Sea Grant
University of Puerto Rico

UNIVERSITY OF PUERTO RICO

SEA GRANT COLLEGE PROGRAM

Sea Grant

PROGRAM GUIDE 2006-2008

Table of Contents

Sea Grant

What is the University of Puerto Rico Sea Grant College Program?

Since 1979, the University of Puerto Rico Sea Grant College Program (UPRSGCP) has been instrumental in the conservation and sustainable use of coastal and marine resources in Puerto Rico, the U.S. Virgin Islands and the Caribbean region. With federal and insular funds to support our strong educational efforts, efficacious applied research and aggressive marine extension projects, we effectively tackle ocean and coastal issues faced every day by our communities of users. UPRSGCP strives to accomplish its mission to conduct excellent scientific research in the areas of water quality, fisheries and mariculture, coastal community economic development and coastal hazards and safety and to apply our scientific knowledge to a variety of marine and coastal problems and issues.

Critical ocean and coastal issues in our region are being tackled effectively by using the set of general guidelines provided

Sea Grant

by our Strategic Plan 2000-2010. This plan has been used as a tool for the planning of activities and the establishment of a long term commitment to key processes pertaining to program management, outreach, education and research.

Managing the Program

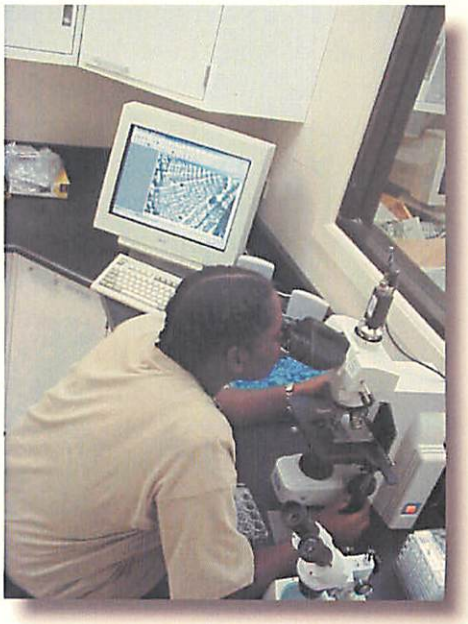
For 2006-2008, the main tasks of the Puerto Rico Sea Grant administration team will be to maintain our level of excellence in outreach, increase our educational efforts, and bring our applied research to a level of excellence, which will include the aggressive dissemination of research findings in reports, papers, books, and peer reviewed articles. We have made great inroads in this direction and will continue to do so in the next biennium. We will also maintain an appropriate administrative structure while continuing to improve program management.

Our Program has and will continue to maintain both high quantity and high quality collaborations with Commonwealth and Federal agencies, as well as with non-governmental organizations (NGO's). We maintain a strong working relationship with the Department of Natural and Environmental Resources, Jobos Bay's Coastal Training Program, NOAA's National Marine Fisheries Service and National Ocean Service, the Commonwealth of Puerto Rico's Coastal Zone Management Program, the Puerto Rico Conservation Trust, WIPR-TV, a PBS affiliate, the UPR Department of Marine Sciences, the Puerto Rico Tourism Company, New York Sea Grant College Program, the Caribbean Regional Association (CaRA), Surfrider Foundation, UNESCO, the P.R. Department of Health, the P.R. Department of Agriculture, National Parks Trust of Puerto Rico and the U.S. Fish and Wildlife Service in a number of research and extension projects.

Following 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 education program in its broadest and most 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 promoting sustainability of the coast and the ocean; and, increasing and improving our internal communications, as well as our communication with the public.

Program Administration Team:

Director-Ruperto Chaparro, M.A.
Associate Director/Marine Outreach Program Director-
Manuel Valdés Pizzini, Ph.D.
Research Coordinator-Kurt Grove, Ph.D.
Communications Coordinator - Camille Krawiec, M.A.
Education Coordinator -
Lesbia Montero, B.S.
Financial Officer-
Yulissa García, B.B.A.
Administrative Secretary-
Migdalia Figueroa, B.S.
Courier - Steven L. Herzog



Research

Our 2006-2008 research projects contribute to our understanding of coastal water quality and management of

Sea Grant

coastal resources based on a better understanding of ecosystems and critical habitats. The research projects selected for this biennium fall into three National Sea Grant categories: Coastal and Great Lakes Habitats, Revitalization of the Nation's Commercial Fisheries and Environmental Technology. These are diverse programmatic areas and research activities will be conducted in a variety of ecosystems and sites.

