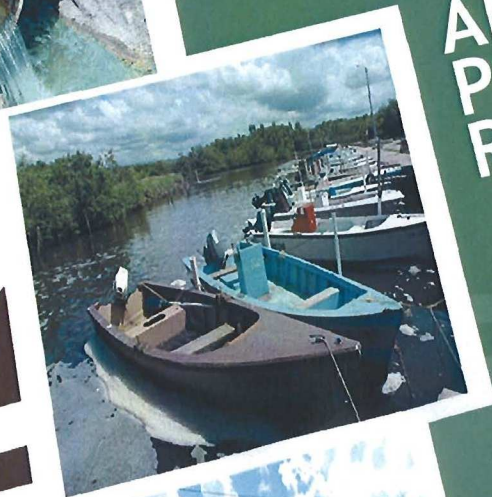
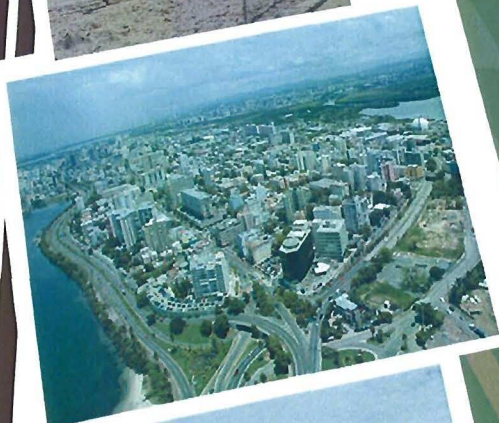
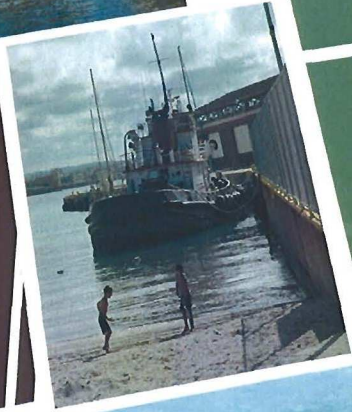
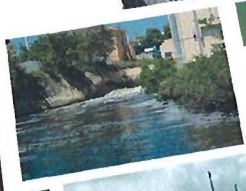


UNIVERSITY of PUERTO RICO

SEA GRANT COLLEGE PROGRAM

ANNUAL
PROGRESS
REPORT

2004-2005



Annual Progress Report
University of Puerto Rico
Sea Grant College Program

November 1, 2004
to October 31, 2005

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This annual report presents the University of Puerto Rico Sea Grant College Program key accomplishments for the period between November 1, 2004 and October 31, 2005. The UPRSGCP's performance is stated in terms of the three performance measures established by NOAA for its matrix programs and as part of the Ecosystem Research Program (ERP).

Measure 1: Return on investment from the discovery and application of new sustainable coastal, ocean, and Great Lakes products.

- Our Coastal Community Development (CCD) project was instrumental in establishing a connection between the Economic Development Center of the University of Puerto Rico and the Municipality of Rincón which produced a \$1M (one million dollars) grant for the construction of a tourist center at the municipal beach park of Rincón. This center is expected to generate at least 20 new jobs and improve the economic opportunities of the municipality.
- An environmental monitoring research project of open cage aquaculture in Culebra funded by UPR Sea Grant set the parameters for the evaluation of the environmental impact generated by open cage aquaculture operations. This project has demonstrated that offshore culture of fish in large cages is an environmentally friendly industry with the potential to create jobs and income for Puerto Rico. The Department of Natural and Environmental Resources in Puerto Rico is already using these parameters as their criteria to approve permits for open cage aquaculture. The results of this study have stimulated the development of this industry. In addition to the original Snapperfarm Inc. pilot project, currently two new companies and a fish hatchery are on the drawing board and trying to obtain permits to establish operations in Puerto Rico.
- Due to the guidance and advice of MOP's CCD specialists fishermen from the Papayo Fishing Village were empowered and capacitated to write and submit an economic development proposal which resulted in an award of \$200,000.00 for the purchase of ten (10) 21' fiberglass boats equipped with fishing gear, safety equipment and a four stroke outboard engine. Since the award fishermen have reported improved economic benefits, changes in attitude and work ethics, and an increase in productivity and effectiveness.
- Due to efforts conducted by MOP regarding the prevention of diving injuries among artisanal fishermen in Puerto Rico there has been a significant reduction in diving accidents from fishing villages that have participated in Sea Grant coordinated workshops. Emergency medical technicians, hospital personnel and emergency room doctors were offered capacity building opportunities by personnel from the Hyperbaric Medicine Services of the Puerto Rico Medical Services Administration. This reduction has been documented by Dr. Juan Nazario, Director of the Hyperbaric Medicine unit of the Puerto Rico Medical Services Administration. As explained by Dr. Nazario one treatment at the hyperbaric chamber runs for \$4,000 without the cost of transportation by helicopter. An average of 70 fishermen divers are treated yearly for an estimated cost

of \$280,000 without transportation costs. Most of these divers do not have medical insurance so the government has to cover all the treatment costs. Besides, once you are treating diving accidents you are limited to use the chamber for other treatments not related to diving reducing significantly economic and health related opportunities.

