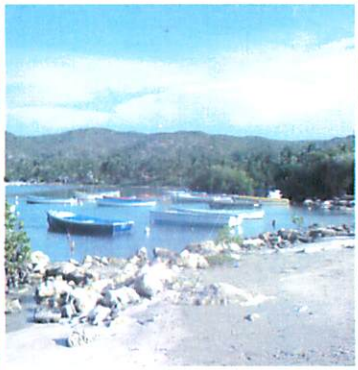
UNIVERSITY OF PUERTO RICO

SEA GRANT COLLEGE PROGRAM



Sea Grant
University of Puerto Rico

PROGRAM GUIDE

2004 - 2006

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Mission

The University of Puerto Rico Sea Grant College Program (UPRSGCP) is an educational program devoted to the conservation and sustainable use of coastal and marine resources in Puerto Rico, the U.S. Virgin Islands and the Caribbean region. This is accomplished through aggressive research and marine extension. The UPR Sea Grant College Program is part of the National Sea Grant network. Sea Grant is based at the University of Puerto Rico in the western municipality of Mayagüez; the Program's Marine Education Center is housed by the University of Puerto Rico in the eastern municipality of Humacao. Our program is one of the components of the Research and Development Center of UPR-Mayagüez. In the wider Caribbean region, the University of the Virgin Islands, through its Center for Marine and Environmental Studies, is our key institutional partner, housing the Virgin Islands Marine Advisory Service (VIMAS), our outreach and education arm in the United States Virgin Islands.

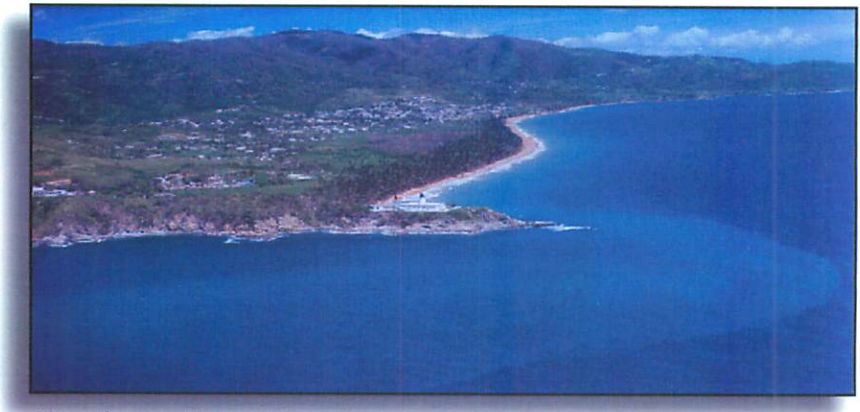
This program's mission is two-fold: 1) to conduct scientific research of excellence in the thematic areas of water quality, fisheries and mariculture, coastal communities economic development, and coastal hazards and safety, and 2) to apply our scientific knowledge to solve a variety of problems our communities of users face every day. For over two decades, the UPRSGCP has been working to promote the conservation and sustainable use of coastal and marine resources through a strong educational approach based on research, outreach, and educational activities conducted in the multi-cultural context of the insular tropical environs of Puerto Rico, the U.S. Virgin Islands, the Caribbean region and Latin America.

Program Administration

Puerto Rico Sea Grant Program strives to be innovative, and scientifically based. It has a strong educational orientation, supported by an aggressive communications strategy and a strong and consistent regional outreach component. The Program Administration component provides the program with an agile and creative administration that successfully faces the challenges presented by the unsustainable economic activities that pervade our region. Our program administration must also make optimal use of the available funding and networking opportunities.

For the 2004-2006 biennium, and in line with our Strategic Plan, program management will devote time and effort to the following endeavors: providing research and educational opportunities for undergraduate and graduate students, as our program moves towards becoming a marine educational program in its broadest and inclusive sense; continuing to support projects and activities in the areas of policy and capacity building for communities and resource users; continuing with our commitment to Coastal Community Development; supporting, encouraging and designing activities and projects dealing with the sustainability of the coast and the ocean; and increasing and improving our internal communications, as well as our communication with the public. We will address these areas while striving to maintain our current level of excellence in outreach, and to bring our research to a level of excellence.