Coastal and Great Lakes Habitats

Coral recruitment, thermal stress and coral reef community structure in St. John, US Virgin Islands

Censuses of juvenile corals in St. John demonstrate that their distribution is not related statistically to that of the contemporaneous adult corals and that their density, growth and mortality are related to varying aspects of seawater temperature. A decade of analysis of the dynamics of juvenile corals in St. John reveals that they die at rates that are unusually high compared to other Caribbean locations. This has demographic implications for the local populations and moreover, suggests that there are hidden sources of coral mortality in this relatively pristine location.

The pervasive and profound effects of temperature on all biological processes has been recognized for centuries, but surprisingly little attention was accorded to the effects on scleractinian corals until the first large scale bleaching episodes of the 1980s were associated with seawater temperature. While it seems certain that thermally

tolerant corals will increase in abundance while thermally susceptible species will decline in abundance, evidence to this effect is rare, and therefore it is challenging to project how coral reefs will change as temperature increases.

Successful coral reef ecosystem conservation requires adaptive management that responds rapidly to changing environmental conditions. Marine protected areas (MPAs) have proliferated with the objective of protecting marine resources through the management of human activities based in the quantification of coral cover. Typically, declining coral cover is construed as "bad" and increases as "good." However, the critical factor here is that changes in reef community structure, as assessed from percentage cover data, has limited capacity to illuminate the mechanistic basis of the changes. Without such information, it is impossible to design effective management strategies, or to project how the reef might change in the future.

Through this study, Peter J. Edmunds, from the Department of Biology of California State University (CSNU), will address the recruitment of reef corals and the role of thermal stress in mediating post-settlement success of juvenile corals. The study quantifies the settlement rates of corals and seawater temperature over a kilometer-wide scale in order to explore the relationship between temperature and recruitment and the role of larval supply versus post settlement mortality in determining coral distribution. Additionally, in situ physiological analyses will be used to determine the "health" of juvenile corals in the summer and winter, in order to test the role of thermal stress in determining mortality patterns of early life stages.

This project will contribute to contemporary and important scientific questions and it addresses several key areas of the UPRSG Strategic Plan including: 1) maintenance of local fish

habitats and the regional economy; 2) the promotion of coral reef monitoring programs; and indirectly, 3) promoting habitat mapping.

Dr. Peter J. Edmunds
Department of Biology
California State University, Northridge, CA

Effects of water quality on sea grass community productivity and biodiversity

Very little is known about seagrass communities and coastal water quality in Puerto Rico, especially near the major population centers of the island. Seagrass beds are one of the most common productive near shore habitats in tropical and temperate zones, and serve as habitat for numerous ecological and commercially important species. These areas provide food for endangered species and mobile or benthic invertebrates, damp waves and currents and filter nutrients and suspended sediments.

One of the most important environmental variables affecting sea grass productivity and survival is light availability. Four main anthropogenic stressors impact light availability in the near shore: eutrophication, sedimentation, over fishing and habitat destruction. These factors are further exacerbated by rapid population growth and urban expansion. Natural phenomena can also play a role in the decline of seagrass populations, especially storm generated waves and suspended sediments.

In this project, Loretta Roberson, from the Department of Biology at UPR will quantify both physical and biological characteristics of seagrass habitats. Surface and pore water samples will be collected by divers at all sites and analyzed for total nitrogen, total phosphorus, particulate organic carbon, turbidity, chlorophyll and salinity. Watershed characteristics will be analyzed by the USGS including a monthly average of rainfall values, stream flow, and stream water

Photo Héctor Ruiz

quality data. Daily average wave heights, wind speeds and tidal heights for San Juan will be used as a proxy for local hydrodynamic conditions. Digital photographs used for seagrass demographics will also be used to measure species richness of seagrasses, epifaunal invertebrates and algae, and macroalgae. Species will be identified to the lowest taxonomic level possible and counted. Photosynthesis will be measured by oxygen production rates in Thalassia and Syringodium leaf tissue.

The proposed work will be performed in collaboration with government agencies and will establish a baseline data set that can be extended into a long term data set. Near shore habitats and the accompanying watersheds will be characterized to provide resource managers with policy recommendations based on scientific data. Connections will be made between the water quality of streams and rivers and near shore habitats. Data on the size, productivity and biodiversity of seagrass habitats in Puerto Rico as well as the minimum water quality required for optimum

seagrass productivity, especially in high risk areas near the San Juan metropolitan area, will be provided.

