

# UPR Sea Grant Strategic Plan 2014-2017

## Scoreboard:

### Focus Areas and Estimated Level of Effort:

**Healthy Ecosystems and Habitats (HEH)** Estimated Level of Effort: 40%

**Resilient Communities and Economies (RCE)** Estimated Level of Effort: 40%

**Education and Workforce Development (EWD)** Estimated Level of Effort: 20%

Over the 2014-2017 period, UPR Sea Grant will concentrate its efforts in three areas:

***Healthy Ecosystems and Habitats (HEH); Resilient Communities and Economies (RCE) and Education and Workforce Development (EWD).***

These three interrelated focus areas emerged from the strategic planning process as areas of critical importance to the health and vitality of the Caribbean region's coastal resources and communities. They respond to issues of major importance to NOAA, the NSGCP, local decision-makers and resource users, and are topical areas in which UPRSGCP has made substantial contributions in the past and is positioned to make significant contributions in the future. For this strategic plan we fused (for programmatic and management reasons) our goals and strategies for the former "Safe and Sustainable Seafood Supply" focus area (now dubbed in the National Plan as Sustainable Fisheries and Aquaculture) into the sections on RCE and EWD.

In each of the three focus areas our program identified specific goals to pursue strategies designed to take advantage of its strengths in integrated research, outreach and education, and its respected, trustworthy and well established presence in coastal communities of the region. Understanding relationships and synergies across focus areas is vital to achieving our goals. UPRSG could not address these complex and interrelated issues without the collaboration of our public and private sector partners. Understanding how activities in one area support and complement other activities and using partnerships to accomplish shared goals are strategies inherent to UPRSG, and will be central to achieving the goals outlined in this plan.

## Introduction

The coastal zone of Puerto Rico's archipelago and that of the United States Virgin Islands, is our most critical natural resource. Its ecosystem provides us with a number of different goods and services. These include, tangible natural resources such as fisheries for commercial and recreational use and less tangible services such as fish and crustacean recruitment in their marine habitats. Other less tangible services include the use of environmental amenities such as pristine beaches for recreational purposes, aquatic sports, tourism and residential development.

Puerto Rico's coastline includes: near shore reefs, near shore islands, mangroves, wetlands, estuaries, tidal flats, sand dunes and the coastal land margin. The biodiversity contained in these ecosystems is threatened by climate-related changes, seasonal to decadal climate processes and pressures of the human population. The increased incidence of storms, coral diseases, human-induced habitat degradation and intensive fishing are significantly responsible for observed declines in associated fishes and invertebrates. Our coastal zone is a finite resource and its capacity to withstand intensive use and development has reached a critical limit.

During the last centuries, Puerto Rico established its buildings, ports and harbors, roads, power lines and sewage systems in hazard-prone areas within the coastal zone; where sixty percent of the almost four million citizens in Puerto Rico live within the forty three (43) municipalities bordering the Atlantic Ocean and the Caribbean Sea. This route of coastal development augments the potential vulnerabilities associated with rise of the sea level and shoreline erosion. Among these threats are coastal flooding, saltwater intrusions, coral bleaching, the inland migration of coastal ecosystems, changes to ocean chemistry, and the increased frequency or intensity of tropical storms. These increased rates of climate-related environmental changes have made the island's coastal communities vulnerable in ways never before imagined. These increases are expected to have a series of socio-economic effects, including loss of land infrastructure and coastal resources, which implies a decline in economic, ecological, cultural and subsistence values associated with the coast. The long-term sustainability of Puerto Rico and its people is dependent on the coastal ecosystem's health. There is a need to develop strategies for the use and preservation of these resources, while assuring their economic and socio-cultural benefits.

Islands are uniquely vulnerable to many of the potential consequences of climate change. Preliminary findings of our strategic planning process demonstrated challenges and suggested adjustments. This set our sight on the education of constituents to spur changes in behavior that would lead to conservation and sustainable development. As island communities, we need to become more resilient to a changing climate and consider implementing a number of adaptive strategies, including public awareness and education. We need to design creative solutions. The University of Puerto Rico Sea Grant College Program (UPRSGCP) is qualified to respond swiftly to the stringent challenges faced by our coastal and marine resources. Sea Grant's integrated national network will be a key player

in addressing these emerging issues. Our program will maintain its focus on the goals and objectives set forth in this plan and will consider the goals of the National Oceanographic and Atmospheric Administration (NOAA), the National Sea Grant College Program (NSGCP) and those of the University of Puerto Rico.

