PIER 2017 Annual Report

Puerto Rico Sea Grant

Official Level of Effort - Only Approved Funding

Report Generated by YULISSA GARCIA on 12/13/2021

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2017 Level of Effort

National Focus Area Name	SG Federal	Match	Pass Thru	Federal + Match + Pass Thru	LOE without Leverage (%)	Leveraged (Managed)	LOE with Leverage (%)
Healthy Coastal Ecosystems	$501,198	$302,292	$56,500	$859,990	43 %	$30,726	42 %
Sustainable Fisheries and Aquaculture	$0	$0	$0	$0	0 %	$0	0 %
Resilient Communities and Economies	$450,510	$300,049	$0	$750,560	37 %	$34,726	37 %
Environmental Literacy and Workforce Development	$278,329	$132,580	$0	$410,909	20 %	$15,363	20 %
TOTAL ALL FOCUS AREAS:	$1,230,037	$734,921	$56,500	$2,021,459	100 %	$80,815	100 %

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2017 Impacts & Accomplishments

Coastal Nature Reserve "Caño Madre Vieja"

NATIONAL FOCUS AREAS: Healthy Coastal Ecosystems

- Impact
- Approved

RECAP: The Coastal Nature Reserve "Caño Madre Vieja" (CMVR), located in the Municipality of Aguada-Aguadilla, includes beaches, mangroves, freshwater wetlands and a federal designated coastal barrier zone. The reserve's extension (50 acres) provides coastal protection from tsunamis, storm surges, coastal erosion and floods to the Espinar Community (1280 inhabitants) at the north-west coast of Puerto Rico.

PROGRAM FOCUS AREAS: Healthy Ecosystems and Habitats

Relevance: Espinar is a coastal community located in the litoral extension of the CMVR. For the last twelve (12) years the NGO "Ciudadanos Aguadeños Pro Conservación del Ambiente" (CAPCA) worked closely with PRSGCP extension agents to educate about the designation of the CMVR as a Coastal Nature Reserve to protect (a) the beauty and natural richness of this coastal ecosystem and (b) the life and property of the residents that are subjected to extreme weather events in the Espinar community.

Response: After many years of collaborative efforts (NGO's and UPRSGCP), finally, in 2016, the CMV was designed a natural reserve. This designation will protect this coastal area from urban development pressure and preserves the natural coastal defense for the community Espinar.

Results: After Hurricane María, CAPCA joined efforts with the NGO "Organización Deportiva y Recreativa Espinar" (ODRE) and the PRSGCP to collaborate in an outreach effort to add more stakeholders to work in a resilience project at the community that will contribute with the post-hurricane recovery phase in the CMVR. PRSGCP and partners will continue outreach efforts in the CMVR through competitive proposals preparation and publications posted on the reserve's web page. (reservanaturalcanomadrevieja.wordpress.com)

PARTNERS: Puerto Rico Department of Natural and Environmental Resources; Ciudadanos Aguadeños Pro Conservación del Ambiente; Organización Deportiva y Recreativa Espinar (ODRE), Aguada;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Coastal Nature Reserve "Caño Boquilla" Increases its Land Extension

National Focus Areas: Healthy Coastal Ecosystems

- Impact
- Approved

Recap: The Coastal Nature Reserve "Caño Boquilla" (CBNR), part of the Río Grande de Añasco Watershed, was declared Natural Reserve in 2002. Until 2016, the reserve's extension covers 120 acres of public domain lands (maritime zone, wetlands, estuaries and mangroves) in the Mayaguez-Añasco coastal zone and nine (9) nautical miles outside the coastal zone at the western Puerto Rico.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: The CBNR is habitat for resident and migratory birds, sea turtles, fishes, mollusks and marine mammals. Also, CBNR is habitat for many flora species, particularly the endangerous tree specie Pterocarpus officinalis. Many outreach efforts have been in place, since 2005, to educate, protect, conserve and increase land extension of this important natural ecosystem.

Response: After years of collaboration, efforts and advisories, the Puerto Rico Department of Natural and Environmental Resources (DNER), the NGO Mayaguezanos Por la Salud y el Ambiente and the PRSGCP increased the reserve's land extension by the acquisition of 57 new private land acres of wetlands and coastal forests. Now, the reserve's land extension increases to 177 acres with a total investment of $348,000 from PR state funds (DNER).

Results: Due to PRSGCP collaboration with DNER and MSA the CBNR increased its land extension and actually comprises nearly 180 acres of coastal habitats (including 3 acres donated by the US Corps of Engineers) that are now protected for the benefit of future generations, strengthening community education and stewardship. PRSGCP and partners will continue outreach efforts in the RNCB through competitive proposals preparation and publications posted on the reserve's web page. (granreservaboquilla.wordpress.com)

Partners: Puerto Rico Department of Natural and Environmental Resources; Mayaguezanos Por la Salud y el Ambiente;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Reef Responsible - A Market driven approach to a sustainable commercial fishing industry in the Virgin Islands

National Focus Areas: Healthy Coastal Ecosystems

- Impact
- Approved

Recap: Puerto Rico Sea Grant's Virgin Islands Marine Advisory Service has been working with local restaurants to certify new and update original restaurants in the Reef Responsible program.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: The demand for seafood is increasing yet many populations of fish are being overfished, especially around the island of St. Croix. This project promotes the purchasing and consuming of fish caught or farmed using environmentally friendly practices. It educates restaurants on purchasing fish that are legally caught using sustainable methods.

Response: VIMAS has joined with staff from local agencies and organizations to develop an education and outreach program that promotes a sustainable fishing industry.

Results: Twenty-five restaurants on St. Croix are now certified as Reef Responsible restaurants. During this period seven restaurants on St. John have also been given this designation. While this has now been integrated on St. Thomas, it has occurred outside of this reporting period. VIMAS has been working with partners to create the Reef Responsible program and supporting educational materials. In addition, an exhibit on the program was done on April 6, 2017, at "The Taste of St. Croix", a local annual event that attracts hundreds of St. Croix residents.

Partners: The Nature Conservancy; Virgin Islands Department of Planning and Natural Resources;

Associated Project(s):
Virgin Islands Marine Advisory Service (2014 - 2017)

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PRSG organized a conference to discuss Rincón's resiliency to coastal natural events

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: PRSG organized the conference "Pensemos en un Rincón más resiliente a eventos naturales costeros" ("Let's think about Rincón's resiliency to natural coastal events") in order to discuss Rincón's resiliency and find solutions to sand loss, removal of collapsed structures from the beach, sand nourishment program for the beaches and erosion problems.

Program Focus Areas: Resilient Communities and Economies

Relevance: For the past 10 years, Rincón-a worldwide known surf town and tourist spot-has been suffering a severe beach erosion problem. During Hurricane Maria, Rincón lost a lot of sand along its beachline. Also, many buildings and houses were severely damaged to the extent that they will not be habitable anymore. Since beaches are the core of the recreation and tourism activities in Rincón, solutions for erosion problems are key to support a vibrant economy in the aformetioned town.

Response: PRSG organized a conference called "Pensemos en un Rincón más resiliente a eventos naturales costeros" ("Let's think about Rincón's resiliency to natural coastal events"). PRSG researchers, scientists, engineers, NGOs members and local and federal government representatives were able to present solutions for Rincón's coastal problems. Conference was held on December 11, 2017 at Villa Cofresí Hotel in Rincón.

Results: Hotel and beach house and apartments owners, managers, community leaders, and government representatives attended the activity. Scientific information about vulnerability, natural hazards, waves and nearshore dynamics, beach nourishment, artificial reefs, resiliency, and economical value of beaches was widely discussed among the attendees. For the first time the removal of collapsed buildings from the beach and the development of a sand nourishment project were discussed with resource managers and residents.From this effort group of business owners, university professors and municipal employees formed a team that was able to provide FEMA with all the needed and required information to qualify for the removal of construction debris form the beaches. Result: The information was submitted to FEMA and as a result FEMA has informed the municipal government that they will start the cleanup during August of 2018.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2014 - 2017)

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Post-Hurricane Maria Fishermen Assistance

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: PRSG-MOP staff visited commercial fishing groups to provide information and guidance on available post-hurricane recovery aid and raise concern among government agencies about Hurricane Maria's level of damage to commercial fishers. Government programs and private donor groups used PRSG-MOP as a link to access fishermen groups and communities most affected by the hurricane, both to provide first necessity items and to replace lost gear essential for their long term recovery.

Program Focus Areas: Resilient Communities and Economies

Relevance: During September of 2017 Puerto Rico and the USVI were devastated by back-to-back major Hurricanes that resulted in the worst natural catastrophe affecting the region in a century. Artisanal fishermen of Puerto Rico were not the exception regarding negative impacts as a result of hurricanes Irma and María. Fishermen facilities or "villas pesqueras" were in many cases completely destroyed down to the ground including boat ramps and piers, fishing arts were lost as well as boats, gasoline and diesel were nowhere to be found, there was no electric power and hence no ice. In addition, many fishermen houses and communities were flooded and/or destroyed by the wind.

Response: PRSG-MOP refocused its efforts to actively assist fishermen providing guidance about available post-hurricane assistance and benefits from federal, state and private entities. Information about how to request available post hurricane aid was arranged and disseminated by various means. Field visits to the most affected fishing villages were conducted to supply water filters, battery powered solar lights, canned food among other needs. Damages and needs were documented to facilitate agencies requirements and contacts were established between fishermen, federal and insular government agencies, NGOs, church groups and the private industry.

Result: Close to twenty-five (25) fishing villages were visited. First necessity items were handed over to at least one hundred (100)

fishermen. Approximately, sixty (60) fishermen received new fishing gear, and two (2) fishing villages received new freezers from private donations as a result of PRSG damage assessments.