Dr. Loretta Roberson
Institute of Neurobiology
University of Puerto Rico, Medical Sciences Campus
Department of Biology
University of Puerto Rico, Río Piedras

Endophytic microbial diversity in seagrass beds of Thalassia testudinum and Syringodium filiforme in Cabo Rojo, Lajas and Vieques, Puerto Rico

The occurrence of marine microorganisms has been documented in sand, sea foam, reefs, salt marshes, mangrove communities, fishes, invertebrates and other fauna. In these studies, microorganisms have been isolated from external surfaces (epiphytic) or the water column, and most have been reported as pathogenic. Although research on endophytes associated with terrestrial plants has shown that these microorganisms can enhance growth of the host plants and deter insect and animal herbivory, studies on endophytic microorganisms associated with healthy tissue in marine plants and algae are scarce. Seagrass beds support phytoplankton, epiphytic flora, invertebrates, and benthic algae. They also stabilize the substrates and provide essential habitat for economically important invertebrate and fish species and threatened endangered species, like the manatee and hawksbill turtles. Fungal endophytes from seagrasses were reported for the first time in 1998, but although protection of the health of this essential fish habitat is critical for the long term survival of marine species of economic importance, the role of endophytic flora within the plants is still unknown.

The main research goal of Sandra Maldonado from the Department of Biology of the University of Puerto Rico at Mayagüez is to determine the endophytic microbial

diversity in Thalassia testudinum and Syringodium filiforme in different geographic areas of Puerto Rico. This project will also: determine temporal and spatial distribution; host specificity and seasonality of the endophytic flora associated with healthy tissue of T. testudinum and S. filiforme; and improve cultivation and preservation techniques for the endophytic flora recovered. Future research on seagrass endophytes will be facilitated by the compilation of diversity, distributional and temporal data in a linked, online database.

The proposed work uses an interdisciplinary approach to understand the role and importance of endophytic microorganisms in the health and survival of T. testudinum. The knowledge acquired will provide new tools for appropriate management of fisheries, the planning of the development of the coastal zone and can also be integrated into the region's decision and policy making processes.

Dr. Sandra L. Maldonado-Ramírez
Dr. Rafael Montalvo-Rodríguez
Department of Biology
University of Puerto Rico, Mayagüez

Revitalize the Nation's Commercial Fisheries

Determining the minimum size fishery closures for protecting grouper spawning aggregations

Reef fish spawning aggregations are unique life history events that occur at specific places and times. Once discovered by fishermen, these spawning aggregations are extremely vulnerable to over fishing and have been eliminated on many islands throughout the Caribbean. Managers of fishery resources have found that the most effective management tool for protecting

critical fish habitat or vulnerable life history periods such as spawning aggregations is through seasonal and permanent fishery closures. Although the approximate location of many spawning aggregations is known, little information is available for the area occupied by fishes during spawning or the migration or movement patterns associated with aggregating species. This lack of information results in the closures often being rejected by local fishermen on the grounds that, the size of the proposed closure is inappropriate.

Detailed information on the movement and migration patterns of the species that are being protected during spawning is critically lacking in the final decision. The spatial and temporal patterns of movement of groupers during spawning aggregations needs to be understood to implement biologically relevant closure boundaries and to justify these boundaries to the fishing community whose livelihoods are being impacted.

Richard Nemeth from the Center for Marine and Environmental Studies at the University of the Virgin Islands will utilize telemetry and an array of receivers mounted on the sea floor to track grouper movements during spawning, but also to get the first ever data on a reforming Nassau spawning population. The ultimate goal of the proposed research is to provide fishery managers the minimum area required to properly protect 3 commercially important grouper species (red hind, Nassau and yellowfin) during their spawning aggregations.

The data generated by this research project will greatly benefit the fishery management agencies with the responsibility for designating fishery closures in an effort to protect the vulnerable grouper spawning aggregations and critical fishery habitats.

Dr. Richard Nemeth
Center for Marine and Environmental Studies
University of the Virgin Islands

Assessing essential fish habitat and connectivity of reef fish otolith michrochemistry

The deterioration of marine habitats and the depletion of fish stocks worldwide are of major concern to fisheries managers and conservationists. It is believed that habitat loss is the single greatest cause of the worldwide decline in biodiversity and has serious implications for ecosystem functioning and integrity. Habitat is known to profoundly affect the productivity of a fish stock and is therefore believed to be fundamentally important to fishery production. Some of the most threatened habitats include coastal marine and estuarine habitats such as mangroves, seagrass beds and coral reefs.

One of the most basic requirements of a marine protected area for fish is that it includes the area occupied by the subpopulation of the fish species of interest, including both the adults and the different ontogenetic development stages of juveniles. Since many species occupy different habitats during these different development stages, evaluating the contributions of these different habitats and the linkages between them is critical in any MPA design.

Many studies in the Caribbean have observed that the juveniles of coral reef fishes migrate from the mangroves and seagrass beds to the reef or deeper waters at a certain age. These results suggest a critical role of seagrass meadows and mangrove lagoons as nurseries for adult reef populations. Thus, there is a critical need to assess the importance of these different juvenile nursery habitats and to determine if management measures are necessary to protect or restore their ecological functions.