## **Vision**

The UPRSGCP envisions a future where people live along our coasts in harmony with the natural resources and attractions. At the same time people would be able to take advantage of the economic and recreational opportunities they offer, while preserving their quality and abundance for future generations.

This vision supports both the vision articulated in the NSGCP: "... a vision of a coastal America where we use our natural resources in ways that capture the economic, environmental and cultural benefits they offer, while preserving their quality and abundance for future generations." As stated in NOAA's Strategic Plan, that vision requires healthy ecosystems, as well as resilient communities and economies "in the face of change."

## **Mission**

Puerto Rico Sea Grant mission is to provide integrated, applied research, outreach and education activities that increase citizens' understanding and responsible use of Puerto Rico's coastal and marine resources. UPRGSP's mission is also to disseminate reliable information to support personal, policy and management decisions that promote this vision.

UPR Sea Grant advances the NSGCP's mission "... to provide integrated research, communication, education, extension and legal programs that lead to the responsible use of the nation's ocean, coastal and Great lakes resources through informed personal, policy and management decision."

## **History and Overview**

In the mid 1960's the founders of Sea Grant proposed a cooperative effort to promote the sustainable use of coastal resources through research, education and outreach activities. The central feature foreseen by these visionaries was to unite the academic power of the nation's universities with a wide range of public and private sector partners. This feature is still in place today and even more relevant than forty-two years ago. Sea Grant moved from the National Science Foundation to NOAA in 1970. It incorporated government, universities, and citizens living and working in America's coastal and Great Lakes states to harness the best science, technology and human expertise to address marine and coastal resource issues of immediate public concern. By requiring to match every two (2) dollars of federal funding with one (1) dollar of non-federal funds, Sea Grant expands the reach and effectiveness of NOAA and other partners in planning for and managing the future of America's ocean, coastal and Great Lakes resources. This match has provided outstanding leverage to limited federal funds.

Sea Grant initiated its efforts in Puerto Rico with a Marine Advisory Project (SGMAP) established in the late 1970's at the University of Puerto Rico in Humacao. In 1980 the SGMAP was relocated as a comprehensive project to the University of Puerto Rico in Mayagüez and matured into a leading educational and conservational institution in the Commonwealth. The project evolved from an effort to educate primarily fishermen and seafood consumers into a diversified program that served mixed clientele groups of resource users, resource managers and policy makers. In 1981, in association with the University of the Virgin Islands, the UPRSGP developed a Marine Advisory Project at the United States Virgin Islands as part of our effort to promote the sustainable development of coastal and marine resources in the Caribbean. In 1989, under the aegis of the Office of the President of the University of Puerto Rico, our program attained the status of Sea Grant College. With a wide range of public and private sector partners, our program has been able to provide integrated, applied research, outreach and education projects. Since its inception, the UPRSGCP has been instrumental in solving problems and creating benefits and opportunities for coastal communities and marine resource users in the Caribbean region. Our program has responded to local environmental challenges through the dissemination of science-based information as well as its non-regulatory presence in local communities. Sea Grant in Puerto Rico is considered an established ambassador, generating policy-relevant research and spreading scientific and technological discoveries among resource managers, decision makers and the general public.

The UPRSGCP Strategic Plan 2014-2017 incorporates the NOAA and NSGO priorities and aligns them with our goals, strategies, outcomes and performance measures. Our institutional culture and integrity, combined with a commitment to the Sea Grant core values, provide us the strength to achieve the goals set forth in this plan.

## **Planning Process and Strategic Approach**

To manage Puerto Rico's and the US Virgin Islands coastal and oceanic resources in ways that balance anthropogenic needs with environmental health, the island must progress in three fundamental areas:

better information about how tropical coastal and oceanic ecosystems function, and how anthropogenic activities affect tropical coastal and oceanic living resources;

citizens who understand the complexities of tropical coastal environments and the interactions between anthropogenic use and the health of coastal ecosystems;

management and decision-making processes that are based on sound information and involve everyone who benefits from the beauty of Puerto Rico's limited coastal resources, and include mechanisms to evaluate the trade-offs between anthropogenic and environmental needs.