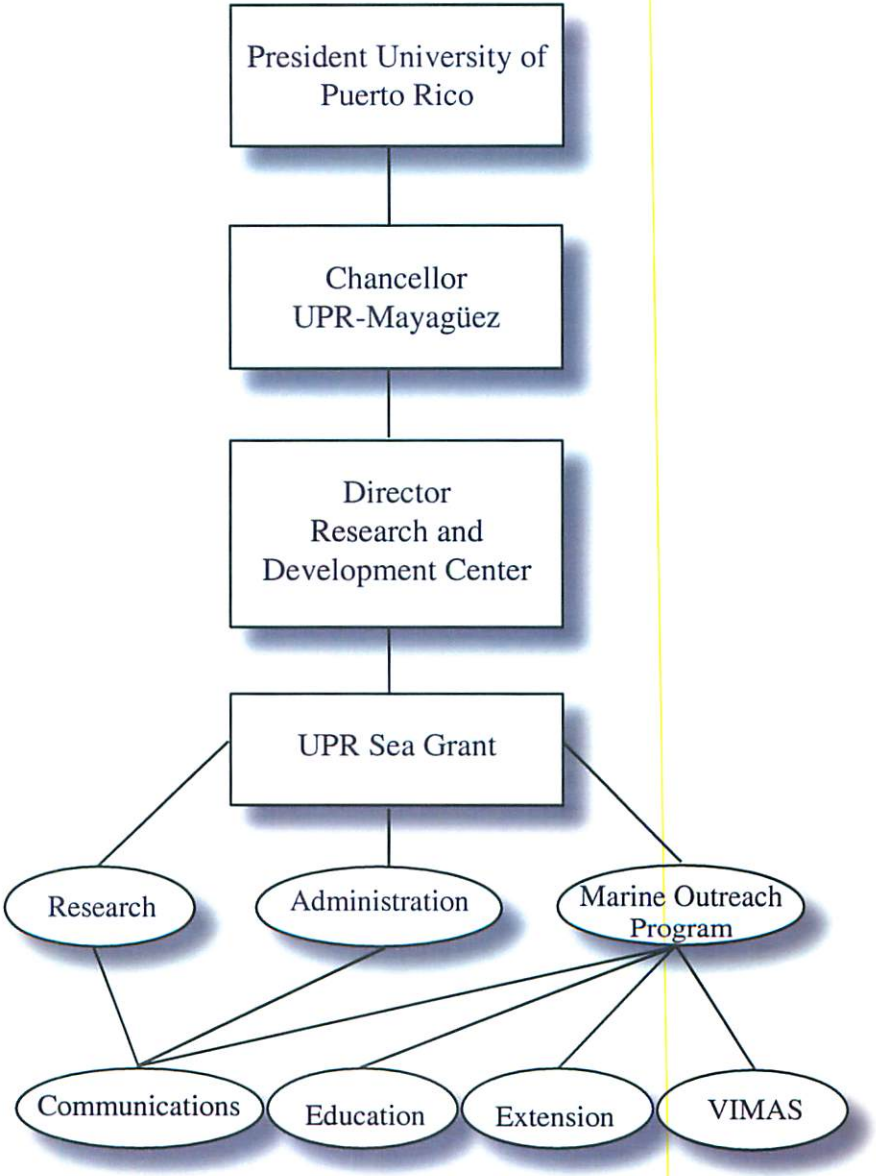
Our Program has developed and will continue to develop, a number of high quality collaborations with Commonwealth and Federal agencies, as well as with non-governmental organizations (NGO's). We have a strong working relationship with the Department of Natural and Environmental Resources, Jobos Bay's Coastal Training Program, the National Marine Fisheries Services, the Commonwealth of Puerto Rico's Coastal Zone Management Program, and the Puerto Rico Conservation Trust in a number of research and extension projects.



Maunabo coast line

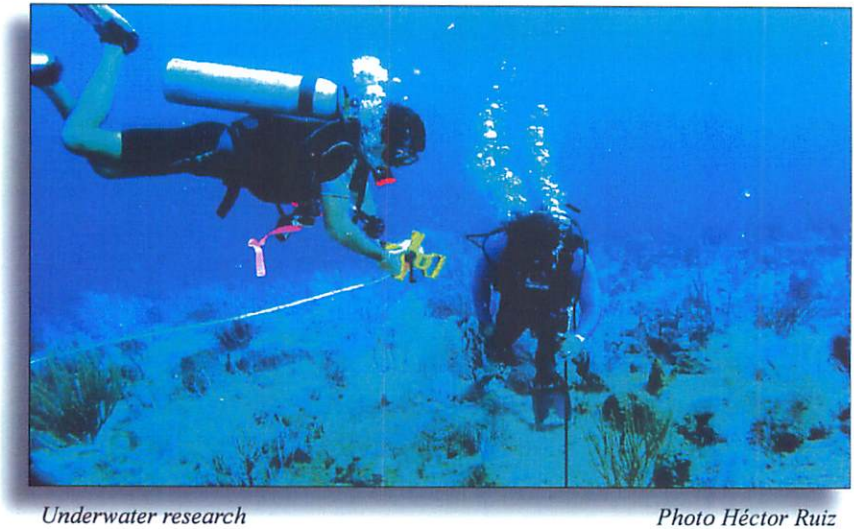
Program Administration Team:
Director-Manuel Valdés Pizzini, Ph.D.
Associate Director-Aixa Rodríguez, Ph.D.
Research coordinator-Kurt Grove, Ph.D.
Financial Officer-Yulissa García, B.B.A.
Administrative Secretary-Migdalia Figueroa, B.S.
Courier - Steven L. Herzog

University of Puerto Rico Sea Grant Program Structure



Research

UPR Sea Grant's Research component aspires to become the prime source of knowledge, technology transfer and guidance related to the conservation and sustainable use of our coastal and marine resources. Research continues to be one of the areas with the greatest potential in our program. Our research agenda is interdisciplinary and involves an outstanding group of investigators, capable of carrying out innovative and pertinent projects, especially in our thematic areas.