Otoliths will be used by Edward Durbin of the University of Rhode Island to determine population structure and connectivity of juvenile French Grunt (Haemulon flavolineatum) and Schoolmaster (Lutjanus apodus), from two different habitat types (mangroves and non-mangroves in Puerto Rico and St. Croix in the US Virgin Islands), to the adult population on the adjacent fore reefs. Otoliths are mineral structures located in the inner ear of fish made up of crystalline calcium carbonate. They grow continually during the fish's life by depositing alternate layers of protein and calcium carbonate onto the outer surface of the otolith. The elemental composition is a reflection of the fish's ambient water conditions. Because otoliths are metabolically inert, once elements are deposited within the otolith they are not altered or reabsorbed. As a result unique elemental concentrations, or chemical fingerprints, arise from distinct ambient water conditions present in different geographic locations. The otoliths of juveniles from each habitat type will be examined and the

microchemical signatures for each sampling site and habitat region determined.

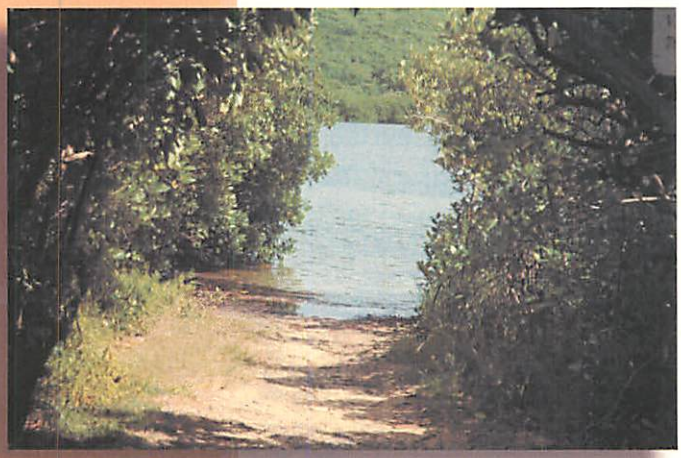
This proposal will increase knowledge of the biology and ecology of commercially and recreationally valuable species. It will identify habitats considered essential for the survival and subsequent recruitment of marine fish, which are increasingly important given the pressures of land use, rise in invasive species and decline in endemic aquatic fauna.

Dr. Edward Durbin
University of Rhode Island

Environmental Technology

Developing a protocol to use remote sensing as a cost effective tool to monitor contamination of mangrove wetlands

The health of mangrove wetlands is of critical importance to societies in tropical marine regions. Mangrove wetlands serve as coastal protection, wildlife refuges, and nurseries for marine life. Mangrove detritus is an important source of nutrition for aquatic eco-systems. Heavy metals taken up in mangrove biomass enter the food chain and can affect the quality of fishery products making the danger of contamination of mangrove areas of utmost importance to the economy of coastal regions.



Vegetation may take up metals in their roots, stems and leaves and therefore, serve as sensors of contamination

that integrate pollution over longer time periods, making them less dependent on daily or seasonal fluctuations. The fact that vegetation reacts to the geochemical conditions of the substrate can be detected by the same remote sensing techniques applied to mineral exploration, where large areas can be efficiently surveyed without expensive field studies.

This study will apply the remote sensing techniques of mineral exploitation to the monitoring of mangrove wetlands for the presence of metal contamination. Mangrove wetlands are especially well suited for this technique because vegetation in mangrove wetlands is not very diverse. As in the case of mineral exploration, remote sensing is a cost effective technique that does not require costly field studies will make an excellent tool for government agencies in charge of monitoring the health of wetlands and the possible contamination of wetland forests.

Johannes H. Schellekens from the Department of Geology of the University of Puerto Rico aims to develop a protocol that will help monitoring agencies determine the health or possible contamination of a mangrove wetland by applying remote sensing techniques that are currently used in mineral exploration. Anomalous metal concentrations in the substrate will influence the growth, including leave reflectance, of the plants on this anomalous substrate. Leave reflectance of trees growing on the deposit are compared to leave reflectance of trees outside the mineralized area. The Normalized Difference Vegetation Index (NDVI) derived from the reflectance is then compared to the NDVI determined by using the spectral bands of multispectral scanners in satellite images.

NDVI for mangroves will be correlated to metal contents of substrate leaves. NDVIs for heavy-metal contaminated mangroves will be determined and distinguished from NDVIs of pristine areas. The numbers for the NDVI are

then used to delineate areas on the images by adding and subtracting the red and near infrared bands and importing these to GIS to make a map of the affected areas. These areas can then be visited and sampled to determine the extent of the contamination and thus provide a cost effective method of monitoring by focusing the field visits to certain areas.