This Strategic Plan, currently under review, was nurtured by management and selected members of staff who provided guidance into its development. Information drawn from meetings, communications (electronic mail, letters and position papers) and activities with our stakeholders (mostly watershed managers, fishers, fishery managers and coastal resource users) was used to prepare the plan. To guide the program into future areas of concern, we used information from focus groups and interviews provided by our Caribbean Regional Assessment on research needs for coastal and marine conservation. A meeting with the Advisory Council is scheduled to finalize the process.

## **Focus Area: Healthy Ecosystems and Habitats**

Puerto Rico and the United States Virgin Islands (USVI) share common problems related to the sustainable development of their natural resources and attractions. Some of the typical problems of this archipelago include: resource degradation related to natural hazards (hurricanes, earthquakes, tsunamis, landslides, and flooding) and to human induced factors (deforestation, habitat destruction, over-fishing, extinction of species, modification of the maritime zone, coastal water quality degradation). Several socio-economic, biological, physical, and geographic factors also limit the sustainable development of the natural resources of these island countries.

Puerto Rico's sea and its seven hundred (700) miles of coastline constitute a vital environment in which a broad and complex variety of urban dwellers, resource users, and tourists all compete for its recreational and economic resources. The present and future growth of both the real estate business and the construction industry lies in the coastal plains. Following a national demographic trend, more and more of the Puerto Rican population is moving into coastal areas each year, creating a demand for housing and development that causes erosion, reduces water quality, and destroys mangrove and wetland habitats.

These growing social, economic, and environmental pressures will increase the demands placed on our coastal resources and threaten the health of these coastal ecosystems, which are the foundation for life along the coast. The UPRSGCP aims to improve and enhance abilities, economic strategies, and planning efforts of coastal communities, insular and federal government agencies, industry, university, and small entrepreneurs in their interaction with marine resources. UPRSGCP's regional consortia, nationwide networks, and international contacts are particularly well suited for helping the nation address ecosystem health at the appropriate local, state, regional, national and global levels.

**Goal: Widespread use of ecosystem-based approaches to managing land, water and living resources. (2)**

### Learning outcomes

Residents, resource managers and businesses understand the effects of human activities and environmental changes on coastal resources (2.3)

Resource managers have an understanding of the social factors, policies and human processes that shape the seascape and habitats (2.4)

### Action outcomes

Residents, resource managers and business owners collaborate, in an open and integrated manner, to facilitate the implementation of ecosystem-based management. (2.7)

Consequence outcomes

Residents, resource managers and business owners integrate social, natural and physical sciences when managing resources and work with all sectors in the decision-making process. (2.9)

**Goal: Habitats and their ecosystems are protected, enhanced or restored. (3)**Learning outcomes

Residents, resource managers and businesses understand the importance of the benefits provided by preserving and restoring tropical coastal and marine ecosystems (3.1)

Action outcomes

Residents, resource managers and business adopt innovative and appropriate approaches and technologies to improve the functions of ecosystems. (3.5)

Consequence outcomes

Critical habitats are protected. (3.6)

Performance measures for Healthy Ecosystems and Habitats

Twenty (20) stakeholders (fishers, researchers and resource managers) develop and test a roadmap for an ecosystem-based approach to fisheries management, with the incorporation of fishers and resource managers from the state (DNER) and the federal government (Caribbean Fisheries Management Council)

Two (2) Sea Grant sponsored research projects incorporate --as partners and collaborators— the following: resource users, resource managers and researchers.

Four (4) marine protected areas implement ecosystem-based approaches for the protection of the reserves, with the incorporation of the stakeholders in ecosystem stewardship. UPR Sea Grant will provide guidance and support to the implementation of the process.

Twenty (20) resource managers incorporate the ecosystem-based approach to their management practices.