Underwater research *Photo Héctor Ruiz*

For 2004-2006, the research selection process increased the participation of researchers from academic programs throughout the UPR system, UVI, and other institutions as well. Researchers' participation in the pre-proposal stage, as well as in the final evaluation of proposals, demonstrated our commitment to the diversification of academic fields, universities (including private institutions), gender, and academic level of researchers (junior and senior faculty) in the proposal submission process. The final selection of meritorious projects (based on the science, potential impact, and relevance to our Strategic Plan) also reflects that commitment.

The research projects selected for this biennium fall into four general categories: coastal ecosystem health and water quality, coastal ecosystems and habitats, coastal natural hazards, and public health and safety. These are diverse programmatic areas, whose corresponding research activities will be conducted in a variety of ecosystems and at a

wide range of sites. Out of six projects funded, we have the following distribution: six new Principal Investigators (never funded by Sea Grant), ten new investigators in all, one female principal investigator, two projects from the UPR-Mayagüez Department of Marine Sciences, two projects from UPR departments (Social Sciences and Geology), one project from the UPR-Río Piedras Department of Biology, and one project from the University of North Carolina.

Coastal Ecosystem Health and Water Quality

Water quality is one of the key issues affecting our waters. Poor water quality is a deterrent to a better quality of life, as well as to sustainable economic development. It is also a threat to the health of coastal populations. Water quality is one of our key priorities, as stated in our *Strategic Plan*, and an important outreach component. For this research cycle, we are funding two projects dealing with the impact of new pollutants (triazine contituents) on coastal waters, and the effects of Aspergillosis in sea fans.

Distribution and impact of triazine constituents in anti-fouling paints on inshore marine communities

Pollution is, according to the Pew Oceans Commission, one of the biggest challenges in the conservation and protection of our waters. This silent crisis, as the Commission describes it, is continuously developing through a multiplicity of human processes, including the development of new pollutants. Irgarol 1051 is a booster biocide (herbicide) formulated with copper in new generation antifouling paints which replaced organotin compounds. An International Maritime Organization ban on the use of organotin compounds such as tributyl tin (TBT) in all shipping went into effect in January 2003, and the use of replacement compounds is set to increase. The global use of Irgarol 1051, as well as other triazine herbicides, raises concerns regarding potential contamination of coastal reef ecosystems, the associated potential for photosynthetic inhibition of coral symbionts photosynthesis by these herbicides, and implications for growth, survival and the health of already vulnerable coral habitats.

Whilst bottom paints containing Irgarol 1051 were first registered for use in the U.S. in 1998, to date there have been no studies investigating potential contamination of coastal waters of the U.S. Caribbean

by this newly introduced herbicide constituent. There is a need to undertake seasonal distribution studies of both sediment and aqueous samples in tropical and subtropical regions to establish the extent of potential contamination of reef ecosystems by these compounds. This study, headed by Ernesto Otero from the University of Puerto Rico at Mayagüez, will quantify the distribution and concentrations of the s-triazine Irgarol 1051 in marinas, harbors and coastal waters of Puerto Rico, the U.S. Virgin Islands and the British Virgin Islands and assess the temporal and spatial distributions of Irgarol 1051 for seasonal evaluation and biomonitoring. One key contribution of this project is the assessment of the potential impact of triazines and other antifouling biocides on zooxanthellae cellular physiology corals (in *Montastraea annularis* and *Porites porites*), zooxanthellae being an essential element of coral communities and the photosynthesis process.

The production of baseline data for ecotoxicological modeling and ecological risk assessment will allow resource managers to make educated choices regarding the use of antifouling compounds in their marine jurisdictions. This will promote the conservation and wise use of coastal and marine resources of Puerto Rico and the U.S. and British Virgin Islands in ways that benefit the entire population of the Caribbean.

Dr. Ernesto Otero Morales
Department of Marine Sciences
University of Puerto Rico, Mayagüez

Aspergillosis disease of sea fans: pathogens, environment and stress

Sea fans are dying in many parts of the Caribbean, with serious consequences for the health of coral reefs. The known pathogen is *Aspergillus sydowii*, a soil fungus. There are several theories about the source of fungal inoculums and host susceptibility. Preliminary data collected by Paul Bayman at the University of Puerto Rico in Río Piedras show that a range of *Aspergillus* species occur in diseased sea fans, and that *A sydowii* is not always present. The general hypothesis of this project, headed by Dr. Bayman, is that several *Aspergillus* species are opportunistic pathogens that can cause the disease, and that stressed or weakened individuals are susceptible, just as in human aspergillosis. Understanding the pathogens, environmental conditions and host susceptibility factors that lead to the disease will be necessary for its management. This project will 1) assess the incidence of disease in sea

fan populations and correlate disease with water quality parameters and spore load, 2) determine which species of *Aspergillus* infect sea fans in Puerto Rico, 3) determine if *Aspergillus* isolated from sea fans are pathogenic by fulfilling Koch's postulates, 4) test the role of stress in susceptibility of sea fans to aspergillosis. Furthermore, this project will monitor water quality and disease progress in sea fans in Puerto Rico, isolate and identify *Aspergillus* and related fungi from sea fans using morphology and DNA sequencing, test pathogenicity of fungi to sea fans in aquarium tanks, and measure levels of heat shock proteins, which are indicative of stress in infected versus healthy sea fans.