Dr. Johannes H. Schellekens
Dr. Fernando Gilbes
Department of Geology
University of Puerto Rico, Mayagüez

Marine Outreach Program

Our highly successful Marine Outreach Program (MOP) has a solid proposal for the next two years, focusing its effort on four thematic areas: water quality, fisheries and mariculture, coastal communities' economic development and coastal hazards.

Sea Grant

MOP is an integrated program consisting of outreach, education and communications, which collaborate in an information and technology transfer program designed to educate and change attitudes, perceptions and practices of resource users, resource managers, and the general public in relation to the sustainable use of coastal and marine resources.

MOP will provide information about the sustainable development of our coastal resources and the management of marine recreation activities to the Department of Natural and Environmental Resources (DNER) and the P.R. Tourism Company (PRTC). Our Coastal Hazards Specialist will work to create awareness of the human vulnerability of coastal communities, with emphasis on identification and education of high risk populations. In addition, coastal flood maps that may be used for hazard mitigation and for monitoring that all coastal construction complies with state and federal laws will be made available to government agencies and the general public.

Awareness regarding the importance of spawning aggregation sites will be generated by our Fisheries Specialist to promote conservation and management initiatives for habitat areas of particular concern. Our program will also coordinate SEAMAP-Caribbean which aims to establish a common forum to plan, coordinate and evaluate fishery data collection and management activities. The education of resource users regarding the development of Marine Protected Areas and Essential Fish Habitats as effective management tools for the development of sustainable fisheries is considered essential. Assistance will be provided in the development of the management plan for two MPAs. Additionally, assistance and advisory services will be provided to artisanal fishermen to empower them to take charge of their social, political and natural environments. Capacity building opportunities related to diving safety and diving related

injuries will be offered to artisanal fishermen divers, hospital personnel and emergency room doctors in order to reduce the number of fatal and non-fatal diving accidents.

As part of our efforts in aquaculture–mariculture, MOP will influence public policy and legal issues related to the development of these industries as well as the education of potential investors. Collaboration with NY Sea Grant in the creation of the Center for Aquaculture Technology Transfer in Mexico to support and guide aquaculture commercial enterprise development in an environmentally sustainable fashion is also being contemplated.

Our Seafood Technology Specialist will educate and create awareness of potential health risks associated with seafood consumption, and disseminate information about Hazard Analysis and Critical Control Point (HACCP) and FDA regulations among fishermen, food handlers and consumers.

Our Water Quality Specialist will promote simple household practices to improve and optimize on-site wastewater disposal systems in the island of Culebra and provide community training in water and land use issues. Access to information related to sustainable development and smart growth among coastal communities, NGOs, stakeholders, government agencies, the private sector and the general public will be enhanced by the efforts of our Coastal Community Development (CCD) Specialist. Our Education Specialist will expose fourth, fifth and six graders in public schools to basic ecosystem and marine conservation concepts via an annual marine fair and a pilot project consisting of an educational exchange between coastal and upland schools "De la montaña al mar."

Collaboration with the UPRM Department of Marine Sciences and the University of the Virgin Islands will be implemented to

establish and sustain an integrated ocean coastal observing system serving the Caribbean EEZ of the United States. Other important tasks of UPRSGCP are to identify and engage stakeholders in the tourism and recreational sectors, to perform assessments of stakeholders' information needs, and assess the direct and indirect economic impact of the Caribbean Integrated Ocean Observing System.

MOP will use the exposure offered by the award-winning environmental TV program GeoAmbiente to disseminate scientific information generated by UPRSGCP researchers to resource users, resource managers and the general public which, at the same time, provides a forum where coastal communities can discuss environmental, cultural and social concerns regarding the conservation of coastal and marine resources.

Through the efforts of our Coast and Beach Stability Specialist, we will explore the possibility of expanding the community visioning process of selected Caribbean islands via pilot projects as well as participate in a proposed Community Visioning session at the Islands of the World Conference, scheduled for Maui in 2006. MOP will explore ways in which Small Islands Voice and possibly other Caribbean institutions can be actively involved in the Small Island Developing States University Consortium. Assistance will be provided to assist communities in Caribbean islands working with Small Islands Voice to understand and cope with the impacts of climate change and sea level rise.

Through our Marine Education Center (MEC), we will enable educators nationwide to easily and efficiently access a marine education clearinghouse that organizes useful electronic resources for marine education in a comprehensive and pedagogically appropriate manner. Our Education Specialist will continue providing science based teacher capacity building and professional development opportunities on a wide range

topics related to the marine sciences. A workshop will be developed to train teachers and increase to twenty the schools that will offer a Marine Environmental Science course in the Puerto Rico school system. Two hundred new educators from different schools throughout the island will be recruited to participate in UPR Sea Grant's MEC education activities.

