Translating Coastal Research Into Application Funded Projects

RipFinder: Mobile Rip Current Detection
California Sea Grant, Project Leads: Shauna Oh & Alex Pang
Federal funding: $150,000 (Tier 1)

This project focuses on providing a rip current detection tool directly in the hands of beachgoers via a smartphone app. The investigators will collect data on different types of rip currents, develop a machine learning model to detect different types of rips, and optimize the model for a smartphone platform. Users will simply point the phone's camera to the water to check the presence and location of rips. The app will engage users as citizen scientists to share information about detected rips, which can be used to help improve the existing NOAA rip current forecast model. The app will also educate the public through videos that explain the different types of rips, how they form and how to identify them. The team will perform community outreach for beta testing users, such as lifeguards and surfers.

Enhancing community resilience through knowledge co-production on sediment transport and bypassing around natural tidal inlets
New Jersey Sea Grant Consortium, Project Leads: Peter Rowe & Kimberly McKenna
Federal funding: $150,000 (Tier 1)

The goal of this project is to gain a better understanding of how hydrodynamic processes influence morphologic evolution at natural inlets and adjacent shorelines. The project will use local community knowledge and commonly used oceanographic analytic methods at Little Egg Inlet and Brigantine Inlet, which are natural, unstructured inlets in New Jersey, to help analyze current and sediment flow and inform interested parties of the changes in different scenarios. To gain community participation and knowledge co-production, the project team will organize listening sessions that aim to include a variety of interested parties to learn about the publics' perspectives on shore protection activities, and human use and ecological species use at natural inlets, affiliated shoals, and adjacent shorelines. The project team will report on the effectiveness of student hands-on learning together with the coastal communities' local knowledge in understanding currents and sediment transport around natural inlets.

Applying and Sharing Emerging Knowledge about Natural and Nature-Based Features and Resilient Shorelines in New York
New York Sea Grant, Project Leads: Katherine Bunting-Howarth & Katie Graziano
Federal funding: $150,000 (Tier 1)

This project will connect diverse end-users in New York City and New York state with relevant expertise about natural and nature based features as multi-beneficial, more resilient alternatives to traditional shoreline armoring. The project leads will coproduce forums, workshops, data visualization and communications products, and formalize a community of practice to share key findings with local, national and international audiences. The project will build upon existing networks to bring applicable research and experiences to practitioners and foster conversations

among researchers and practitioners that will ensure shoreline monitoring, data analysis, visualization and research extension products are accessible and useful for the widest range of interested parties.

Harnessing marsh spatial heterogeneity and hydroperiod for multiple benefits through community engagement
Georgia Sea Grant, Project Lead: Matthew V. Bilskie
Federal funding: $499,999 (Tier 2)

The goal of this project is to provide coastal Georgia community members with guidelines and tools for marsh management practices. The project investigators will develop enhanced guidelines for marsh spatial planning supported by a geospatial visualization tool that allows interested parties to see outcomes of different marsh interventions, such as vegetation enhancement, thin layer placement, oyster reef (living shoreline) construction, or cuts through marsh terrain. Community input will be sought in the development of the geospatial planning application. The outputs from this project will inform approaches that can evaluate marsh planning and trade-offs between the conservation of new land versus land management actions to existing salt marsh.

In-Situ Detection of Fecal Indicators Enables Advanced Ocean Safety Forecasting
Hawai'i Sea Grant, Project Lead: Craig Nelson
Federal funding: $499,725 (Tier 2)

This project will further the advancement of two in situ water quality technologies that will provide information on the current and future impacts of terrestrial derived sewage and fecal matter on Hawai‘i’s coastal water quality. Water samples will be taken before, during and after storm events and King Tides to be evaluated for wastewater indicators. A model will be developed that is capable of forecasting fecal indicator bacteria levels in the Waikīkī region using wave, atmospheric, and realtime stream data. This project will work with a diverse set of interested parties, such as regulatory agencies, state legislators, and elected officials, neighborhood boards and other community leaders, local activist networks, and NGOs to help improve necessary safe access to coastal waters.