Partners: Puerto Rico Department of Agriculture; Puerto Rico Department of Natural and Environmental Resources; Caribbean Fishery Management Council (CFMC); Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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The New Generation of Aquaculture Experts

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: PRSG-MOP in collaboration with the UPRM College of Agricultural Sciences fosters the new generation of aquaculture professionals through a formal undergraduate course as part of the Animal Science Program curriculum.

Program Focus Areas: Resilient Communities and Economies

Relevance: Future increases in seafood availability and the varieties of aquatic species will depend on the continued development and expansion of aquaculture as an essential component of the world's food supply. Since wild capture fisheries will not be able to meet global future demands, aquaculture offers the only viable solution for the production of seafood products. However, there is an urgent need for information relating to scientific and technical aspects of marine culture, such as: nutrition and feeds, health and disease, spawning and larval rearing technology and genetics of cultured species.

Response: Through collaboration with the Animal Science Program of the College of Agricultural Sciences, PRSG designed and offered a three (3) credit Introduction to Aquaculture undergraduate course CIAN 4050 at UPRM. The course focused on the study of management practices used in the cultivation and production of aquaculture species of importance in Puerto Rico. The main objective of the course was to develop individuals for working on established aquaculture businesses in the island and to encourage graduate studies in this field.

Results: PRSG-MOP offered a three (3) credit course to 20 undergraduate students from the Animal Science Program of the College of Agricultural Sciences. Course requirements included the preparation of a competitive proposal for development of a self-sustained aquaculture system. Two (2) of the students decided to continue their class project outside of the class while receiving partial funding from local NGOs.

Partners: Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Puerto Rico Sea Grant Efforts to Improve Preparedness, Relief and Recovery of Communities Affected by Disasters. UPDATE

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: PRSG in collaboration with the National Disaster Preparedness Center of the University of Hawaii coordinated two (2) Hurricane Awareness training workshops to improve preparedness, relief and recovery of communities vulnerable to natural hazards and climate change. A total of 74 participants were certified with 296 training hours on hurricane awareness and preparedness.

Program Focus Areas: Resilient Communities and Economies

Relevance: After the pass of hurricanes Irma and Maria through Puerto Rico, poverty and social inequality were drastically magnified exposing the severity of the disasters and the vulnerability of the island. Puerto Rico's ability and capacity to respond to such a catastrophic event was weakened by the financial instability and the collapse of critical infrastructure including telecommunications and the electric power grid. There is an urgent need to augment the resilience and adaptation capabilities of residents, emergency managers and other government employees on matters related to preparedness, mitigation, adaptation and recovery from expected natural hazards.

Response: PRSG initiated a MOU with the National Disaster Preparedness Training Center (NDPTC), of the University of Hawaii to develop and deliver training and educational programs related to disaster management, with a specific focus on natural hazards, coastal communities, and the special needs and opportunities of Puerto Rico.

Result: Two (2) NDPTC workshops were coordinated by the PRSGCP on Hurricane Awareness training activities. Seventy-four (74) participants, including planners, community leaders, emergency managers, engineers, government agencies employees, natural resources managers, and representatives from coastal communities received 296 certified training hours. The Puerto Rico College of Engineers and Surveyors certified 248 Continuing Education Credit hours to engineers and surveyors that attended the courses.

Partners: University of Hawaii at Manoa, National Disaster Preparedness Training Center; Puerto Rico College of Engineers and Surveyors;

Associated Project(s):
Coastal Communities Development (2014 - 2017)

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Center for the Education of Climate Change Adaptation (CenECCA): Transferring Applied Climate Science to Puerto Rico's Coastal Communities

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: PRSG through the CenECCA provided new tools and updated information on climate change expected impacts, in order to improve skills and enhance capacity to adapt and be more resilient. Participants included municipal administrators, emergency managers, public policy developers, emergency responders, coastal communities, teachers and 9-12 students and are expected to incorporate information provided into their mitigation and adaptation plans

Program Focus Areas: Resilient Communities and Economies

Relevance: Close to two (2.3) million persons live on Puerto Rico's 44 coastal municipalities. Most of these coastal communities are at risk and in need of information related to storm surge, hurricanes, sea level rise, coastal erosion and flooding. Municipal administrators, emergency managers, public policy developers, emergency responders, coastal communities, teachers and 9-12 students need new tools and updated information on climate change expected impacts, to improve their skills and enhance their capacity to adapt and be resilient.

Response: PRSG through the CenECCA coordinated and provided a series of workshops and guided field trips to resource and emergency managers, first responders, planners, engineers, GIS experts, 9-12 grade students and residents of coastal communities. about the application and use of information and tools (including NOAAs' Climate Tool Kit) to increase their resilience and capacity building needed to endure vulnerabilities associated to natural hazards (hurricanes, storm surge, flooding, and sea level rise).

Result: PRSG trained one hundred eleven (111) key stakeholders on Hurricane Awareness, Coastal Inundation Mapping, and Resilience of Coastal Infrastructure. A total of 1,239 capacity building/ training hours were completed, of which 407 were validated as Continued Education Credits hours to local engineers and planners. In addition, one hundred and eighty four (184) 9-12 grade students where instructed on ocean acidification, mangrove, seagrass, coral reefs and coastal erosion through guided educational field trips to the CENECA facilities at the Boquerón State Forest.

Partners: Autonomous Municipality of Cabo Rojo, PR;

Associated Project(s):
Climate Extension (2014 - 2017)

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The PR Sea Grant Coastal and Marine Ecosystems Curricular Guides keep being implemented in Puerto Rican schools

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: The PR Department of Education approved PRSGCP marine educational guides as the tools to educate private and public school students on matters related to mangroves, coral reefs and marine grass beds. These guides include an information booklet for students, teacher presentations with photos, illustrations and diagrams, pre and post-tests, field, classroom and lab activities, a teacher guidebook and UPR marine sciences graduate student assistance. Close to 5,000 K-12 students were impacted by these PRSGCP marine educational guides.

Program Focus Areas: Education and Workforce Development

Relevance: Within the last few years, Puerto Rico has suffered major economic, social, cultural and environmental changes. Furthermore, our changing climate becomes more intense every day through sea level rise, coastal erosion processes and extreme weather events. There is an urgent need to become deeply familiar with our marine and coastal resources and their importance in order to develop and establish a conservation culture on these regards. To achieve this conservation culture, it is vital that our students are educated toward these means from an early age. We must provide experiences that allow them to connect to the coastal and marine environments and see themselves as an

essential part of it. Teachers need training and curricular materials to equip them with the necessary tools to integrate ocean literacy into the teaching-learning process. The Puerto Rico educational system lacks curricular materials to assist educators in their efforts to integrate ocean literacy into their classes.

Response: PRSGCP continues to expand its efforts to patronize the implementation of our three coastal and marine ecosystems curriculum educational guides that integrate mangrove forests, seagrass beds and coral reefs information to public and private schools in Puerto Rico. PRSCP also provides field trips and educational activities to assist teachers in their efforts to integrate these topics into their classrooms. The Puerto Rico Department of Education endorsed the educational guides and authorized teachers to participate in educational trips and activities of this PRSGCP effort.

Results: Puerto Rican schools continue to integrate the Puerto Rico Sea Grant coastal and marine educational guides as part of their Science curriculum. Approximately 59 educators from the public and private schools took advantage of this opportunity. Four thousand seven hundred and twenty-nine (4,729) elementary, middle and high school students, have benefited from this educational effort. Pre and post-tests demonstrated a significant learning gain, validating that coastal and marine ecosystems are an excellent natural learning environment.

Partners: Puerto Rico Department of Education;

Associated Project(s):
Marine Education (2014 - 2017)
Communications and Publications (2014 - 2017)

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PR Sea Grant Supports the Development of Marine Science Courses in Private Schools

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: Two schools in Puerto Rico developed and implemented Marine Sciences courses motivated and supported by PRSGCP and utilizing our marine ecosystems curriculums.

Program Focus Areas: Education and Workforce Development

Relevance: Coastal and marine resources are constantly under threat from anthropogenic activities and from extreme weather events such as hurricanes, storm surges, erosion, sea level rise and other factors. This brings forth an urgent need for our K-12 students to learn about the importance of protecting and preserving our coastal and marine resources. A good alternative for doing this is allowing the students to have educational experiences within their academic curricula at school that connects them to the environment surrounding them. Schools in Puerto Rico offer science classes such as Biology, Chemistry and Physics. Environmental Sciences are offered as an elective for high school-level students. However, these subjects do not delve too deeply into topics and themes related to coastal and marine resources. There is a need for curricular materials that would aid the teacher in presenting these topics in class.

Response: The Puerto Rico Sea Grant Program continues to train public and private school teachers with our three coastal and marine environments curricular guides to integrate these subjects into their educational efforts, as part of an existing curriculum, or as a base on which to build a marine sciences course.

Results: The Robinson School at San Juan, developed and successfully implemented a two semester marine sciences course to their secondary level academic offer during the 2017 school year. PRSGCP coastal and marine educational guides and the Sandwatch Project books are the foundation for the schools marine science course. The PRSGCP provides additional support needed with our graduate students serving as advisors to the teachers participating in field trips and offering special talks to students so they can continue implementing this course. Along similar lines, students from the Western Adventist Academy used the seagrass bed guide book as a primary source for a Science Fair research project and won First Prize.

Partners: Western Adventist Academy (Private School); Robinson School (Private School);

Associated Project(s):
Marine Education (2014 - 2017)
Communications and Publications (2014 - 2017)

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PRSG beach drowning research project leads to the creation of 38 jobs in the aquatic safety field.

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

RECAP: PRSG has been gathering drowning statistics on Puerto Rico's beaches to justify the need to improve aquatic safety services in Puerto Rico. The creation of 38 lifeguard positions constitutes a great progress towards promoting aquatic safety in Puerto Rico.