Extension Specialists

Manuel Valdés Pizzini, Ph.D., is Associate Director for Research, and MOP and VIMAS Coordinator. Dr. Valdés is a Professor in the Department of Social Sciences at UPRM with vast experience in the field of maritime anthropology and outreach.

Ruperto Chaparro, M.A., Director of UPRSGCP, is also the Tourism-Marine Recreation Specialist. Mr. Chaparro is in charge of extension projects concerned with coastal economic development and planning and marine recreation and tourism. He also conducts applied research on the evaluation of natural resources and attractions.

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, HACCP and seafood safety and technology. Mrs. Riesco aims her efforts at 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., whose base of operation is at the UPRSGCP offices on the Mayagüez Campus is in charge of outreach projects concerned with artisanal fishermen, fisheries resources, marine protected areas (MPAs), essential fish habitats and mariculture. Dr. Ojeda maintains an honest exchange of information between 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 data throughout the southeastern United States.

Aurelio Mercado, M.S., physical oceanographer and Sea Grant researcher, is our MOP Team Coastal Hazards Specialist. His efforts are directed towards the goal of 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 Coastal Community Development Specialist. Mrs. Ramírez completed her Master's Degree in Biology recently at UPR-Mayagüez, while working part-time for our Program. She is responsible for initiating capacity building projects with community members, developers, government personnel, NGO activists

and resource users in order to help them create strategies to solve development problems based on sound information. Mrs. Ramírez also serves as a facilitator and link between resource users.

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 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.

Yaritza Rivera and Verónica Acevedo, M.S. candidates in the UPR-RUM Department of Marine Sciences, are K-12 Marine Education Specialists. Their responsibilities include dissemination of information on topics pertaining to the marine environment and the distribution of educational publications, newsletters and creative teaching aides. They also offer technical assistance to teachers by coordinating talks, field trips and environmental education activities (beach cleanups, environmental walks and field trips, among others).

Sea Grant

MOP Administration

Coordinator MOP and VIMAS:
Manuel Valdés Pizzini, Ph.D.
Administrative Secretary: María Matos, B.S.

Education

The Marine Education Program for the 2006-2008 cycle will continue to be the first resource for marine education for the sustainable use of resources for Puerto Rico. It is based on the needs identified by educators in the different activities conducted for the UPRSGCP strategic plan. It also closely follows the areas identified in the Sea Grant Educators Network Strategic Plan 2003-2008.

The main goals of the Marine Education Center are to:

- Provide science-based teacher preparation and professional development opportunities on a wide range of topics.
- Develop and produce high-quality exhibits and resource materials for formal and informal education.
- Develop and produce materials, curricula, and program based on national standards.
- Program science-based activities to engage audiences of all ages.
- Increase support for the continued development of innovative courses, research opportunities and workshops for undergraduate students interested in marine science-related professions.

- Offer activities that provide resources and experiences of value to participants of all ages —from K-12 to higher education— and involve families.
- Provide teachers in classrooms throughout the island with tools and strategies for involving their students in technology-based science discoveries.
- Increase teacher participation in fruitful collaboration and partnerships with additional resources to support marine education efforts.

Lesbia Montero, B.S., stationed at the UPR Humacao Campus, is our Education Specialist. She has extensive experience in the coordination of marine and coastal resources workshops for K-12 teachers. 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.

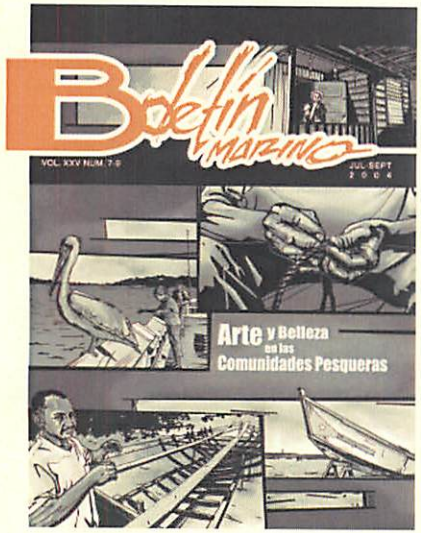
Education Administration

Education Coordinator: Lesbia Montero, B.S.
Administrative Coordinator: Noemi Colón, B.A.

Communications and Publications

The Communications and Publications division of the University of Puerto Rico Sea Grant College Program is one of the components of the Marine Outreach Program (MOP) along with Extension, Education and the Marine Education and Information Resources Center (MEIRC). In addition,

the Communications and Publications division serves the dissemination needs of the two other functional areas of the program: Administration and Research. Among the communications products developed by this division are: two quarterly magazines (Boletín Marino in Spanish and Sea Grant in



the Caribbean in English available in electronic version); books, educational posters, brochures, conference materials, booklets, t-shirts, pins, flyers, and other promotional materials. For the 2006 - 2008 cycle, we will update the format and look of the magazine, which will be a semi-annual publication. Our recently redesigned webpage (http://seagrant.uprm.edu), is user friendly and a comprehensive source of information regarding publications, research activities, proposal guidelines and material related to the Program's key thematic areas.