- An innovative aquaculture venture is being developed thanks to a seed money grant from UPR Sea Grant. A UPR Department of Marine Sciences graduate student is successfully cultivating salt water shrimp (*Litopenaeus vannamei*) in aquaculture ponds at the Lajas Valley. Water quality tests were conducted in several locations of the Lajas Valley to measure salinity and other essential parameters of underground water reserves for the cultivation of this salt water shrimp. After six months the shrimp have adapted to the water conditions of the Lajas Valley. If this cultivation experiment continues to be successful it will open the door to a new and lucrative aquaculture venture that will reap economic benefits from land that is no longer useful for agriculture.

Measure 2: Cumulative number of coastal, marine, and Great Lakes issue-based forecast capabilities developed and used for management.

- An assessment of Red Hind (*Epinephelus Guttatus*) breeding population structure and spawning habitat in the US Virgin Islands demonstrated the benefits of seasonal closures. Benefits are roughly a three fold increase in fish size, fish density, biomass and population size. The results of this study helped determine the area designated for seasonal closure for the red hind fishery in the US Virgin Islands. The Caribbean Fisheries Management Council used the results of this study to establish the area to be closed.
- A model for the integral assessment of water quality and marine ecosystem health indicators was developed in a project carried out at the La Parguera bioluminescent bay. Models and maps which will allow assessment of eutrophication and health of tropical waters were developed. Local NGO's and resource managers will benefit from these technological tools to monitor the health of this fragile and unique ecosystem that is the key tourist attraction in La Parguera.
- Development of a contaminant and erosion control baseline GIS database for the Puerto Mosquito Watershed, Vieques, PR This database establishes the physical/chemical triggers for blooms of bioluminescent phytoplankton in Mosquito Bay Vieques PR and compares it to La Parguera bay. The database will allow to study how sedimentation affects bioluminescence in the future. Resource managers will be able to use this database to make decisions regarding these unique resources in Puerto Rico. In addition, the Environmental Quality Board could use this database to establish erosion and sedimentation control plans for the management of these valuable natural resources and attractions.

Measure 3: Percentage/number of tools, technologies, and information services that are used by NOAA partners/customers to improve ecosystem-based management.

- An evaluation of the main ports and bays in Puerto Rico and the US Virgin Islands as to their exposure to hurricane wave attack was conducted by our coastal hazards specialist. This study used recently acquired high resolution SHOALS bathymetric data in order to ascertain the risk of coastal infrastructure located inside the main ports and bays of these islands. Hurricane forced surface gravity waves are an almost annual hazard which affect coastal infrastructure including ports and power plants. An important tool for hurricane refuge site for boaters has been made available with a series of maps developed by this project for selected bays and harbors with anticipated wave height and direction under different hurricane conditions. In addition, the UPR Sea Grant web site is being prepared to host this database which will be available to a wide variety of stakeholders who may need this information.
- Although coastal flood maps for Puerto Rico have been available for the past 15 years, these are not easily accessible. UPR Sea Grant has made GIS-based coastal flooding mapping for Puerto Rico using ArcView available through the Internet (<http://coastalhazards.uprm.edu>) showing areas potentially floodable by hurricanes (100-year storm, Category 1-3-5 hurricanes), tsunamis, and other coastal flood data available. The data used to prepare the maps has been facilitated to the USGS, the International Institute of Tropical Forestry of the US Forest Service and to several NGO's. These maps are essential for hazard mitigation, coastal zone management, coastal planning and decision making on matters as relevant as hurricane evacuation.
- Microbiological parameters for local seafood health risks were developed as part of a UPR Sea Grant funded study for bivalves collected in southwestern Puerto Rico. The parameters were developed using a critical hazard analysis rating (CHAR) system that can be adopted and used by the appropriate government agencies. The microbiological parameters can be used to classify oyster and clam harvesting waters and to develop relaying or purification treatments from a public health perspective. Using these parameters Sea Grant seafood and water quality specialists will develop a guide to prevent oyster and clam related intoxication.
- The University of Puerto Rico's Coastal Hazards Center has been established under the UPR Sea Grant umbrella. One of the center's first tasks involves the transfer of tsunami forecasting technology from the Pacific to the Atlantic, under a NOAA sponsored project. To accomplish this task we will make use of the tsunami DART buoys to be deployed in the Atlantic and Caribbean regions.
- Our MOP fisheries specialist conducted a study to learn the current status of the marine ornamental wild fisheries in Puerto Rico. Findings and recommendations from this report were used by the Department of Natural and Environmental Resources and the Caribbean Fisheries Management Council (CFMC) for the establishment of the commercial fishing regulations on wild ornamental fish.