PROGRAM FOCUS AREAS: Education and Workforce Development

Relevance: Drowning incidents at Puerto Rico's beaches have been consistent for more than 30 years, with an annual rate of 30 fatal incidents as a result of an insufficient number of open water lifeguards at the beaches. Puerto Rico is in the midst of economic and fiscal crisis which has been responsible for the elimination of more than 50 jobs in aquatic safety positions, particularly in the Puerto Rico Department of Sports and Recreation (PRDSR) and the Puerto Rico National Parks Trust (PRNPT). These agencies are responsible for the management of eleven (11) beach parks or "balnearios" and the dismissal of lifeguard positions increases the probabilities of drowning incidents for residents and tourists.

Response: On 2017 the PRDSR administration contacted PRSGCP and requested beach drowning statistics to justify the re-establishment of lifeguard's positions at beach parks managed by this agency. They also requested PRSGCP advice on the economic losses caused by drowning incidents in Puerto Rico. The requested information was submitted to the Office of Training and Labor Affairs Advisory and Human Resources (OCALARH, by its Spanish acronym).

Result: In the summer of 2017, OCALARH approved the PRDSR request to create and open 38 new lifeguard positions. These positions represented an allocation of $159,600 on payroll expenses.

PARTNERS: Puerto Rico Department of Sports and Recreation;

ASSOCIATED PROJECT(S):
MARINE OUTREACH PROGRAM (2014 - 2017)

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Citizen Scientists participate in the development of an ecosystem management tool that will support Tres Palmas Marine Reserve management

NATIONAL FOCUS AREAS: Healthy Coastal Ecosystems

- Accomplishment
- Approved

RECAP: Community members collaborated with scientists to generate scientific data to be used for the management of the Tres Palmas Marine Reserve as part of an ecosystem management approach.

PROGRAM FOCUS AREAS: Healthy Ecosystems and Habitats

Relevance: Human activities have led to the decline of reef-building corals like the Tres Palmas Marine Reserve endangered Acropora palmatta. Marine Protected Areas (MPAs) have been recognized as an important resource in restoring fish populations and generated optimism that they could also benefit corals by reducing threats like overfishing, which cause coral degradation and mortality. The ecological, economic and social value of marine reserves has established these resources as a conservation priority. The IUCN's World Commission on Protected Areas defined the management effectiveness of protected areas as "the degree to which management actions are achieving the goals and objectives of a protected area."

Response: In 2015 PRSG partnered with Amigos de Tres Palmas, HJR Reefscaping and DNER in order to collect and analyze each one of the inventories conducted in TPMR from 2004 to 2015. As a result of this analysis, it was determined that it was necessary to update the inventory, this time using NOAA Coral Reef Monitoring Program methodologies and protocols. The Belt Transect Fish Survey Protocol, Coral Demographics Survey Protocol and Line Point-Intercept (LPI) Survey Protocol were the ones recommended and selected to be carried out in TPMR.

Result: From 2016 to 2017, PRSG, DNER and Amigos de Tres Palmas designed and funded a project that aimed to recruit students and community members to be trained about NCRMP protocols in order to participate in the inventories. As part of the project, 22 participants were trained about NCRMP protocols and how to use biological indicators to obtain data on coral abundance, size and condition, reef fish abundance and size, habitat composition, among other data. Nineteen surveys were conducted in sites within and adjacent to the Tres Palmas Marine Reserve. Many new species were observed during surveys. In fact, in addition to the threatened corals already documented in the reserve, at least one sample had Nassau grouper (recently designated as threatened). A total of 180 volunteer hours were dedicated to this project.

PARTNERS: Amigos de Tres Palmas; Puerto Rico Department of Natural and Environmental Resources; HJR Reefscaping;

ASSOCIATED PROJECT(S):
MARINE OUTREACH PROGRAM (2014 - 2017)

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Protection of Natural Valuable Ecosystems by Community and Schoolchildren

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: In a collaborative effort with our partners, the PRSGCP and Dewey University were awarded $31,600 from National Fish and Wildlife Foundation to develop the project: "Community Restoration, Stewardship and Monitoring in the Caño Boquilla Wetland System (CBWS) at the Río Grande de Añasco Watershed, Puerto Rico".

Program Focus Areas: Healthy Ecosystems and Habitats

The project provided education and environmental services to the coastal communities of Sabanetas-Maní and Algarrobo (8,390 inhabitants) at the Municipality of Mayaguez, coastal sectors severely impacted by Hurricane Maria.

During 2017, before and after Hurricane María, UPRSGCP and partners restored two kilometers (2 km) of coastal wetlands and beach habitat of the CBWS, planted 200 coastal trees, removed three-hundred (300) pounds of trash and marine debris and organized twenty (20) outreach and educational activities with more than (300) participants. These activities promoted community knowledge and commitment and contributed to the post-hurricane recovery phase in these impacted coastal areas.

Results: The project created a Citizen Water Quality Monitoring Program where 12 volunteers were trained and performed weekly water quality tests- ten (10) water quality parameters (physical, chemical and biological)- in two estuaries of the CBWS (Caño Maní and Caño Boquilla). This project will continue throughout 2018 and we expect to double all the restoration metrics in the conservation of the CBWS, including the habitat of the wetland-dependent or wetland-associated migratory birds, coastal zone, riverine banks and beaches throughout the maritime zone. PRSGCP and partners will continue providing information services throughout the PRSGCP pages. (granreservaboquilla.wordpress.com and naturalezasintoxicos.wordpress.com)

Partners: Dewey University; Puerto Rico Department of Natural and Environmental Resources; Lola Rodríguez de Tió, San Germán (Public High School); Agricultural Coop Extension Service, UPR; Mayaguezanos Por la Salud y el Ambiente; Guama Comunidad Agro ecoturística (GCA);

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Mangrove mortality in Cabo Rojo, PR

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: A mangrove mortality research effort, based on cover change during an 18 years period at Los Morrillos Lighthouse and the Cabo Rojo Salt Flats is experiencing a reduction in terms of its spatial distribution due to mortality. Resource managers, including the USF&WS, the DNER and the municipality of Cabo Rojo were informed of this ecosystem change.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: Mangrove forests are extremely productive ecosystems that provide numerous goods and services to the marine and coastal environments as well as to people. The mangrove forest at the Los Morrillos Lighthouse and the Cabo Rojo Salt Flats facilities, where PRSGCP climate change center (CenECCA) is located, is experiencing a high mortality rate that is generating mangrove cover loss and changes in the coastal and marine ecosystem.

Response: PRSG developed a collaborative effort with the Interdisciplinary Center for Coastal Studies of UPRM to inquire into mangrove mortality based on cover change during an 18 years period. Using aerial photographs, GIS and Google Earth the study determined mangrove cover in the area and the extension of dead and live individuals.

Results: Mangrove cover in the area by 1998 was identified and compared to that of 2016 mangrove spatial distribution, which resulted in a reduction of 43% of total cover. The research note is published in https://cieluprmorg.files.wordpress.com/2016/06/escalera-y-rivera-2017.pdf.

Partners: None listed in Database

Associated Project(s):
Climate Extension (2014 - 2017)

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Exploring solutions to point and non-point sources of contamination in the Lajas Valley Watershed, Puerto Rico

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: PRSG in collaboration with the College of Agricultural Sciences of the UPR developed a project to create awareness of point and non-point sources of contamination in the Lajas Valley Watershed, and address environmental literacy for 4H and UPRM undergraduate students. Participants implemented this new knowledge for monitoring stream health in pre-selected areas for expanding water quality database in support of important remediation action activities.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance:The Lajas Valley Watershed comprehends 60,000 acres of land connected to the Guanica bay and to fringing coral reefs. The area has a mix of urban, suburban and rural uses of which only a small group of selected urban communities are connected to the sewage treatment infrastructure. Human activities, including deforestation, agriculture and coastal development have altered the natural flow of the watershed through high levels of point and non-point sources of nutrient and sediment that make their way to the reefs.

Response: Through a collaborative effort with the College of Agricultural Sciences, Puerto Rico Sea Grant coordinated an effort for undergraduate and high school 4-H students made up of Sea Grant educational activities related to watershed management and its impacts on our coastal and marine areas.

Result: Two Encounter with the Sea Workshops were conducted for the UPRM undergraduate students and 4-H youth where they learned about the relationship between watershed management and its benefits in the conservation and protection of coastal and marine resources. Both groups completed 135 capacity building hours and undergraduate students received seven (7) hours as part of a three (3) credits interdisciplinary course INTD 3990 at the UPRM.

Partners: None listed in Database

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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PRSG published a lionfish cookbook

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: To promote lionfish consumption, PRSG publish a cookbook to show how to prepare this tasty fish in a variety of ways.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: Lionfish is an invasive species in Atlantic and Caribbean waters. It eats commercially important fishes at their juvenile phase and has no predator in our region, except humans. To fish and consume lionfish is part of the strategy to control its population and lionfish is healthy and tasty.

Response: PRSG published a lionfish cookbook to promote its consumption and show a variety of ways to prepare it. Chefs, cooks, fishers and particular individuals offered their recipes to produce the cookbook.

Results: The Lionfish Cookbook was published and is available through our webpage and ISSUU page: https://seagrantpr.org/communications-and-publications/books/.

Partners: None listed in Database

Associated Project(s):
Marine Outreach Program (2014 - 2017)
Communications and Publications (2014 - 2017)

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Puerto Rico Sea Grant developed new educational panels for Las Salinas Interpretive Center

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

RECAP: PRSG, US Fish and Wildlife Service, and a local NGO joined efforts to produce eight educational panels to educate close to 25,000 visitors per year about the Cabo Rojo salt flats.

PROGRAM FOCUS AREAS: Healthy Ecosystems and Habitats

Relevance: Cabo Rojo Salt Flats are a natural treasure that houses valuable ecosystems such as mangrove forests, hypersaline lagoons, and subtropical dry forest. It is also refuge for hundreds of native and migratory birds that feed themselves in this area. A clear understanding of Cabo Rojo Salt Flats' and its relevance to tropical coastal ecosystems will contribute to the conservation, sense of belonging, and stewardship of this area.

