in the variety of topics discussed within the strategic priority areas, including:
 - Relevant trainings, acquiring Certified Floodplain Manager certifications, and when appropriate, hiring staff with relevant expertise
 - Green infrastructure design, maintenance, costs, and benefits
 - Risk communication
 - Response and recovery
 - Local codes, ordinances, and policies
 - Cultural competencies
- Provide dedicated program funding to engage in identified actions in each Strategic Priority Area

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- Continue and expand existing Sea Grant programming with emphasis on:
 - Engaging in critical community conversations with diverse stakeholders and partnering agencies.
 - Provide extension in recovery and response, and policy topic areas including flooding training,
 - Needs assessment/community engagement

Years 4-6

- Incorporate Community Response to Flooding visioning results into National and individual Sea Grant strategic plans under the following focus areas:
 - Resilient Communities and Economies
 - Healthy Coastal Ecosystems
 - Environmental Literacy and Workforce Development

Years 7-10

- Convene relevant NOAA programs in regular flood-focused meeting/conference

Glossary

Built infrastructure (see also Grey infrastructure): The human-made environment, facilities, and physical structures that are necessary to keep communities functioning; includes buildings, roads, bridges, tide gates, stormwater management systems, wastewater treatment plants, utility lines, etc.

Community A municipality, locality, or other entity with land-use jurisdiction, encompassing the culture, people, rules and regulations, infrastructure, and character of a given geographic region.

Environmental justice The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (US EPA).

Flooding The temporary condition when water covers dry land; depth can be only a few inches to several feet.

Green infrastructure Stormwater management method utilizing plants, soils, and natural percolation processes to minimize flooding; ecologically preferable to grey/built infrastructure because it mimics and restores natural processes and improves water quality.

Grey infrastructure (see also Built infrastructure): The human-made environment, facilities, and physical structures that are engineered by people to control and manage stormwater; includes, bridges, pipes, pumps, ponds, catch basins, etc.

Prepare The act of preparing for a natural disaster, specifically a flood; accomplished through planning, public outreach and information, and gathering necessary supplies at the individual, family, and community level.

Response During and immediately after a disaster, response is needed to keep people safe through blocking access to flooded roads, rescuing people from flooded homes and cars, public outreach about storm information and how to stay safe, and coordinating local, state, and federal efforts to provide assistance.

Recovery The act of restoring the normal functioning of a community immediately following a disaster; this phase typically lasts about a month and includes clearing debris, restoring power, repairing infrastructure, and fixing homes.

Stormwater Surface water resulting from a rainstorm; the practice of stormwater management ensures that stormwater flood risk and damage is minimized through redirecting the water away from infrastructure that could flood.

Storm pathway The path of least resistance and lowest elevation through which floodwaters pass. Identifying and mitigating storm pathways can significantly reduce flooding.