Dr. Paul Bayman
Dr. Alberto M. Sabat
Dr. Edwin Hernández
Department of Biology
University of Puerto Rico, Río Piedras

Coastal Ecosystems and Habitats

For this biennium, our program has two projects in this category. One of the projects examines the potential restoration of gorgonians (soft corals). Sea Grant, jointly with current NOAA efforts (Coral Reef Ecosystem Studies), remains committed to the understanding and conservation of coral reefs in the Caribbean region. The other project will deal with the exploration of deep-water habitats off the coast of Puerto Rico. While exploring these habitats and their geochemical features, this project will also contribute to our work on natural hazards, due to the connection between these geological features and potential seismic activity.

Restoration of gorgonian populations

Coral reefs are the essential and most precious marine habitat in the coastal waters of Puerto Rico and the U.S. Virgin Islands. However, according to Sea Grant supported research, this habitat is being threatened by anthropogenic activities throughout the archipelago. As a result, we are losing the coral reef cover area at an alarming rate. Thus, corals are the target of important government, university and private research and conservation initiatives, in which NOAA is playing a leading role. UPR Sea Grant has supported critical research activities on the reproductive patterns of corals, the impact of anthropogenic activities, the status of coral reefs ecosystems, habitat connectivity, and the transplantation of hard corals (*Acropora cervicornis.*).

Gorgonion *Photo Héctor Ruiz*

Hard corals (scleractinian) are imprinted in the imagination of the public as the quintessential form of coral organisms. However, gorgonians (also known as soft corals) are a prominent feature of the coral reef systems of the Atlantic and represent an important natural and societal resource for the Caribbean. For example, the gorgonian biotope serves as an important nursery area for ecologically and commercially important fish and invertebrate populations. In addition, because of their aesthetic impact on human observers, gorgonians undoubtedly represent an important marine resource for the recreational tourist industry. Finally, some gorgonian species (e.g., *Pseudopterogorgia elisabethae*) are commercially important in the pharmaceutical industry. Unfortunately, along with other coral reef organisms, gorgonian populations are threatened by a variety of natural and anthropogenic influences, including hurricanes, bleaching, disease, and ship groundings, among others.

As an alternative to the dramatic loss of corals throughout the region, Paul Yoshioka, from the Department of Marine Sciences at UPR-Mayagüez, heads this important project aimed at the restoration of gorgonian populations through the transplantation of large colony branches. Population dynamics of gorgonians indicate that branch transplants should be successful in restoring gorgonian populations. This project represents the "proof of principle" application of baseline information to the applied goal of restoring gorgonian populations. As such, the project will concentrate on the cost-and time-effectiveness of various transplant methods. The question is not whether restoration

is warranted or whether the techniques can be successful, but which techniques are the simplest and most effective.

Dr. Paul Yoshioka
Department of Marine Sciences
University of Puerto Rico, Mayagüez

A pilot study to investigate the possible linkages between submarine groundwater and coastal waters

Exploration of the deep-sea ocean floor is still shrouded in mystery. Thus, the potential for understanding the complex geo-chemical processes that shape our planet and our waters offers exciting possibilities.

Nancy Grindlay, from the University of North Carolina at Wilmington heads this interdisciplinary investigation on the geological and chemical aspects of a unique deep-sea habitat on the northern margin of the island of Puerto Rico. The goal of this research project is to determine the composition and measure the flux of fluids along the northern insular margin, with particular emphasis on the vicinity of an amphitheater-shaped masswasting scarp. This study is a first step towards evaluating the groundwater contribution to the coastal waters off northern Puerto Rico, while conducting a high-resolution geological mapping of the amphitheater-shaped scarp, upper platform and debris slopes. This is an important and practical issue that needs to be addressed in order to quantify the amount of potential pollutants (e.g. excess nutrients) that contaminate the coastal waters. It will also help constrain the mechanism(s) that resulted in the formation of the amphitheater-shaped scarps. Determining if these scarps formed slowly, through block-by-block dissolution and headward erosion, or as a result of a single catastrophic event has major implications for the tsunamigenic potential of the northern Puerto Rico margin. Moreover, if cold seeps are present along the headwall scarps, the potential for the discovery of new and diverse chemosynthetic species associated with the seeps is great.