## **Focus Area: Resilient Communities and Economies**

Coastal communities, ecosystems, resources and natural attractions in Puerto Rico and the USVI, provide vital economic, social, and recreational opportunities for millions of Puerto Ricans, but decades of population migration have transformed our coastal landscapes and intensified demand on finite coastal resources. The increase in population has resulted in new housing developments and recreation facilities, as well as a new generation of energy development activities, port expansions, and other business activities. These changes are placing tremendous pressure on coastal lands, water supplies and traditional ways of life. To accommodate more people and activities and to balance growing demands on coastal resources, we must develop new policies, institutional capacities, and management approaches to guide the preservation and use of coastal and oceanic resources. UPRSGCP will engage a diverse and growing coastal population by applying the best available scientific knowledge, and use its extension and education capabilities to support the development of healthy coastal communities that are economically and socially inclusive, supported by diverse and vibrant economies and function within the carrying capacity of their ecosystems.

All the residents of Puerto Rico and the USVI are considered coastal residents since they live less than fifty miles from the coast. New developments and critical infrastructure for tourism, industries and commerce are established in the coastal zone, which are the most rapidly growing areas in the territories. Citizens and decision-makers have an urgent need for tools that will help them evaluate the implications of land-use changes, coastal development pressures, and increased resource use, in approaching the policy and management decisions they face. Regional cooperation and coordinated land-use and watershed planning are essential. UPRSGCP's well-established role as a trusted broker among a wide range of interests, makes it a key player in providing sound information for decision-makers, convening stakeholders to seek common ground, and facilitating the development and implementation of new coastal policies, plans, management approaches, and consensus-building strategies.

The sea level rise, increased number and intensity of coastal storms and other natural and human hazards are putting more people and property at risk along the nation's coasts with major implications for human safety and the economic and environmental health of coastal areas. It is essential that residents of coastal communities understand these risks and learn what they can do to reduce their vulnerability and respond quickly and effectively when these events occur. UPRSGCP will use its integrated research, training, technical assistance capabilities and its presence in coastal communities to play a major role in helping local citizens, decision-makers, and industries plan for hazardous events and optimize the ability of their communities to respond and rebuild.

It is not enough for communities and businesses to understand their vulnerabilities; they must act on this knowledge and become more resilient or the human and economic losses will continue to mount. Individuals, businesses, and communities need to develop



comprehensive emergency preparedness and response plans that increase their resiliency and enable them to respond effectively. Sea Grant will contribute to this by building a sound knowledge base to improve forecasting capabilities by identifying development and best management practices that reduce the vulnerability of people, buildings and businesses to coastal hazards, and by advancing ways in which communities can manage and recover from these events when they occur.

**Goal: Support the development of resilient coastal economies. (6)**

Learning outcomes

Communities are aware of the economic contributions of coastal areas and the interdependence of the economy and the health of the natural and cultural systems (6.1)

Communities are knowledgeable about the economic impact and benefits of sustainable practices (6.3 & 6.5)

Action outcomes

Communities engage in economic development planning initiatives that capitalize on the value of their natural and cultural resources in a sustainable manner (6.6)

Consequence outcomes

Communities have diverse, healthy economies and industries that sustain the littoral economy. (6.7)

**Goal: Support comprehensive planning efforts to assist communities in making informed strategic decisions. (7)**

Learning outcomes

Communities understand the connection between planning and resource management decisions that minimize user conflicts, improve resource conservation efforts and identify potential opportunities. (7.1)

Action outcomes

Communities adopt coastal and land-use plans. (7.3)

Consequence outcomes

Quality of life in communities, as measured by economic and social well-being, improves without adversely affecting environmental conditions. (7.5)

**Goal: Resilient coastal communities adapt to the impacts of hazards and climate change. (9)**

Learning outcomes

Residents and decision-makers are aware of and understand the complex physical, natural and human processes that produce hazards and climate change and the implications of those events for their communities. (9.1)

#### Action outcomes

Communities apply best available hazards and climate change information, tools and technologies in the planning process. (9.5)

Communities develop and adopt climate adaptation strategies suited to local needs, jointly with government and municipal officials. (9.7)

#### Consequence outcomes

Communities effectively respond to hazardous events and climate change in the coastal communities and watersheds of PR/USVI. (9.10)

#### Performance measures for Resilient Communities and Economies

Twenty-five (25) coastal municipalities (management teams) understand the key role of fishing and other local extractive activities in engaging local people in productive activities, and sustaining other economic activities in the area. These municipalities will be using, as guidelines, the “master plan for the sustainable development of coastal communities” proposed for 2013-2014.