Development of a probabilistic compound flood hazard assessment tool and evaluation of countermeasures for Great Lakes cities
Michigan Sea Grant, Project Lead: Michael Fraker
Federal funding: $500,000 (Tier 2)

This project will assess compound flood risk for disadvantaged communities in Milwaukee, Wisconsin, and the municipalities of Benton Harbor and St. Joseph in Berrien County, Michigan. Alongside project investigators, these communities will participate in co-creating critically needed tools to evaluate the effectiveness of proposed flood risk mitigation measures. Simulations generated will evaluate drivers of flooding alongside land use and building structure data, community-proposed flood countermeasures, and effects on socioeconomic equity. The

specific risk profiles generated, as well as the general risk analysis modeling tool, can serve to advise flood risk reduction policy. Expected results include an evaluation of the spatial distribution of flood risk in the case study cities, as well as quantification of the avoided damages obtained by implementing a variety of flood reduction measures under future climate scenarios.

Co-developing a community and data-driven framework for coastal protection decision making
North Carolina Sea Grant, Project Lead: Frank Lopez
Federal funding: $460,186 (Tier 2)

This project will co-develop a coastal protection design and siting framework, and living shoreline training courses and certification program for interested parties in North Carolina, including coastal property owners, engineers and contractors. The project team will collect survey data on community member perceptions of coastal adaptation options and data on effectiveness of different substrates and designs for living shoreline sites. Working with said data, the team will develop a coastal protection framework that will assist shoreline property owners, permit issuing agencies and contractors in identifying optimal shoreline protection strategies. This information will be used to improve coastal protection training and outreach programs, such as expanding a pilot training course to include advanced design tracks for waterfront property owners and a design certification program for marine contractors.

Continuing to scale and apply hybrid approaches for compound flood risk assessments: Directly incorporating climate model output into U.S. West Coast resilience projects
Oregon Sea Grant, Project Lead: Peter Ruggiero
Federal funding: $498,916 (Tier 2)

This project will apply a USCRP-funded hybrid framework for estimating compound flood risk to co-develop a suite of online tools and products for direct implementation into an ongoing estuarine planning process in Oregon. Oregon's coastal population is largely centered near its estuaries and knowledge of present day and future projections of flood frequency, magnitude and impacts are necessary as communities begin to identify and prioritize local actions for increasing resilience. The tools and guidance documents will be developed for a range of interested parties and decision-makers to explore how the region's long-term risk to compound coastal flood hazards might be transformed under different climate scenarios. Additionally, the project will train early career researchers in convergent, transdisciplinary approaches to developing actionable coastal hazards research and products.

Developing a Framework for Assessing the Benefits and the Feasibility of Thin Layer Placement in South Carolina
South Carolina Sea Grant Consortium, Project Leads: Katie Finegan, Giulio Mariotti, Andrew Tweel, Amanda Guthrie, Matt Gorstein, Brita Jessen, Ellie Lovellette
Federal funding: $499,715 (Tier 2)

This project will co-develop a multi-sectoral framework to assist decision making for potential thin-layer sediment placement sites in South Carolina. Thin-layer placement is a process where sediment from dredging is transported and applied to a marsh's surface as a means of restoring marsh elevations. Potential sites will be assessed from an economic, regulatory, ecological and sociocultural lens, then implemented in modeling to evaluate the potential for success. The project team will engage with a diverse group of interested parties to define site success and discuss expected benefits. Through meaningful co-production, this project will identify considerations for thin-layer placement to be feasible and successful in South Carolina and create a transferable framework for future work within and beyond the state. The resulting tool will be in the form of a website that includes background information, maps, models, results and analysis.

Enhancing resilience of energy and water supply infrastructure along the Texas Coast against catastrophic coastal flooding through integration of climate-informed adaptation strategies
Texas Sea Grant, Project Lead: Debalina Sengupta
Federal funding: $499,492 (Tier 2)

This project aims to improve the resilience of energy and supporting water infrastructure along the upper Texas coast to extreme floods in present and future climates. In partnership with University of Texas at Arlington, Lamar University and energy producers, water suppliers, regional governments, flood mitigation organizations and state agencies overseeing flood planning and coastal resilience, the project team will appraise the future flood hazards for existing and planned energy and water infrastructure, evaluate candidate adaptation measures for cost-efficacy, and integrate the results in regional community development and infrastructure management plans. The team will make recommendations on infrastructure plans to state and regional governments that will improve the economic well-being of underserved, disadvantaged communities. The results will also be disseminated through community workshops in the region.