Dr. Nancy Grindlay
Center for Marine Sciences
Dr. William Moore
Department of Geological Sciences
University of North Carolina

Coastal Natural Hazards

During the 2000-2002 biennium, our program increased its efforts in the area of coastal hazards, by hiring professor Aurelio Mercado (Department of Marine Sciences, UPR-Mayagüez) as a specialist in this field.

Mercado's research on tsunamis, coastal hazards (hurricanes), and the mapping of the coastal zone was translated into programs and efforts in mitigation, a tsunami warning system (see http://Poseidon.uprm.edu), and information transfer to the public. Our efforts in this area resulted in stimulating the interest of colleagues in a diversity of fields (Geology and the Social Sciences) in understanding the natural and social complexity of natural hazards. Researchers from both projects selected in this thematic area have collaborated in scientific and outreach endeavors over the last ten years.

Development of Rapid Seismic Monitoring for a Tsunami Warning System

The beehive of Puerto Rico is always buzzing and active. Such is the characterization of the seismic activity in the region, one that causes extreme concern among government officials and the scientific community, always alert to earthquakes and potential tsunamis. Sea Grant research and extension activities over the past eight years have documented and modeled the potential for tsunami generation in the region. UPR Sea Grant has also played a leadership role in the development of a tsunami warning system.

This project, headed by Victor Huérfano and Christa von Hillebrandt from the Seismic Network of the University of Puerto Rico at Mayagüez, will evaluate the use of available seismologic methods for the rapid identification of earthquake source parameters using the broadband seismic waveforms recorded by the Puerto Rico Seismic Network (PRSN). The study will also develop automated procedures for the emergent Puerto Rico-Virgin Islands Tsunami Warning System. This work addresses the need for the tsunami warning system to rapidly determine the source characteristics of offshore earthquakes.

No doubt, this project will serve as the capstone of Sea Grant efforts in coastal hazards and the science of modeling and simulating the impact of tsunamis in the region. Along with the information provided by the

project on the vulnerability of the coastal communities, these important pieces of Sea Grant-sponsored research will make a contribution to the science and management of coastal hazards.

Dr. Victor Huérfano
Department of Geology
Christa von Hillebrandt-Andrade
Department of Geology and Puerto Rico Seismic Network
University of Puerto Rico at Mayagüez

Unsustainable coastal development.

Population Composition, Geographic Distribution, and Natural Hazards: Vulnerability in the Coastal Regions of Puerto Rico

The big picture of population growth and urban sprawl often leads to layman explanations about the potential impact of natural hazards in the coastal area. A few pieces of aggregate data, and a handful of aerial photographs often serve to make broad generalizations, and even guide public policy on response and mitigation. This project provides a systematic approach to understanding the interrelationship among the key variables of population composition, geographic distribution of the population, emergency response capabilities of government agencies, and the public perceptions of risk in order to assess coastal vulnerability. Survey techniques and in-depth interviews will be used to assess the capabilities of emergency response agencies and other organizations, to understand risk perception, attitudes, knowledge, preparedness, and mitigation strategies of Puerto Rican communities residing in the coastal area, and to determine the public's level of knowledge regarding natural hazards and disasters.

This project will produce geographical maps, in both paper and GIS format, of the coastal areas of Puerto Rico that will include detailed demographic and socio-economic data of the resident population. Using 1900 and 2000 Census data, the research team will also generate a vulnerability index for this segment of the population, using variables such as household income, level of poverty, percent of female headed households, sex and age distribution, disability status of household members, and housing tenure, among others.

Dr. Havidán Rodríguez
Department of Sociology and Criminal Justice
University of Delaware
Dr. Walter Díaz
Department of Social Sciences
Prof. Aurelio Mercado
Department of Marine Sciences
University of Puerto Rico, Mayagüez

Marine Outreach Program (MOP)

The UPR Sea Grant Marine Outreach Program (MOP) is a multi-island information and technology transfer program implemented to educate and change the attitudes, perceptions and practices of resource users, resource managers, and the general public in relation to the sustainable use of coastal and marine resources. The outreach component is integrated by the former Marine Advisory Service (MAS), our Marine Education Center and the Communications division. MOP's goals and objectives are achieved through extension activities based on Sea Grant's research projects, and on information generated by the program's specialists and agents regarding the insular/tropical environment of the Caribbean region.

In addition, our commitment is to be an effective liaison between the research community and government agencies, private industry, and resource users through the transfer of technology and related information. Our work plan features innovative projects based on our Strategic Plan 2000-2010 and on the cultural context of Puerto Rico, the U.S. Virgin Islands, and other Caribbean countries.

Extension

Coral Reef Workshop 2002.

Our most successful program, MOP, presents a solid proposal aiming its effort at priority issues such as water quality, fisheries and marine aquaculture, coastal community development, and coastal hazards. MOP is increasing its efforts in Coastal Community Development (CCD), with a specialist in that area and an education assistant providing services and capacity building activities to the coastal communities. The CCD project will also be involved with issues related to "Smart Growth," and sustainable development.