Fifteen (15) coastal resource managers understand the key role of fishing and other local extractive activities in engaging local people in productive activities, and sustaining other economic activities in the area.

Ten (10) coastal NGOs, devoted to conservation and economic development, understand the key role of fishing and other local extractive activities in engaging local people in productive activities, and sustaining other economic activities in the area.

Ten (10) resource management agencies, coastal NGOs, and municipalities develop sustainable strategies for the improvement of local coastal economies based on Sea Grant research results on the quality of life in the coast.

One hundred (100) municipal officials and coastal residents understand the array of tools and strategies available to cope and adapt to climate change and coastal hazards.

Five (5) coastal communities in two municipalities develop and adopt hazard adaptation strategies, to respond to the events

One (1) proposal, for the sustainable improvement of the coastal fisheries activities is developed and implemented.

**Focus Area:**  
**Education and Workforce Development**

UPR Sea Grant has been a leader in the transfer of information and technology and a major force in capacity building for NGOs, resource managers and teachers. Since the beginning of our program in the late 1970's, marine education through formal and informal means, and the building of ocean literacy has been our forte. We believe that education is critical for a better citizenship, for the stewardship of the resources and the conservation of ecosystems and habitats, and for the building of sustainable practices in our archipelago. As stated in the NSGCP Strategic Plan, the future workforce, and successful communities facing natural and socio-economic changes need to be literate in science, technology, engineering and mathematics (STEM) in order to be competitive, but also to be resilient and face the challenges imposed by unsustainable practices and policies. Our stakeholders and communities, in PR/USVI face everyday development projects and policies that jeopardize their livelihoods and threaten the health of the ecosystems and habitats. It is our mission to provide them with the best information available, and to share with them the knowledge and tools for sustainability. It is our goal to build an ocean, and coastal ecosystems and habitats literacy for action.

**Goal: An environmentally literate public supported by a continuum of lifelong formal and informal management opportunities. (10)**

Learning outcomes

Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education. (10.1)

Action outcomes

Formal and informal education programs incorporate environmental literacy components. (10.6)

Formal and informal education programs take advantage of the knowledge of UPR Sea Grant-supported scientists and engagement professionals. (10.7)

Educators in PR/USVI collaborate and work in tandem to leverage federal, state and local investments in coastal environmental education. (10.10)

Consequence outcomes

Teachers, students, resource users, managers and the public incorporate broad understandings of the complex natural and human processes that shape the oceans, ecosystems and coastal, knowledge translated into personal decisions, actions and learning and teaching strategies. (10.11)

### Performance measures for Education and Workforce Development

Fifty (50) teachers and schools form part of a network of educational units incorporating environmental literacy in their programs.

Fifty (50) teachers work and collaborate with UPR Sea Grant educators in the transformation of curricula and pedagogical practices, with the active participation of students.

Fifty (50) schools incorporate the knowledge and tools provided by the Sandwatch Program, and applied them to the hands-on-experience monitoring of tropical beaches.

One thousand (1000) fisheries' stakeholders (fishers, distributors, managers and scientists) produce, share and incorporate knowledge conducive to sustainable practices, new productive technologies and the implementation of the ecosystem-based approach to management, through meetings, presentations and the preparation and distribution of printed and electronic (Internet) materials.

### **Cross-cutting Performance Measures**

One thousand (1000) resource users, educators, policy makers and resource managers will benefit from UPR Sea Grant activities, showing high levels of satisfaction, measured with a number of evaluation techniques.

Twelve (12) peer-reviewed publications, based on Sea Grant sponsored research, education and extension projects and activities, are produced and disseminated to the stakeholders.

Thirty (30) students will be supported and mentored by UPR Sea Grant researchers, outreach specialists and staff, and educators; twenty (20) undergraduate and ten (10) graduate students with ten (10) degrees conferred. (19)