Response: PRSG, USFWS, and Comite Caborrojenos Pro Salud y Ambiente, Inc. (CCPSAI) worked together in a series of eight educational panels that show and explain the history of the Salt Flats, its importance for native and migratory birds, its variety of ecosystems, and the ways in which people can enjoy while visiting this location. PSRSG provided writing, edition, content translation, pictures, and illustrations of organisms.

Results: Eight educational panels were produced and will be installed at the Las Salinas Interpretive Center. According to USFWS reports, an average of 25,000 visitors will be able to read the panels every year.

PARTNERS: US Fish and Wildlife Service (US DOI, FWS); Caborrojeños Pro-Salud y Ambiente, Inc;

ASSOCIATED PROJECT(S):
COMMUNICATIONS AND PUBLICATIONS (2014 - 2017)

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PRSG published an issue of Marejada on the topic of La Parguera Natural Reserve

NATIONAL FOCUS AREAS: Healthy Coastal Ecosystems

- Accomplishment
- Approved

RECAP: PRSG published an issue of Marejada on the topic of La Parguera Natural Reserve. Its publication contributes to increase awareness about the ecological, social, and economic importance of the Reserve as well about its wise use. Information about La Parguera is available to different audiences.

PROGRAM FOCUS AREAS: Healthy Ecosystems and Habitats

Relevance: La Parguera Natural Reserve is one of the most important natural attractions of Puerto Rico. The proximity and connectivity of mangrove forests, seagrass beds, coral reefs and the bioluminescent bay make this natural attraction a unique ecosystem which is highly visited by marine recreationists and tourists. Puerto Rico is struggling to jumpstart its ailing economy that was hurt further after hurricane María, one of its worst natural disasters in the past 100 years. In times of economic austerity monies for the management of natural resources, are one of the first lines to be eliminated from the government budget making educational efforts and public outreach responsible for the conservation of resource users.

Response: PRSG published an issue of Marejada about La Parguera Natural Reserve. The issue covers the topics of bioluminescence, light pollution, and landscape changes. It also includes an educational activity for teachers, and a summary of the research paper People, Habitats, Species, and Governance: An Assessment of the Socio-Ecological System of La Parguera, Puerto Rico.

Results: Managers, scientists, teachers, students, and resource users have a source of information about La Parguera through our magazine. The issue is available in our webpage: https://issuu.com/seagrantpr/docs/marejada_14_l.

PARTNERS: None listed in Database

ASSOCIATED PROJECT(S):
COMMUNICATIONS AND PUBLICATIONS (2014 - 2017)

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Sea Grant 4-H Fisheries and Aquaculture Summer Camp

NATIONAL FOCUS AREAS: Resilient Communities and Economies

- Accomplishment
- Approved

RECAP: PRSG through its Fisheries and Aquaculture summer camp for 4-H Clubs youth utilized positive experiences and individual attention as its ultimate recruitment tool to awaken exiting aquaculture scientific research fields to talented youths with interest in a sustainable future.

PROGRAM FOCUS AREAS: Resilient Communities and Economies

Relevance: Over the next decades, food production systems need to provide for an increasing world population of 9 billion people. Food insecurity and hunger have been major development priorities for a long time, and are being exacerbated by climate variability, price volatility and overconsumption. Existing food production systems are very important for the sustainment of poor people's livelihoods, but place major stress on the environment (water, soils, fisheries and biodiversity). Traditional aquaculture methods are currently under scrutiny because of a series of negative environmental impacts (fish-farm wastewater on marine coastal areas) combined with rising prices of feed (availability of protein to produce industrial feedstock) and land.

Response: PRSG designed and coordinated a four (4) days and three (3) nights summer camp to recruit potential new college students to the areas of fisheries and aquaculture sciences. Students visited a marine science research field station, an agricultural experimental station and a private aquaculture farm to develop their interest in pursuing fisheries and aquaculture sciences at UPR.

Results: A total of twenty-five (25) 4-H Youth from 15 to 18 years old learned about the crucial role fisheries and aquaculture research will play during the next decades with regards to world food security and coastal and marine ecosystems management. As a result of these effort one (1) of the participants was admitted to the UPRM Animal Science Program and two (2) others were motivated to start small-scale aquaponic projects at their local 4-H Clubs.

Partners: Puerto Rico Department of Education; Puerto Rico Department of Natural and Environmental Resources; Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Small-Scale Aquaponics Systems a Sustainable Food and Nutrition Solution

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG successfully fosters proliferation of small-scale aquaponics to deliver fresh vegetables and animal protein whilst conserving precious fresh water and virtually eliminating impacts to coastal and marine resources.

Program Focus Areas: Resilient Communities and Economies

Relevance: With the looming global crisis in food security projected by 2050 along with global trends in urbanization with arable land being lost to housing, there is a clear need to look for sustainable food solutions including reintegrating food production into cities. In its call to action, AULP (2017) states "The search for sustainable food and nutrition security solutions will grow even more complicated, particularly against the backdrop of limited access to clean water, finite land for agriculture production, climate change, and evolving diets that demand more high-value food products"

Response: UPRSGCP-MOP developed six (6) workshops to promote small-scale aquaculture systems as an obvious solution to food insecurity crisis. The idea is very appealing as it envisions a low cost system that is in perfect biological balance with waste from one group of organisms (fish in Recirculating Aquaculture System, RAS) serving as a nutrient source for plants (grown in a soil-less hydroponics system) which in turn clean up the water for the fish.

Results: PRSG-MOP conducted six (6) workshops, three (3) at public schools and at three (3) at major agricultural fairs. Workshops included information about the different components of aquaponic systems, how to build and run your own small-scale system using easily accessible materials and initial system building costs. Close to one hundred (100) persons assisted and other 5,000 view the live transmission through the Internet.

Partners: Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Porto Rico 1930 Georeferenced: A Coastal Mosaic

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG in collaboration with the Interdisciplinary Center for Coastal Studies, UPRM and the Coastal Zone Management Program, DNER developed 1930 Georeferenced aerial photographs for the coastal areas of Puerto Rico. A total of 432 aerial photographs of the coast of Puerto Rico were geo-referenced to the 1983 North American Datum, Puerto Rico State plane coordinate system, representing 775 km2 of

inland coverage. The final product is accessible to coastal municipalities, natural resources managers, engineers and planners to facilitate the understanding of changes prior and after disasters.

Program Focus Areas: Resilient Communities and Economies

Relevance: Puerto Rico has good sets of historical aerial photography; however, most of them are either in paper format or digital format without geographic reference. The lack of geographic reference limits the use of aerial photography and analytical applicability within Geographic Information Systems.

Response: PRSG and the Interdisciplinary Center for Coastal Studies identified and developed Geo- referenced aerial photographs of 1930 for the coastal areas of Puerto Rico. Final products were published in the PRSGCP website making them available for the general public.

Results: A total of 432 aerial photographs of the coast of Puerto Rico were geo-referenced to the 1983 North American Datum, Puerto Rico State plane coordinate system. These photographs represent 775 km2 of inland coverage. The final product is accessible to coastal municipalities, natural resources managers, engineers and planners to help visualize and understand changes prior and after disasters. Georeferenced photographs and the final report is available in https://prgeoref.weebly.com/

Partners: Puerto Rico Department of Natural and Environmental Resources; Puerto Rico Coastal Zone Management;

Associated Project(s):
Climate Extension (2014 - 2017)

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Agricultural Extension Service Agents Trained in Federal and State Fisheries Regulations

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG-MOP successfully trained AESA on federal and state fisheries regulations.

Program Focus Areas: Resilient Communities and Economies

Relevance: Commercial artisanal fishing is part of the cultural heritage of Puerto Rico and the USVI; however, harvests have been steadily declining and at present, it is difficult to make a livelihood as a full-time artisanal fisher. Islands governments have responded to the overfishing problem by implementing stricter regulations that in turn impose social, economic and legal constraints on local fishermen.

Response: Through collaboration with the Agricultural Extension Service, PRSGP-MOP designed and coordinated an eight (8) hour workshop on federal and state fisheries regulations to familiarize Agricultural Extension Service Agents (AESA)from coastal municipalities with fisheries laws and regulations.

Results: PRSG-MOP offered three (3) formal workshops to fifty (50) Agricultural Extension Service Agents (AESA) on federal and state fisheries regulations. This capacity building training has been effective familiarizing AESA with essential information needed to advise and empower fishermen to participate of the regulatory process at public hearings and fisheries advisory councils.

Partners: Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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PRSG joined efforts with the Center for Hemispherical Cooperation (CoHemis), the Interdisciplinary Center for Coastal Studies (ICCS) and the Coastal Resilience Center

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG, CoHemis, ICCS, and CRC joined efforts to increase resiliency and preparedness among our communities, and promote collaboration among the academia, the communities, and the private sector to reduce vulnerability of coastal residents.

Program Focus Areas: Resilient Communities and Economies

Relevance: On September 2017, Hurricane Maria passed through Puerto Rico, causing major losses on infrastructure, agriculture, communications, and natural resources. Puerto Rican beaches were severely affected, many coastal communities suffered severe floodings, numerous roads and bridges were damaged, and power and communications systems collapsed.

Response: PRSG, CoHemis, ICCS, CRC developed a series of lectures called "Lectures for a Resilient Puerto Rico ("Conversatorios para un Puerto Rico resiliente") in which experts presented scientific information on the topics of coastal erosion and economic value of beaches, power and communications systems, and infrastructure in Puerto Rico.

Results: PRSG, CoHemis, ICCS, and CRC presented four lectures on the aforementioned topics. Students, professors, managers, and community leaders attended the conferences. Problems and solutions were widely discussed among the attendees. Over 400 hundred persons attended the lectures.