The UPRSGMOP's aim is to improve and enhance abilities, economic strategies, and planning efforts of coastal communities, insular and federal government agencies, industry, university, and small entrepreneurs, in their interaction with marine resources. Ours is a mature outreach program with new and on-going projects on several key areas and issues to which our program devotes efforts and resources. Key areas and issues comprise:fisheries; mariculture and pond farming; marine protected areas (MPA's) and essential fish habitat (EFH); seafood safety and Hazard Analysis of Critical Control Points (HACCP); water quality, non-point source pollution and beach protection and conservation; coastal communities' economic development; coastal hazards; beach erosion management, and public policy and beach management.

Extension Specialists

Ruperto Chaparro, M.A., is stationed at the UPRSGCP offices on the Mayagüez Campus. Currently, Mr. Chaparro is the UPRMOP and VIMAS Coordinator, Tourism-Marine Recreation Specialist and Associate Dean of Administration at UPR-Mayagüez. Mr. Chaparro is in charge of those extension projects concerned with coastal economic development and planning, and marine recreation and tourism. Applied research on natural resource and attractions evaluation are also part of his duties.

María Beatriz Riesco, M.S. is our off-campus Marine Extension Specialist. She works out of the Department of Natural and Environmental Resources, Coastal Zone Management Offices in San Juan. Mrs. Riesco specializes in consumer education, Hazard Analysis and Critical Control Point (HACCP) and seafood safety and technology. Mrs. Riesco directs her efforts to the education and exchange of information with seafood inspectors, epidemiologists from local and federal regulatory agencies, nutritionists, home economic specialists, dietitians, students and fishermen.

Ana Navarro, Ph.D., is stationed at the UPRSGCP offices on the Mayagüez Campus. She is in charge of outreach projects related to point- and non-point source pollution, water quality, population growth and cumulative impacts on watersheds, nutrients, environmental degradation of habitats, legislation and non-regulatory tools for water resources protection. Dr. Navarro also engages in applied research projects to help communities develop strategies to protect wetlands and drinking water, and reduce non-point source pollution, emphasizing water protection practices that reduce the need for treatment.

Edgardo Ojeda, Ph. D. is stationed at the UPRSGCP offices on the Mayagüez Campus. He is in charge of outreach projects concerned with artisanal fishermen, fisheries resources, marine protected areas (MPA's), essential fish habitats and mariculture. Dr. Ojeda maintains an honest exchange of information among managers of the fisheries, researchers and constituents (recreational and artisanal fishermen). He is the coordinator for the Caribbean Region of NOAA's Southeast Area Monitoring and Assessment Program (SEAMAP), which plays a key role in providing fisheries management throughout the southeastern United States.

Aurelio Mercado, M.S., a physical oceanographer and Sea Grant researcher, is our MOP Team coastal hazards specialist. His efforts are directed towards the goal of more disaster-resistant coastal communities, beginning at the level of individual households and neighborhoods. Professor Mercado specializes in tsunami simulation programs, the development of storm surge coastal flood maps, and the education of emergency personnel at all levels of municipal, insular and federal government on matters related to vulnerability assessment techniques.

Lillian Ramírez, M.S. is our specialist on coastal community development. Mrs. Ramírez completed her Master's Degree in Biology recently at the UPR-Mayagüez, while working as a part-time coastal community specialist for our Program. She is responsible for capacity building projects with community members, developers, government personnel, NGO activists and resource users on different strategies to solve development problems based on sound information. Mrs. Ramírez also serves as a facilitator and link between resource users.

Sandra Lebrón, is an M.S. candidate at the UPR-RUM Department of Marine Sciences. Ms. Lebrón has been hired as a K-12 marine education specialist, with responsibilities that include dissemination of information on topics pertaining to the marine environment and the distribution of educational publications, newsletters and creative teaching aides. She also offers technical assistance to teachers by coordinating talks, field trips and environmental education activities (beach cleanups, environmental walks and field trips, among others).

Gillian Cambers, Ph.D. is our Coast and Beach Stability specialist. Since 1994, UPR Sea Grant and the United Nations Educational Scientific and Cultural Organization (UNESCO) have coordinated an initiative to help small islands develop the capability to better manage their beach resources. UPRSGCP became a partner in this initiative under a project coordinated by Dr. Gillian Cambers entitled "Managing beach resources and planning for coastline change, Caribbean islands" (COSALC). The project has been so successful that it is being extended to include partners in the Indian Ocean (Seychelles) and the Pacific (Cook Islands and Palau). Dr. Cambers is based at the UPRSGCP offices on the Mayagüez Campus. She is in charge of those outreach projects concerned with beach erosion management and coastal processes, coastal economic development, planning for coastal change, and beach management education projects in several Caribbean islands. Dr. Cambers engages

in applied research in areas related to her field of expertise, produces publications and coordinates workshops and conferences with MOP.