The main objective of our Communications and Publications Division is to support UPRSGCP's extension and education efforts by creating effective and attractive communication products. In addition, the division will continue to support all areas of the program, coordinating logistics and

producing conference materials for proposed research and outreach conferences and workshops.

Communications and Publications Staff

Communications Coordinator - Camille Krawiec, M.A.
Information Specialist MEIRC - Maria Font, B.A.
Administrave Secretary - Delmis del C. Alicea Segarra, M.A.
Photolithographer - Guillermo Damiani González
Assistant Photolithographer – Juan Ríos Ramos, B.B.A.

Virgin Islands Marine Advisory Service (VIMAS)

The Virgin Islands Marine Advisory Service (VIMAS) enters into its twentieth year of operation as a major extension of the Sea Grant College Program at the University of Puerto Rico. VIMAS is administered through 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 in St. Croix. Many Territory-wide programs and initiatives are handled cooperatively by the agents, though each respective program may have a slightly different focus since the needs of each island (group) can be very different. Although the Virgin Islands Marine Advisory Service (VIMAS) faces enormous challenges, it 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 these 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 for 2006-2008 fall into six National Sea Grant Program Theme Areas listed in the National Sea Grant Strategic Plan for FY 2003 to FY 2008 and Beyond that are connected to NOAA's mission goals and strategies. VIMAS programs focus on Coastal Communities, Coastal Natural Hazards, Ecosystems and Habitats, Fisheries, Urban Coasts and Marine Science Literacy. Within these Sea Grant program initiatives, VIMAS agents have focused their efforts on several key areas including: non-point source pollution awareness programs, marine careers, education, community outreach activities, K-12 marine education programs, marine protected areas, coral reef monitoring and assessment, mangrove restoration, and fishermen outreach programs. These VIMAS programs emphasize environmental education, awareness and knowledge of marine-related issues and careers, and technology transfer.

VIMAS staff

Richard S. Nemeth, Ph.D is the Director of the Center for Marine and Environmental Studies at the University of Virgin Islands, St. Thomas. Dr. Nemeth has conducted groundbreaking research during the past four years concentrating on investigating the recovery of the red hind spawning population in a recently established marine conservation district and on assessing the condition of coral reefs around the Virgin Islands. Through the use of advanced nitrox diving and video technology,

he has expanded his capacity to conduct visual counts of aggregating groupers and other fish for conducting coral reef surveys. He is a Member of the American Fisheries Society and the Ecological Society of America. Dr. Nemeth is Scientific Advisor of St. Thomas/St. John Fisheries Advisory Council and Regional Coordinator for the Society for the Conservation of Reef Fish Aggregations.

Marcia Taylor, M.S., M. Ed. in Marine Science has been a Virgin Islands resident since 1978, and an extension agent on St. Croix since October 1991. Marcia was a dive instructor before working for the V. I. Government in its Department of Planning and Natural Resources Environmental Protection Division. Following 13 years of supervising the water quality monitoring office, she came to VIMAS. An alumna of the University of Connecticut, she completed her graduate work both at Southeastern Massachusetts University and the University of the Virgin Islands. Her research interests include tropical marine algae and coral reef ecology. Marcia is also involved in outreach education. Her current projects include tropical marine resources, wetland ecology and Nonpoint Source (NPS) water pollution.

UPR Sea Grant College Program Staff Contact Information

Administration

Ruperto Chaparro, M.A.
Director
Phone: (787) 832-3585
Fax: (787) 265-2880
e-mail: rchaparr@uprm.edu

Manuel Valdés Pizzini, Ph.D.
Associate Director
Phone: (787) 832-3585
Fax: (787) 265-2880
e-mail: m_pizzini@hotmail.com
valdespizzini@gmail.com

Kurt Grove, Ph.D.
Research Coordinator
Phone: (787) 832-3585
Fax: (787) 265-2880
e-mail: kgrove@uprm.edu

Yulissa García Lugo, B.B.A.
Administrator/Financial Officer
Phone: (787) 832-3585
Fax: (787) 265-2880
e-mail: ygarcia@uprm.edu

Migdalia Figueroa, B.S.
Administrative Secretary III
Phone: (787) 832-3585
Fax: (787) 265-2880
e-mail: mifiguer@uprm.edu

Steven Herzog
Courier
Phone: (787) 832-3585
Fax: (787) 265-2880
e-mail: ayuyu@hotmail.com