Partners: Centro Hemisférico de Cooperación en Investigación y Educación en Ingeniería y Ciencia Aplicada (CoHemis);

Associated Project(s):
Communications and Publications (2014 - 2017)

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Climate Education for Virgin Islands High School Students

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant's Virgin Islands Marine Advisory Service has continued to provide high school students with the necessary information to understand global climate change and how they can work to mitigate it. Additional climate change education is planned for Sept. 2018 school year.

Program Focus Areas: Resilient Communities and Economies

Island communities are particularly vulnerable to the impacts of climate change. Small islands like St Croix and St. Thomas have a major portion of its population located in coastal areas threatened by increased sea level rise. Impacts from sea level rise, increasing sea water temperatures and increases in the intensity of hurricanes as well as other effects of climate change will continue and intensify in coming years. Despite its vulnerability, the local population has little knowledge or understanding of climate change science.

This project provides climate change education to high school students so that they are better equipped to adapt to the changing climate and its local impacts as they continue their education and enter the workforce. Increased awareness of the problem assists with better resource management and planning and better mitigation of climate change impacts, and the reduction of individual carbon footprints through changes in behavior.

During this period, the St. Croix VIMAS agent was part of the NOAA Climate Stewards education project attending monthly webinars. VIMAS provided climate change education to high school students by providing eight climate change presentations to environmental science classes on St. Croix. These students presented climate change information gained to their school (lunchtime presentation, approx. 60 students), to parents (Science Family Night, approx. 20 people) and to the community (the St. Croix Earth Day EcoFair, approx. 120 students). Pre\post tests show significant improvement in climate change literacy in the students who participated. A presentation was made to 20 students in the St. Thomas office VIMAS operated Youth Ocean Explorers Summer Program about the effects of climate change to include ocean acidification and sea level rise. Students in this program were given the opportunity to hear from several Underrepresented Minority STEM-based professionals from the Coastal Estuarine Research Federation (CERF); one such professional was Dr. Justin Campbell from the Smithsonian Marine Station at Fort Pierce who studies the impacts of climate change on important NOAA trust resources such as seagrasses. As a culmination activity to this presentation, students planted 75 red mangrove seedlings at Brewers Bay St. Thomas to help buffer our coastlines from the negative impacts of hurricanes.

Partners: Virgin Islands Department of Education;

Associated Project(s):
Virgin Islands Marine Advisory Service (2014 - 2017)

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Commercial and Recreational Fish Users Education

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG fisheries extension has been serving as a long-term outreach facilitator and a non-advocate advisor for a diverse group of local fishers of Puerto Rico representing commercial, recreational, skin-diver, kayak recreational sport-fishers, and wild ornamental fishers, including state and federal resource managers.

Program Focus Areas: Resilient Communities and Economies

Relevance: PRSG advisory services have been oriented to help commercial fishers (˜1200) to set priorities and develop long-range plans. The specialized advisories have been extended to provide recommendations to resource managers, particularly to the PR-Department of Natural and Environmental Resources, and the PR-Department of Agriculture, on matters related to marine resources regulations, governmental incentive programs, and other critical fishers' needs.

Response: PRSG provided specialized assistance on marine advisories for the sustainable use of the fishery resources, to commercial and recreational fishers, resource managers and scientific investigators, oriented toward applied science for the resources conservation. Outreach included technical support to maintain commercial and recreational fishers informed about fishing regulations, biological aspects of regulated species, and issues dealing with environmental conservation.

Results: As the Scientific Academy appointed representative member to the "DNER Secretary Fisheries advisory board", PRSG-MOP fisheries advisories have been extended providing specialized recommendations to resource managers (˜10), commercial and recreational fishers (˜300). Amid this advice, FEPDEMAR (˜15 fishing Associations, representing ˜180 fishers) has become the main recognized organization representing fishery workers of Puerto Rico, relying on their traditional knowledge, while asserting their social standing, their political status, and preserving their role in the natural environment. A wide range of other specialized advisories were also provided through over (˜63) direct stakeholder's interactions.

Partners: Puerto Rico Department of Natural and Environmental Resources; Caribbean Fishery Management Council (CFMC); Federación de Pescadores de Puerto Rico y Defensores Del Mar, Inc. (FEPDEMAR); Puerto Rico Department of Agriculture;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Caribbean/NMFS Cooperative SEAMAP Program" (Coordination)

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG coordination of SEAMAP-C provided fisheries-independent populations' data acquisition, to support the CFMC and PR-DNER resources management plans, educational workshops on sampling methodologies, and outreach on fisheries scientific data.

Program Focus Areas: Resilient Communities and Economies

Relevance: The Southeast Area Monitoring & Assessment Program (SEAMAP) contributes to the development of fisheries independent baseline data, standards, and indicators to support ecosystem-based approaches to land use, water, fisheries, and other resource management. The information obtained is shared with a wide variety of constituencies in PR/USVI and the Caribbean.

Response: Puerto Rico Sea Grant coordinates SEAMAP-C, establishing a common plan and a coordinated evaluation methodology for fishery data collection, which is essential for management activities. Collected information include: marine bottom habitat mapping, reef fish independent data, conch (Strombus gigas) distribution, lobster (Panulirus argus) pueruli settlement and juvenile abundance, and the West Indian top shell (Cittarium pica) recruitment and abundance. The fisheries independent data obtained from this long-term program is being used by students, scientists, and state and federal managers to describe population trends; explain responses to environmental factors; estimate stock abundance; and to track reproduction, recruitment, and yields. This information is essential for sustainable management fisheries decisions in PR and the USVI.

Results: PRSG/MOP through SEAMAP-C liaison activities coordinated effective and efficient data collection during surveys, management and dissemination of fishery-independent data. As an example, CFMC and PR-DNER Management Plans for conch and reef fish have been based on population data obtained by SEAMAP-C. MOP fisheries efforts have improved precision and accuracy of the long-term reef-fish data collection through quality control evaluations.

Partners: Caribbean Fishery Management Council (CFMC); Puerto Rico Department of Natural and Environmental Resources; National Marine Fisheries Service (US DOC, NOAA, NMFS); Virgin Islands Department of Planning and Natural Resources;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Fisheries & Aquaculture Electronic Portal

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: The web-portal provides detailed information on works conducted by the MOP fisheries/aquaculture specialist, access to fisheries studies, their results and reports, including fishery independent studies, links to other publication sources and relevant marine advisories. The site also promotes the aquaculture/mariculture development in Puerto Rico, while increasing the public's awareness on maintaining sustainable fisheries and ensuring responsible and productive use of the resources.

Program Focus Areas: Resilient Communities and Economies

Relevance: Marine users from public and private sectors have an imperative need for direct support and advice to increase their appreciation of coastal and marine ecosystems and integration into collaborative ecosystem-based management. With the World-Wide-Web expansion, PRSG-MOP fisheries is making science information available, promoting the wise utilization of the coastal natural assets, while increasing public awareness of the need to protect our resources. The portal provides a wide open forum on matters related to fisheries and aquaculture.

Response: An electronic "blog" site administrated by MOP-fisheries was created and opened to public access: http://prsgfisheriesoutreach.wordpress.com/. Relevant information related to fisheries and aquaculture outreach and investigations conducted by MOP has been summarized and posted for forum discussions. A section in the portal provides for SEAMAP-C publications and data downloading. Others sections include applied fisheries studies, fisheries management announcements, collaborators publications and information on mariculture outreach projects.

Results: This year, 396 visitors "hits" from different countries were received at the Puerto Rico Sea Grant (PRSG) electronic portal "Marine Outreach Program in Fisheries and Aquaculture, Puerto Rico Sea Grant College Program", in support of collaborative ecosystem based management and sustainable fisheries practices.

Partners: Pew Charitable Trusts; Federación de Pescadores de Puerto Rico y Defensores Del Mar, Inc. (FEPDEMAR); Puerto Rico Department of Agriculture; Puerto Rico Department of Natural and Environmental Resources;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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La Parguera Marine Interpretative Center

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: With the technical/scientific support of UPRSGCP, the University of Puerto Rico, Marine Sciences Department, Marine Visitors Center is serving as a priceless educational tool in being able to appreciate and protect the great ecological values of "La Parguera Natural Reserve".

Program Focus Areas: Resilient Communities and Economies

Relevance: La Parguera is a coastal village designated as "Natural Reserve" on 1979, to protect the variety of ecosystems and resources living in their mangroves, sea grass beds and coral reefs essential fish habitats. Given that the health on coastal and marine resources at "La Parguera" has decreased significantly during the past decades, there was an urgent need of a strategic project able to educate residents and visitors on scientific and historical information of its surrounding sea, its coastal keys, and the marine environment health, while stimulating a marine environmental and conservationist ethic. La Parguera Marine Interpretative Center, a Sea Grant collaborative project was allied to the UPRM-DMS Visitors Educational Center. The Center is serving as a priceless educational tool in being able to appreciate and conserve the ecological values of La Parguera.

Response: The UPR-DMS Center received SG-MOP advisories on the saltwater aquariums systems representing the three coastal marine essential fish habitats, and provided educational material in marine life, fisheries, and environmental issues such as global warming and ocean acidification. The Center is being linked to the DNER 'Playita Rosada' beach facilities as a strategic access to promote the DMS Educational Center.

Results: The UPR-DMS Marine Visitors Center has been receiving visits from organized students groups (4-workshops) and visitors, (˜400 participants), which received printed, oral and video presentations.

Partners: None listed in Database

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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In case of a tsunami, only a quarter of the habitants in the flood zone of Rincón will make it to safe zones in less than 5 minutes, another 40-50 % in less than 15 minutes

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant creates evacuation routes and times for extreme event flood hazard for Rincon Puerto Rico.

Program Focus Areas: Resilient Communities and Economies

Relevance: Coastal communities are subject to a variety of natural hazards which can threaten life and property. Historically, floods have been the most frequent disaster causing natural events. To model and evaluate personal response to extreme conditions will reduce loss of life and help communities adapt to these hazards.