Lesbia Montero, B.S., stationed at the UPR Humacao Campus, is our education specialist. She has extensive experience with the coordination of marine and coastal resources workshops for teachers K-12. Our Education component conducts training programs and workshops for elementary and secondary school teachers, and provides them with educational publications, newsletters, curriculum guides and creative teaching aides. Mrs. Montero's efforts are directed towards promoting education at all levels and enhancing the quality and effectiveness of teaching methods used to demonstrate the complex relationships among economics, social conditions and the marine environment.

MOP administration team:

Coordinator MOP and VIMAS - Ruperto Chaparro, M.A.
Administrative Secretary - María Matos, B.S.

Education

The primary goal of our education component is to turn education into a key strategic area defining our program. This requires going beyond the traditional realm of the Marine Education component of our program and redirecting the joint efforts of education, outreach and research toward the education of the private and public sector to attain sustainable development, sound management decisions, personal choices and conservation practices. The Marine Education work undertaken by the UPRH Sea Grant staff is the groundwork for developing awareness about Sea Grant goals and for enhancing the level of marine literacy among Puerto Ricans.

Since the main thrust for Marine Education has always been teachers and students at the elementary, intermediate and high school levels, most of the efforts are concentrated on promoting a close encounter with the sea to learn about its resources, the importance of the ocean and the intimate relationship between the ocean and human beings. Marine education activities in Puerto Rico have stimulated students from K to 12 to learn more about the sea and to change their attitudes toward the importance of marine resources in the economy of the Island.

Regular offerings for students include school lectures, guided field trips, marine exhibitions and workshops. Our lectures on topics such as Marine Environments, Sand as a Natural Resource, and Sea Turtle Conservation are requested by teachers and constitute the initial point of contact between Sea Grant and students. Later on, that initial experience develops into more intensive activities (field trips, workshops or even volunteer work) for the majority of students. The emphasis of the marine education teaching/learning activities has been on field work, hands-on activities and teacher generated materials, an approach that has proven to be very effective. An important concern in our activities is to relate their content to the Standards for Excellence proposed by the Department of Education so that teachers may find in the study of the marine environment different strategies to comply with the official guidelines.

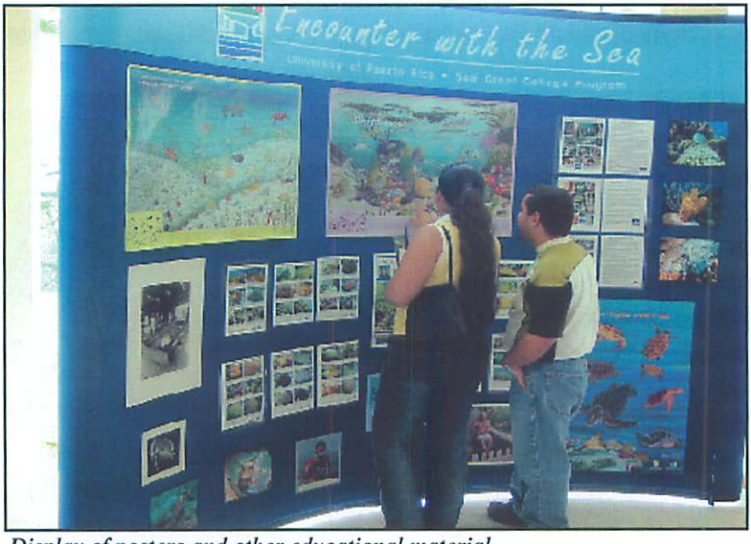
For the 2004-2006 cycle, the Marine Education component will continue to be the foremost marine education resource for sustainable use of the marine and coastal resources in Puerto Rico. Our proposed projects are based on the needs identified by educators in the different activities conducted to explore their views in preparation for the UPRSGCP Strategic Plan, and include the development of a Marine Science Course within the public education system, and preparation of new educational materials including two interactive marine environment lessons. The Program will continue the following activities that have proven to be cost-effective and have long term impact on education: educator workshops, marine activities directed to K-12 and undergraduate students, and the Sea Turtle Monitoring Project.

Educator workshop

Marine activities for children Beach information Center, Luquillo summer 2003.

Communications

During the 2002-2004 cycle, UPR Sea Grant completed the integration of the Communications and Publications Unit into the Marine Outreach Program (MOP) to form a unified outreach component. This new structure has proven successful, since we now have a communications strategy designed to serve our extension and education efforts. The communications and print shop staff developed a holistic communication strategy through which the Communications and Publications component became an agile team of content and design advisors, as well as creative product developers.



Display of posters and other educational material.

Our staff continues to serve the other functional areas of the program, namely program administration and research. Research findings are regularly featured in our publications *Boletín Marino* and *Sea Grant in the Caribbean* in non-technical language that makes them accessible to a wider audience. In addition, technical reports, proposals and all other material produced by the program administration share the design characteristics of all other publications, thus creating a uniform public image for the program.