Marine Outreach Program

Manuel Valdés Pizzini, Ph.D.
MOP Leader
Phone: (787) 832-8045
(787) 832-4040 ext. 3533
Fax: (787) 265-2880
e-mail: m_pizzini@hotmail.com
valdespizzini@gmail.com

María Beatriz Riesco, M.S.
Seafood Technology
Phone: (787) 725-1155
Fax: (787) 724-0390
e-mail: mbriesco@coqui.net

Ana Navarro, Ph.D.
Water Quality
Phone: (787) 832-8045
(787) 832-4040 ext. 2509
Fax: (787) 265-2880
e-mail: anavarro@uprm.edu

Edgardo Ojeda, Ph.D.
Fisheries
Phone: (787) 832-8045
(787) 832-4040 ext. 3451
Fax: (787) 265-2880
e-mail: eojeda@uprm.edu

Aurelio Mercado, M.S.
Coastal Hazard and Risk Management
Phone/Fax: (787) 265-5461
email: amercado@cima.uprm.edu

Lillian Ramírez, M.S.
Coastal Community Development
Phone: (787) 832-8045
(787) 832-4040 ext. 3621
Fax: (787) 265-2880
e-mail: liramirez@uprm.edu

Sea Grant

Yaritza Rivera, B.S.

Marine Educator
Phone: (787) 832-8045
Fax: (787) 265-2880
e-mail: yaritza@cima.uprm.edu
yaritzarivera@gmail.com

Verónica Acevedo, B.S.

Marine Educator
Phone: (787) 832-8045
Fax: (787) 265-2880
e-mail: v_acevedo_soto@yahoo.com

Gillian Cambers, Ph.D.

Coast and Beach Stability
Phone: (787) 832-8045
(787) 832-4040 ext. 5301
Fax: (787) 265-2880
e-mail: g_cambers@hotmail.com

María Matos, B.S.

Administrative Secretary III
Phone: (787) 832-8045
Fax: (787) 265-2880
e-mail: mmatos@uprm.edu

U.S. Virgin Islands

Richard Nemeth, Ph.D.

Director
The Center for Marine and
Environmental Studies (CMES)
University of the Virgin Islands
St. Thomas, USVI 00802
Phone: (340) 693-1389
Fax: (340)693-1385
e-mail: rnemeth@uvi.edu

Marcia Taylor, M.S.

Marine Agent
Virgin Islands Marine Advisory Service VIMAS
RR2 10000, Kingshill
St. Croix, USVI 00850
Phone: (340) 778-1112
Fax: (340) 779-3388
e-mail: mtaylor@uvi.edu

Education

Lesbia Montero, B.S.

Marine Educator
CUH College Station
100 Route 908
Humacao, PR 007921-4300
Phone: (787) 850-9360
Fax: (787) 850-0710
e-mail: ll_montero@webmail.uprh.edu

Communication & Publications

Camille Krawiec, M.A.

Communications Coordinator
Phone: (787) 834-4726
Fax: (787) 265-2880
e-mail: camartinez@uprm.edu

María E. Font, B.S.

Information Specialist
Marine Education and Information Resources Center
Phone: (787) 805-5110
(787) 832-4040 Ext. 2165
Fax: (787) 805-5110
e-mail: mfont@uprm.edu

Sea Grant

Delmis del C. Alicea, M.A. Administrative Secretary I
Phone: (787) 834-4726
Fax: (787) 265-2880
e-mail: fd_alicea@rumad.uprm.edu

Guillermo Damiani Photolithographer
Phone: (787) 834-4726
(787) 832-4040 Ext. 5302
Fax: (787) 265-2880
e-mail: gudamiani@uprm.edu

Juan Ríos Ramos, B.B.A. Assistant Photolithographer
Phone: (787) 834-4726
(787) 832-4040 Ext. 5302
Fax: (787) 265-2880
e-mail: tatoojj31@hotmail.com

Credits

Text:

UPR Sea Grant Staff

Editing:

Ruperto Chaparro, M.A.
Aixa Rodríguez, Ph.D.
Yasmín Detrés, Ph.D.
Camille Krawiec, M.A.

Cover and Design:

Jorge A. Montes Goñi, B.A.

Layout:

Delmis del C. Alicea Segarra, M.A.

Photolithographer:

Guillermo Damiani González

Assisstant Photolithographer:

Juan Ríos Ramos, B.B.A.

Sea Grant

This publication was made possible by the National Sea Grant College Program of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration under grant number NA06OAR4170016 to the University of Puerto Rico Sea Grant College Program.

Additional copies are available from:

UPR Sea Grant College Program
UPR-RUM
PO Box 9011
Mayagüez, PR 00681-9011

Web Page: http://segrant.uprm.edu

UPRSG - Q - 103
UPR SEA GRANT PUBLICATIONS 2006