Response: Puerto Rico Sea Grant conducts research to determine the shortest and quickest routes to safe refuge. The coastal communities of Rincon, Puerto Rico were selected for the study. Rincon is a tourist area that has experienced historical tsunami, tropical hurricanes, large swell, and river flooding. The coastal infrastructure (houses, hotels, schools, parking) are combined with recent demographics to create worst case pedestrian response to tsunami and category 5 hurricane flooding.

Results: The model that best addresses the needs of people living in the floodable areas of Rincon neighborhoods is the Tsunami Evacuation Model evaluated for pedestrian evacuation. The 1918 tsunami reached the town of Aguadilla 5 minutes after the earthquake so evacuation time is essential to save lives. The times calculated in this project suggest that only a quarter of the habitants in the flood zone will make it to safe zones in less than 5 minutes and another 40-50 % in less than 15 minutes. Researchers suggested that elevated, resistant structures like those used for parking be designated or built to provide safe refuge and reduce pedestrian evacuation time.

Partners: None listed in Database

Associated Project(s):
Exposure and adaptive capacity to floods: A comprehensive vulnerability assessment of Rincon's neighborhoods (2014)

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Sea Grant research provides the alternatives available to mitigate economic losses related to coastal erosion in Rincón, Puerto Rico: managed retreat, armoring and beach nourishment.

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSGCP research aids decision makers at municipal, state government levels to seek federal government aid to mitigate the long and short term coastal erosion problem in Rincón in support to benefit the local economy and restore beach natural habitat ecosystems. Such reconstruction efforts are vital to the local community since Rincón sandy beaches are the number one natural attraction for the tourism industry.

Program Focus Areas: Resilient Communities and Economies

Relevance: Rincón's local economy thrives on the condition of its beaches and has been driven primarily by the tourist industry since the late 1950's. Its beachfront hotels and the variety of small beaches along its shoreline are key to its prosperity. However, Rincon has one of the most rapidly eroding coastlines in Puerto Rico. In order to protect life and property, beach restoration has been the method of choice in many areas. This method remains controversial due to its high cost and requires an adequate cost-benefit analysis.

Response: A framework was developed to relate property parcel costs, which are based to the year 1958, to the present, and second to estimate a preliminary sand volume need to conduct a beach nourishment project. With these two milestones a benefit cost ratio in support to municipal, state and federal government agencies will facilitate the evaluation of feasible solutions to the erosion problem

Results: This project provides a preliminary benefit-cost ratio analysis, to conduct a beach nourishment project on the west shoreline of the Municipality of Rincón, PR. A proposed range of the interest rate was used to determine the most likely value of oceanfront properties ($375,000,000) along the proposed site to carry out the beach nourishment project ($30,000,000). The value of coastal infrastructure was compared with the cost of protecting that property using beach restoration and the benefit cost-ratio analysis is four (4). This methodology is already being considered by the NOAA's Puerto Rico Coastal Zone Management Program to evaluate the shoreline of other municipalities.

Partners: None listed in Database

Associated Project(s):
Life cycle cost analysis of beach restoration: Rincon, PR testbed (2014)

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NSF, FEMA and the Puerto Rico Science Trust awarded three grants that add up to $322,000 to Sea Grant Researchers to examine beach nourishment and the severe erosion left behind by Hurricane María.

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: At the moment the only potential solutions to save Rincón beaches are retreat and demolition of coastal infrastructure, or a major beach nourishment project that adds significant beach width. Puerto Rico Sea Grant developed a user friendly tool to visualize beach profile and texture information for the coast of Rincón.

Program Focus Areas: Resilient Communities and Economies

Relevance: During the last several decades the shoreline of Rincón has suffered severe erosion, putting at risk private and public property and affecting real estate and tourism and the overall economy of the area. Rincón beaches are no longer able to serve as energy buffers during storms or to provide an adequate resource for tourism and recreation. It has recently been suggested that beach nourishment may be a potential solution to mitigate the erosion problems affecting Rincón by adding significant beach width. Volume and sand texture are required information for any successful project.

Response: Puerto Rico Sea Grant seeks to make progress towards evaluating the feasibility of conducting a beach nourishment project in Rincón by developing local capacity to conduct survey-grade beach face and bathymetric surveys, understanding the temporal and spatial variability of sand characteristics in Rincón beaches, and by developing an user-friendly online tool to view the project findings. An online database that incorporates texture and profile data was also developed. A viewer provides quick access and facilitates project development and discussion among stakeholders.

Result: Profile and sand textural characteristics were sampled and described from 2015 to the present. Researchers expressed that "Only potential solutions to save Rincón beaches are retreat and demolition of coastal infrastructure, or the development of a major beach nourishment project that adds significant beach width." The samples and data were taken throughout the year and include the effects of hurricane Mathew (2016). The information added to the viewer can be accessed at https://www.canalsresearch.com/rincon-sediments/ . Besides the technical advances mentioned above, the capabilities generated by Sea Grant-funded projects have partially resulted in three proposals that add up to $320,000 from FEMA, NSF and the Puerto Rico Science Trust to examine beach nourishment as well as the severe erosion left behind by Hurricane María.

Partners: Federal Emergency Management Agency (US DHS, FEMA); National Science Foundation (NSF);

Associated Project(s):
Towards potential beach nourishment in Rincon: RTK beach mapping, sediment compatibility analysis and an online tool for data sharing (2014)

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PRSGCP researchers detected coastal ocean acidification hotspots within the near shore ecosystems of La Parguera Marine Reserve

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: This project provided baseline information on CO2 dynamics that enabled the detection of coastal ocean acidification hotspots within the nearshore ecosystems of La Parguera Marine Reserve, Puerto Rico and highlighted areas particularly vulnerable to carbonate dissolution.

Program Focus Areas: Resilient Communities and Economies

Relevance: Carbonate coastal barriers, including coral reefs, provide essential protection to coastal communities in the region. Ocean acidification makes coastal barriers at imminent risk of dissolution and erosion. To date, most of the research and monitoring on ocean acidification has focused a single site on a living reef. This project aimed at identifying ocean acidification hotspots on these living reefs and other adjacent ecosystems and carbonate structures, which also serve as coastal barriers or which can export "acidified waters" to other living reefs.

Response: PRSG, in addition to providing financial support, fostered interdisciplinary collaboration with two programs of the UPRM (Coastal Science and Engineering program and the Department of Marine Sciences), the Marine Science and Coastal Engineering School at UNH, and the Caribbean Coastal Ocean Observing System (CARICOOS). This project provided training to local students on biogeochemistry, oceanographic and coastal engineering areas and offered financial support to graduate students at UNH. Project outcomes were disseminated and provided a platform accessible to local stakeholders, scientists, coastal managers, engineers, and community members to better evaluate management strategies and identify areas of resilience and vulnerability. Project outcomes, were highlighted by the New Hampshire Sea Grant College Program, in their publication "Sea Grant from the field" (https://seagrant.unh.edu/coastalbarriersatrisk).

Another key partner using the results of this project is the Puerto Rico Climate Change Council (PRCCC).

Results: Results from this effort highlight the current and foreseeable increasing vulnerability of near coastal carbonate barriers to ocean acidification exacerbated by land-borne runoff and organic carbon loading from shore fringing highly productive mangroves. The CO2 values measured in these environments by this study are significantly higher than the seawater CO2 projected by the end of the 21st century assuming an intermediate CO2 emission scenario. This finding should result in interdisciplinary efforts towards assessing the functional longevity of these coastal barriers and identifying alternatives for shoreline protection. This study has already impacted local forums (PRCCC, CARICOOS General Assembly) and is expected to impact a wider audience after results are shared with the scientific and resource management communities. The potential scope of impact includes tropical coastal areas in and beyond the Caribbean region.

Partners: University of New Hampshire;

Associated Project(s):
Natural Coastal barriers at risk: A First Assessment of Biogeochemical and Physical Stressors (2016 - 2017)

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Sea Grant researchers demonstrate hurricane María's impact on Puerto Rico's beaches with the use of Unmanned Aerial Vehicles (UAVs)

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant implements coastal erosion evaluation utilizing Unmanned Aerial Vehicle, digital video-imagery and GPS control to assess modern and historic coastline erosion.

Program Focus Areas: Resilient Communities and Economies

Relevance: Coastal monitoring is fundamental to understand the morphological changes in coastal environments due to natural and anthropogenic factors. Simply put, coastal monitoring is a continuous data gathering process about coastal change on which to base future decisions. To efficiently monitor the coastal regions, frequent surveys are required to detect and quantify the morphological changes. Using UAVs for coastal monitoring provides great advantages that include relatively low hardware costs, rapid-response deployment, low operating cost, high precision positioning, high level of automation and high-resolution imagery.

Response: This PRSGCP research project focused on monitoring coastal erosion in four areas distributed along the western region of Puerto Rico coastline using small UAVs based systems. Effective shoreline monitoring systems are needed to provide the foundation to determine erosion or accretion rates along the island and its impact on coastal infrastructure. Such actions will lead to the development of effective action plans to be implemented by the Government of Puerto Rico and its Coastal Municipalities. One of the many contributions of this work is the establishment of the 5 observational sites that encompassed the denoted Caribbean Littoral Aerial Surveillance System (CLASS). The idea behind CLASS is to produce a robust data set of coastal erosion and vegetation evolution, allowing local stakeholders to develop policy tools. Low-cost imagery was collected before and after hurricanes Irma and Maria.

Result: Historic accretion and erosion rates use The Digital Shoreline Analysis System (DSAS). This system quantifies beach erosion by computing the rate-of-change statistics of the coastal zones from multiple historic shoreline positions. Results are divided in 3-time frames: (1) 1930-2016 (historic rates before Hurricane Maria); (2)1930-2017 (historic rates including Hurricane Maria) and: (3) 2016-2017 (annual rate).