- Our MOP continues the coordination of the SEAMAP-Caribbean Committee (Puerto Rico and the US Virgin Islands) of the South East Area Monitoring and Assessment Program (SEAMAP-C). The committee decides which projects will be included in the long term marine resource independent studies for improved, efficient and effective data collection management and dissemination of fishery-independent data on the marine resources and their environment, within the territorial sea and the EEZ. Data gathered by surveys on reef fish species, conch (*Strombus gigas*), lobster (*Panulirus argus*), whelk (*Cittarium pica*), and Essential Fish Habitat Bottom Mapping are used as tools by resource managers to evaluate the status of marine resources through ecosystem based management and conservation measures. SEAMAP produced (7) publication/reports on reef fish monitoring, post-larvae and juvenile spiny lobster and whelk which have been used by government agencies and managers of marine resources (Department of Agriculture, CFMC, DNER, US Fish and Wildlife Service, UPRSGCP to develop management, education and outreach tools (marine habitat maps, fact sheets, papers, reports and articles).
- Capacity building activities and information provided by MOP to emergency medical technicians, hospital personnel and emergency room doctors has assisted these health professionals in dealing adequately with ciguatera patients. Consumers have also benefited from Sea Grant's efforts to identify certain fish species known to cause illnesses. Thanks to the coordination of various workshops and other capacity building activities the Puerto Rico Health Department is cognizant about illnesses caused by consuming seafood, health officials have established a protocol when events of ciguatera occur, and the Epidemiology division has improved its reporting procedure. Sea Grant's ciguatera publication is the official education tool used by the Epidemiology Division for all consumers that have suffered from ciguatera and reported their cases to the Division.
- Due to the efforts of Sea Grant's MOP the Health Department has recognized that Puerto Rico needs a program to guarantee the safe harvesting, processing and distribution of locally captured mollusk shellfish.
- UPR Sea Grant developed a guideline on quality and safety requirements for fishermen and fish farmers in order to market their products in the Department of Agriculture (DA) production centers. Products that comply with the established quality criteria will have the benefit to display the DA seal "Del País."
- Results from a study of "Risk and prevention of dysbaric osteonecrosis among Puerto Rican Seafood Divers" are the basis for educational outreach programs to reduce DON in divers and to protect the seafood divers' health and income, and are also being disseminated in diving safety workshops coordinated by MOP.
- Sea Grant constituted a HACCP team to provide high caliber training to seafood processors and importers in Puerto Rico to help them comply with the requirements of the FDA' Seafood HACCP regulations. This team is an example of how managers of the resource (FDA, Puerto Rico Health Department) and the academia (Sea Grant and the

Agricultural Extension Service) can work together in the education of the industry. By educating the industry on federal regulations the number of violations has been reduced, the seafood imported and transshipped to Puerto Rico is safer and of higher quality and the number of consumers exposed to illness associated with seafood consumption has been reduced.

- A technical guide related to simple practices to improve the disposition of used waters in residential septic systems was developed and published by our water quality specialist. The guide was adopted by the Department of Natural and Environmental Resources (DNER), the Puerto Rico Health Department-Environmental Health Division and the Permits and Regulations Administration (ARPE). More than 400 copies of the guide were distributed among managers of the resources, developers, extension agents and municipal governments.
- A technical report related to facilities with permits to discharge contaminants to Puerto Rico's bodies of water was developed and published by UPR Sea Grant. The report is being used as a water protection and conservation capacity building tool for coastal community leaders and stakeholders.
- A four million dollars (\$4M) plan developed by the Puerto Rico Aqueduct and Sewer Authority (PRASA) incorporated Sea Grant's recommendations offered by our water quality specialist.
- MOP is coordinating the implementation of the Clean Marina Program for the Archipelago of Puerto Rico by educating more than 200 marina users who have adopted good boating practices to keep our waters clean as emphasized in the workshops.
- The Puerto Rico House of Representatives unanimously approved the bill that designates the Tres Palmas Marine Protected Area (MPA) of Rincón. The MPA will provide permanent protection to the threatened reefs of the area and is a result of over three years of lobbying, outreach and education. The legislation orders the DNER to assign \$100,000 for the implementation of the law, for drafting a management plan and to render annual reports on the state of the natural reserve to the Legislative Assembly. The bill also passed the Senate, was signed by the Governor and became a law in 2004. UPR Sea Grant, Surfrider and the local community of Rincón were behind this effort. The Tres Palmas MPA will be protected for the future generations of Puerto Rico and is a natural attraction that will provide economic and recreational opportunities for residents and visitors. MOP is coordinating the development of the management plans for the Tres Palmas MPA and for the Canal Luis Peña MPA in Culebra.
- The communications and publications division published the text book "Los Arrecifes de Coral", a teacher's manual and a CD Rom. There will be a launching press conference in January, 2006. This is the first text book in Spanish about coral reefs in Puerto Rico. UPR Sea Grant will promote the use of these materials in public as well as private elementary schools.