The Communications division publishes *Boletín Marino* and *Sea Grant in the Caribbean* four times a year each. Both publications feature the program's research efforts on a regular basis and disseminate to a wide and varied readership information on educational activities and

workshops developed by the education component. The Communications and Publications component designs and publishes books, posters, promotional materials, public policy papers, brochures and Marine Facts Sheets. In addition, through the Marine Education and Information Resources Center, educators, students, researchers and the general public have access to a wide variety of information about our coastal and marine resources.

Finally, our program has a web page (http://seagrant.uprm.edu), now in its third generation, and collaborates with Jobos Bay National Estuarine Research Reserve to produce a web page (http://ctp.uprm.edu) for the coastal training activities of the program.

Communications and Publications Staff:

Communications Specialist and Editor - Aixa Rodríguez, Ph.D.
Information Specialist MEIRC - Maria Font, B.A.
Administrative Secretary - Delmis del C. Alicea Segarra, M.A.
Photolithographer - Guillermo Damiani González

Virgin Islands Marine Advisory Service (VIMAS)

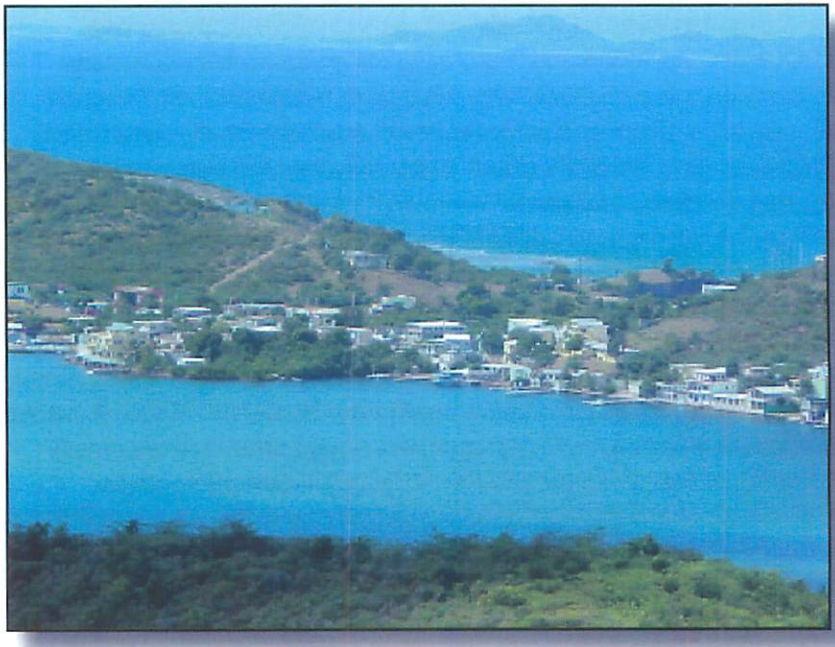
The Virgin Islands Marine Advisory Service (VIMAS) enters its eighteenth year of operation as a major extension of the University of Puerto Rico Sea Grant College Program. VIMAS is administered as a program under the Center for Marine and Environmental Studies (CMES) at the University of the Virgin Islands and has one agent stationed in the St. Thomas/St. John region and one on St. Croix. Many territory-wide programs and initiatives are handled cooperatively by those agents, although each respective program may have a slightly different focus since the needs of each island can be very different. The Virgin Islands Marine Advisory Service (VIMAS) faces enormous challenges and has numerous opportunities to enhance the interactions between Virgin Islanders and the marine environment. VIMAS develops and implements many of its programs in cooperation with local and federal agencies and organizations. Some of those collaborative ventures have included assisting the Department of Planning and Natural Resources with resource management, education programs and technical training, collaborating with NOAA on territorial coral reef monitoring

and assessment, and assisting marine industries with training and information exchange.

VIMAS programs and activities fall into two broad National Sea Grant Program strategies given in the Implementing the Sea Grant Network Plan 1995-2005:Coastal Ecosystem Health and Public Safety and Education and Human Resources. Within those Sea Grant program initiatives for 2004-2006 VIMAS agents will develop projects in on several key areas including, marine protected areas, coral reef monitoring and assessment, mangrove restoration, seafood safety, marine careers, community outreach activities, non-point source pollution awareness programs, environmentally friendly boating practices, K-12 marine education programs, and environmental justice workshops. These VIMAS programs emphasize environmental education, awareness and knowledge of marine related issues and careers, and technology transfer.

VIMAS staff

Director of CMES-Richard S. Nemeth, Ph.D
Extension agent for St. Croix - Marcia Taylor, M.A., M. Ed.
Extension agent St. Thomas/St. John-Elizabeth Ban



Island of Culebra

Credits

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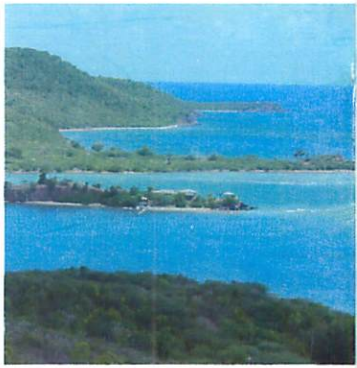

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