Partners: None listed in Database

Associated Project(s):
Coastal Ecosystem Assessment, Development and Creation of a Policy Tool using Unmanned Aerial Vehicles (UAVs) for: A Case Study of Western Puerto Rico Coastal Region (2016 - 2017)

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Expanding Puerto Rico's Fish Aggregating Devise (FAD) System

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: A FADs program for the west and south coasts of Puerto Rico will be implemented during 2018 as a result of a proposal approved to the PRSGCP. FADs are expected to provide a much-needed boost to the sport fishing community by reducing time and resources spent searching for schools of pelagic fishes targeted species. In addition to the economic and recreational opportunities and benefits provided by the FADs a research program led by UPRM and focused on pelagic fisheries in the Mona Passage and off Southwestern Puerto Rico will be developed.

Program Focus Areas: Resilient Communities and Economies

Relevance: Fish aggregating devices (FADs) have been used for many years as an effective method to attract pelagic species targeted by commercial, subsistence and recreational fishermen. During the past five years the DNER has been installing FADs on the North shore and sport and recreational fishermen from the West coast have contacted PRSGCP regarding our advice on FADs funding, installation and benefits. Our program has also been contacted regarding the impacts these FADs could have on fisheries movement or migration patterns, rate or duration of retention and effects on seasonal fish movements.

Response: UPR-MOP submitted a proposal to the U.S. Fish and Wildlife Sports Fishing Restoration funds through the PR-DNER to expand the Puerto Rico FADs network to the south and west coast. This effort will enhance the local sport and recreational fishing experience and economic opportunities of the West Coast. Besides, these FADs are expected to be the basis for an applied research project led by UPRM and focused on pelagic fisheries in the Mona Passage and off Southwestern Puerto Rico.

Result: PRSG was awarded $129,980 by the USF&WS to install at least four (4) FADs on the West and South coasts of Puerto Rico.

Partners: US Fish and Wildlife Service (US DOI, FWS); Puerto Rico Department of Natural and Environmental Resources;

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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Marine Debris Education and Community Engagement

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: VIMAS increased awareness of marine debris and engaged over eight hundred (800) people in reducing marine debris in the VI.

Program Focus Areas: Education and Workforce Development

Relevance: Marine debris is a problem throughout the Virgin Islands (VI) as well as in many Caribbean islands. It is a deterrent to tourism, a human health hazard, degrades marine habitats and can impact marine plants and animals. Past studies have shown that about 80% of VI marine debris is from recreational use of the beaches and surrounding areas. If we are to mitigate this problem we must increase community awareness and engage the community in actions that will result in behavior change. Participating in coastal clean-ups allow participants to engage in an activity which helps our marine environment and develops a sense of stewardship, promoting positive behavior change.

Response: VIMAS increased awareness about the problem of marine debris and engaged the community in activities to address the issue. VIMAS coordinated the annual coastal cleanup event in Sept. and Oct. In addition, classroom presentations were made to local schools on the issue.

Results: VIMAS increased awareness about the problem of marine debris and engaged the community in activities to address the issue. During this period, three Coastal cleanups were done on St. Croix involving about 60 people. Two classroom presentations on marine debris were given on St. Croix and 6 were facilitated on St. Thomas which involved 124 students. Many other cleanups were planned but due to the two cat 5 hurricanes that pasted, these had to be cancelled. In addition, four post-hurricane cleanups were done on St. Croix involving about 70 students and 4 were done on St. Thomas, involving 115 volunteers and removing 1,411 pounds of debris, 276 of which were hard plastics that are being shipped off island through the Department of Planning and Natural Resources (DPNR) Coastal Zone Management (CZM) Beach Plastics Recycling Program.

Partners: Ocean Conservancy;

Associated Project(s):
Virgin Islands Marine Advisory Service (2014 - 2017)

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Sandwatch Project Begins in Tres Palmas Marine Reserve, Playa Aviones and La Punta at Condado

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

RECAP: PRSGCP supported the empowerment of Robinson School, the Manuel García Pérez School's CETE Club, and the San Juan Bay Estuary, in the implementation of the UNESCO's Sandwatch Project activities, to monitor, learn and inform resource users about the need to conserve and use wisely our marine and coastal resources.

PROGRAM FOCUS AREAS: Education and Workforce Development

Relevance: Along with the damages caused by anthropogenic activities, Puerto Rican beaches have been experiencing increasingly frequent atmospheric events, including hurricanes, storm surges, sea level rise, and severe erosion, among others. There is an urgent need to educate and empower residents about this ecosystem's fragility and the importance of its conservation and wise use and the need for them to take charge and become part of the solution.

Response: Puerto Rico Sea Grant Program continues offering workshops, resources, information and methodology from the Sandwatch Project to teachers, students and community groups that are engaged in the conservation and preservation of our marine and coastal resources.

Results: The Sandwatch Project has been integrated into the Robinson School's curriculum, in the marine sciences courses. Students from that school adopted La Punta beach in El Condado, and consistently perform their monitoring duties at this site. Meanwhile, the Ecological Tourism Student Club (CETE, by its Spanish acronym) from the Manuel García Pérez School in Rincón started monitoring Steps Beach (at the Tres Palmas Marine Reserve) to measure the coastal erosion. Similarly, a group of volunteers from the San Juan Bay Estuary have adopted Playa Aviones, in Piñones, to evaluate and compare beach erosion/growth (accretion/build up) on a dune restoration project to study changes on beach profiles.

PARTNERS: UNESCO;

ASSOCIATED PROJECT(S):
MARINE EDUCATION (2014 - 2017)
COMMUNICATIONS AND PUBLICATIONS (2014 - 2017)

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Puerto Rico Sea Grant Connects Teachers to Marine Science Through Professional Development Opportunities for the Enhancement of Ocean Literacy

NATIONAL FOCUS AREAS: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

RECAP: A teacher-training model developed by Sea Grant received high marks from educators. The model instructs participants with regard to marine topics, facilitates educational materials and motivates teachers to keep participating in the program. As a result of this effort close to four thousand (4,000) students will be impacted by this effort.

PROGRAM FOCUS AREAS: Education and Workforce Development

Relevance: Most Puerto Rican teachers lack formal or informal studies on issues related to marine sciences. This lack of knowledge is reflected in the classroom, where discussion of these issues, are limited. Training for in service teachers and hands-on student field learning experiences, are efficient ways to disseminate new and relevant research results, to enhance marine environmental stewardship.

Response: Puerto Rico Sea Grant developed five (5) professional development programs related to: marine debris, marine mammals, mangrove forests, sea turtles and bioluminescence.

Results: Fifty-seven (57) teachers attended the workshops and completed a Workshop Evaluation Form (WEF). All the educators completed the WEF and rated the workshops activities excellent or good. Ninety five percent (95%) of participants that completed the WEF acknowledged they learned new information about marine topics and related materials. One hundred percent (100%) of the teachers confirmed that they could use the information and materials provided at the workshop in their classroom. Pre and post-test assessment indicated an eighty four percent (84%) improvement in participant content knowledge.

PARTNERS: None listed in Database

ASSOCIATED PROJECT(S):
MARINE EDUCATION (2014 - 2017)

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Puerto Rico Sea Grant Develops an Effort to Expose K-12 Students to Marine and Coastal Experiences

NATIONAL FOCUS AREAS: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

RECAP: Puerto Rico Sea Grant contributes to the development of an ocean literate citizenry and a future workforce that is diverse, knowledgeable and adequately prepared to advance the understanding of marine and coastal environments, its wise use, management and conservation.

PROGRAM FOCUS AREAS: Education and Workforce Development

Relevance: In order to safeguard Puerto Rico's coastal and marine environments and guarantee its sustainable development a well informed, marine-science literate and environmentally responsible citizenry is required. There is an urgent need to integrate ocean literacy to school curriculums to develop and strengthen the interest on marine environments. The participation of K-12 students in topics related to coastal and marine science and marine careers activities, will contribute to the development of a work force acquainted with marine environmental needs of Puerto Rico.

Response: The Sea Grant Marine Science Adventure Program develops a wide range of active, high-quality learning experiences and its related support services for K-12 students and teachers. This program launches students into the marine environment through exhibitions, laboratories, conferences and field activities at selected coastal nature reserves in Puerto Rico. This multidisciplinary (STEM) approach, depicts environmental problems, promotes applied science and community involvement among participants.

Results: Eighteen (18) educational events were coordinated for close to 1,000 K-12 students and sixty (60) teachers. Students acquired a 54.3% knowledge gain about marine and coastal ecosystems (as showed by the pre and post tests) and had the opportunity to understand and appreciate the varied study fields in marine sciences. Seventy-one percent (71%) of the students expressed this was their first marine educational experience.

PARTNERS: Puerto Rico Department of Education;

ASSOCIATED PROJECT(S):
MARINE EDUCATION (2014 - 2017)

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Puerto Rico Sea Grant Efforts Lead to Improved Beach Profile Monitoring at Efrain Archilla Nature Reserve in Humacao, Puerto Rico

NATIONAL FOCUS AREAS: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems

- Accomplishment
- Approved

RECAP: The collaborative efforts of PR Sea Grant supported data gathering regarding beach changes due to coastal erosion and its impact on endangered species and their vulnerability to survive due to nesting habitat loss.

PROGRAM FOCUS AREAS: Education and Workforce Development ; Healthy Ecosystems and Habitats

Relevance: Since 1985, Puerto Rico Sea Grant has made efforts for the conservation of sea turtles in the southeast of Puerto Rico. Each year three species of sea turtles return to the beaches of the Humacao Natural Reserve to lay their eggs. Sea turtles face a variety of threats that affect their survival including beach erosion which hinders their nesting process. Erode and eroding beaches present one of the greatest long term threats to the sea turtles.

Response: Puerto Rico Sea Grant contacted the Natural Reserve Management Office and collaborated in the design of a strategy to obtain data about the physical behavior of the beach. Volunteers interested in this collaboration were recruited and participated on two Sandwatch workshops to monitor the affected beach. A group of fifteen students from the Gerardo Selles Sola Intermediate School in Caguas, accompanied by two teachers and ten university students from the Coastal Marine Biology Program of the UPR-Humacao, were trained in methods to measure beach profiles, currents, waves, wind and granulometry.

Results: The volunteer group initially identified 3 sampling points and after Hurricanes Irma and Maria included 2 more points on the 1.5 kilometers of beach. The project started in February 2017 and data is still being collected from the site. In 2017, 9 trips were conducted, gathering data on beach behavior. Intermediate and university students are working with the data to make a preliminary report. The data collected through the project can provide valuable information to state and federal resource managers who seek to understand and conserve beaches as species habitats.

PARTNERS: Puerto Rico Department of Natural and Environmental Resources; University Of Puerto Rico, Humacao (UPR);

ASSOCIATED PROJECT(S):
MARINE EDUCATION (2014 - 2017)

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A new environmental club arises in Manuel García Pérez School work in favor of Tres Palmas Marine Reserve conservation

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: The creation of the Ecological Tourism Students Club represents the beginning of new environmental leader's development. CETE has increase not only the number of members but also their participation in citizen science projects.

Program Focus Areas: Education and Workforce Development

Relevance: Marine and natural reserves in Puerto Rico lack the funding and enforcement needed to establish effective conservation resources. During 2016 PRSG trained 20 students from Manuel García Pérez High School to become Tres Palmas Marine Reserve ecological guides in an effort to educate residents and visitors regarding the fragility and value of this marine reserve and the need to develop conservation efforts and promote negative attitude changes and behaviors. Due to the great impact of this past effort, other students became interested in being part of TPMR ecological guides motivating teachers and students to request the help of Sea Grant in the development of a school club dedicated to promote TPMR conservation through education and citizen science projects.

Response: As a result of the PRSG support and the great commitment of the teachers and students, on March 2017 thirty-four students were initiated as members of Ecological Tourism Students Club (CETE, by its Spanish acronym). Since the creation of CETE, its members have dedicated more than 200 volunteer hours in different conservation efforts conducted in TPMR, such as water quality monitoring and beach cleanups and educational talks. They have also continued developing beach profiles as part of the Sandwatch program citizen science activities.

Result: The Ecological Tourism Students Club encouraged its members to use the Reserve as the ideal place to carry out citizen science projects. As a result of this effort one of the students won First Prize at a district and regional level science fair project about TPMR water quality. His achievement was published in the international Sandwatcher magazine publication of March 2017.

Partners: None listed in Database

Associated Project(s):
Marine Outreach Program (2014 - 2017)

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PRSG continue taking advantage of social media networks

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Social media networks have been an excellent tool for PRSG to share news and information, announce events, and increase ocean literacy.

Program Focus Areas: Education and Workforce Development

Relevance: PRSGCP efforts on ocean literacy education and dissemination is intended to provide guidance to students, teachers, community groups, policy makers and the general public on the big ideas of ocean science so that they may be able to communicate about coastal and marine resources in a meaningful way, and be equipped to make informed and responsible decisions about activities that impact our oceans. Social media networks are part of the daily life of many people all over the world and Puerto Rico is no exemption. Social media has been proved to be and excellent tool to share information, educate, and create awareness.

Response: PRSG continues its engagement in social media and maintains its Facebook, Twitter, and ISSUU pages. Through them, PRSG announces its publications and events, share news and stories, and helps partners to share valuable information.

Results: Our audiences are aware about PRSG projects and efforts, and are able to share valuable information produced by PRSG. PRSG Facebook page has over 6,000 likes, Twitter page has over 1,600 followers, and people are able to read our publications through the Internet and share them.

Partners: None listed in Database

Associated Project(s):
Communications Supplement (2014 - 2015)

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The Interdisciplinary Center for Coastal Studies and PRSG published three issues of the Fuete y Verguilla magazine

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Fuete y Verguilla keeps informing Puerto Rico's fisheries managers and resource users in an effective and reliable fashion

Program Focus Areas: Education and Workforce Development

Relevance: Artisanal fishermen of Puerto Rico need a reliable source of information regarding laws and regulations that apply to fisheries activities. Fisheries managers, also need an information source to deliver relevant information regarding laws and regulations to resource users, if they plan to be effective in their education and law enforcement efforts.

Response: The Interdisiciplinary Center for Coastal Studies (ICCS) and PRSG published three issues of Fuete y Verguilla a fisheries magazine that serves as an open communication channel between fisheries resource users and fisheries managers.

Results: All three issues of Fuete y Verguilla were published in paper and posted at the PRSGCP and ICCS webpages https://seagrantpr.org/communications-and-publications/fuete-y-verguilla/ and https://ciel-uprm.org/publicaciones/fuete-y-verguilla/. Our audiences are able to receive fishing activities information about laws and regulations, seasonal closures, technical and administrative advice, meetings and public hearings, safety and enforcement concerns and other topics of interest to fisheries resources managers and users.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2014 - 2017)

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Marine Nature and Conservation Newspaper Column

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: VIMAS is increasing marine education by regular newspaper submissions and other media.

Program Focus Areas: Education and Workforce Development

Relevance: If the community is to protect and conserve marine resources they need to have an understanding of them. This can be done in a variety of ways such as publications, public and school presentations, field activities, as well as through the media. This project would involve writing articles on marine nature and conservation as well as promoting the VIMAS program and website. The local newspapers are widely read on a daily basis in the VI. VIMAS will increase this type of education by regularly writing a publishing in the newspaper and other media.

Response: VIMAS has started to make more regular submissions to the local media in order to increase awareness of marine issues.

Results: "Volunteers Needed for Clean-up Drive Planned in Charlotte Amalie" - October 31st, 2017 - St. Thomas Source; "Coastweeks Partners with CZM to Recycle Plastics" - August 28, 2017 - St. Thomas Source; "VI Students Educated on Marine Careers & Oceans at YOE Summer Program" - August 4, 2017 - St. Thomas Source; "Keepin' It Clean in 2017" Participants Honored for Recycling Initiatives" - June 28, 2017 - St. Thomas Source; "NSF $300,000 SEAS Your Tomorrow Grant to Educate VI Youth for Careers in STEM" - March 28, 2017 - St. Thomas Source; "VI Marine Advisory Service Implements Mangrove Planting

Project" - February 14, 2017 - St. Thomas Source; "Coastweeks Cleanups Continue on St. Croix" - St. Croix Source 10/27/17; "The VI Marine Advisory Service and SEA join the challenge here on St. Croix with Coastweeks" - St. Croix This Week/Aug 2017.

Partners: None listed in Database

Associated Project(s):
Virgin Islands Marine Advisory Service (2014 - 2017)

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2017 Leveraged Funding

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Project Level

Source	Project	Title	Amount	Type
National Marine Fisheries Service (US DOC, NOAA, NMFS)	9919 - Marine Outreach Program (A/151-1-14)	SEAMAP-C	$76,815.00	Managed
Environmental Protection Agency	9921 - Coastal Communities Development (A/151-3-14)	Exploring Solutions to Point & Non-point Sources of Contamination in the Lajas Valley Watershed, PR	$4,000.00	Managed
Puerto Rico Department of Natural and Environmental Resources	9919 - Marine Outreach Program (A/151-1-14)	Citizen scientists participate in the development of an ecosystem management tool that will support Tres Palmas Marine Reserve management	$6,560.00	Influenced
		TOTAL:	$87,375	

Program Level

No Program Level Leveraged Funding for this year

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Performance Measures

2017 Communities implementing hazard resiliency practices

County of the Coastal Community	Name of Coastal Community	Number of Resiliency Training/Tech Assistance provided	Community hazard resiliency improved
San Juan	San Juan	3	No

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2017 Sea Grant Products - (tools, technologies, info services)

(No Data)

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2017 Economic (market and nonmarket) impacts

Description	Businesses Created / Retained	Jobs Created / Retained	Economic Benefit	Patents
Puerto Rico Sea Grant drowning research project leads to the creation of 38 jobs in the aquatic safety field. Drowning statistics and data from a Sea Grant supported thesis regarding the economic loss caused by drowning in Puerto Rico were used by the Puerto Rico Department of Sports and Recreation to support and justify the creation of new lifeguard positions.	/	38 /	$159600	

2017 National Performance Measures - General

Performance Measure	Annual Target	Reported	Program Comment
Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.	4,196	22	
Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.	223	16	
Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities.	331,630	261	
Number of resource managers who use ecosystem-based approaches in the management of land, water, and living resources as a result of Sea Grant activities.		1	
Number of people engaged in Sea Grant supported informal education programs.	773,973	141	

Number of Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation.	118		

2017 Program Performance Measures

(No Data)

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2017 Metrics

Staffing Numbers	Individuals	SG FTEs	non-SG FTEs
Administrative	6.00	4.20	1.33
Communications	12.00	4.34	3.00
Education	6.00	2.71	1.00
Extension	10.00	4.47	2.02
Research	50.00	6.56	2.90

Core Funding	Proposals	Institutions Involved	From Home Institution
Pre-Proposals	41	28	11
Full Proposals	15	11	5
Proposals Funded	8	5	3

Student Support	Number of New Students	Number of Continuing Students	Number of Degrees Awarded
Sea Grant Supported Undergraduate Students	16	14	4
Sea Grant Supported MS/MA Graduate Students	6	12	4
Sea Grant Supported PhD Graduate Students	1	2	0
Other Sea Grant Supported Professional Degree Graduate Students	0	2	1

Other Metrics	Amount
VolunteerHours	1404
Number of P-12 Students Reached Through Sea Grant-Trained Educators or Directly through Sea Grant Education Programs	18568
Number of P-12 Educators who participated in Sea Grant education programs	176
SG-Sponsored/Organized Meetings/Workshops	136
Attendees in SG Meetings/Workshops	7557
Public or Professional Presentations	33
Attendees at Public or Professional Presentations	7457
Clean Marina Program -- Certifications	0
HACCP -- Number of people with new certifications	0