

RESEARCH

at the UNIVERSITY OF GUAM



UNIVERSITY OF
GUAM
UNIBETSEDĀT GUAHAN

2015



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MESSAGE FROM THE PRESIDENT



I am pleased to announce the 2015 update of the Research at the University of Guam (UOG). Booklet. UOG's research capabilities have expanded dramatically over the past decade. Whether it is in the natural sciences, protection and management of resources, the social sciences, economic trends or health disparities, UOG leads the way in the conduct of research for and about Guam and Micronesia. In recent years, we have arranged for the establishment of CESU's with our federal partners and created the Research Corporation of the University of Guam (RCUOG). As part of our Good to Great (G2G) plan, the UOG has also increased our ability to be responsive to the demands of researchers, grantors, and both public and private partners in the community.

We hope that the information presented here will highlight the many facets of UOG's research activities and will help you gain a greater understanding of what UOG has to offer. Please feel free to contact me directly with any ideas or suggestions. Ina, Deskubre, Setbe (to enlighten, to discover and to serve) is our trifold mission. This is manifest in all our academic activities, especially research.

Biba UOG!

Robert A. Underwood, Ed.D.
President

MESSAGE FROM THE ASSISTANT VICE PRESIDENT

The University of Guam has a long and prestigious history of research based in Guam and the western Pacific region. UOG's Marine Lab and Water Environmental Research Institute (WERI) are among the world's best centers of their kind, as is the Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS) in the area of disability support for the region.

New challenges for Guam and the region include the U.S. Military buildup and the looming impacts of global climate change. UOG is prepared to meet these with robust capacity in research facilities, programs, leadership, and resource scientists. We provide expertise in water resources, cancer health disparities, marine and coral reef studies, watershed conservation, and biosecurity and risks of invasive species. UOG produced the only regional biosecurity plan in the world that now serves as a model, and that cooperative project with the Department of the Navy has now expanded to eight current cooperative agreements ranging from sea turtle and bat conservation to cycad and marine monitoring projects with a total investment of over \$2.5 million from Joint Navy Region Marianas. By the time this booklet is published we expect to announce our first award of a major new institutional program partnering with the National Science Foundation.



Our extramural funding has increased steadily since 2009 from \$6 million to over \$18 million in 2014-2015. The Office of Research and Sponsored Programs has worked in tandem with the research centers and the newly formed Research Corporation University of Guam to facilitate and promote research and service activities. Many of these have direct bearing on our regional challenges, while other areas address the need for leadership in public civility, reflection, and inafa'maolek around the paths ahead.

We welcome collaboration in the region and encourage agencies as well as investigators and consulting entities to explore partnering with UOG as a local base for offshore entities and as a supportive colleague for those either on or offshore from Guam and those within as well as outside the region. The challenges are frankly too serious and the stakes too high to allow the research field in our region to be fragmented and divisive.

John A. Peterson, Ph.D.
Assistant Vice President
Graduate Studies, Research & Sponsored Programs



Graduate Studies, Research & Sponsored Programs

Research Mission: The University of Guam's institutional mission addresses three primary foci: teaching, research, and outreach pertinent to the western Pacific region.

The major priorities of the Office of Research and Sponsored Programs are to:

- Support faculty members and University personnel to conduct research activities and to successfully manage existing research and sponsored projects
- Select public and private agencies locally, nationally, and internationally.
- Seek external funding and engage in projects related to the mission and goals of the University
- Coordinating research and management studies for the Cooperative Ecosystem Studies units on agreements with Department of Navy, NPS, and other federal agencies. Currently 2.5 million in natural resources agreement studies.

Upcoming Research Project Opportunity

The University of Guam is being considered for a Research Infrastructure Improvement (RII) Track-1 with the National Science Foundation. This award would provide over one million per year for up to 5 years to support coral reef and marine research and cyber Infrastructure improvements in research areas selected to support Pacific STEM activities and the Science and Technology goals for the territory of Guam having the best potential to improve future R&D competitiveness for the jurisdiction.

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Research Corporation of the University of Guam (RCUOG)

The Research Corporation of the University of Guam was established in February 2014 by Public Law 32-114 and is governed by 10 Board of Directors. The mission of RCUOG is to create an efficient managerial environment to compete for and manage grants.

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MARINE LABORATORY

The University of Guam Marine Laboratory (UOGML) has served the greater Micronesian region, including the Territory of Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia (Yap, Chuuk, Kosrae, and Pohnpei), the Republic of Palau, and the Republic of the Marshall Islands since it was established as a research unit in 1970.

Its mission is trifold:

1. To perform basic and applied research on the biology of tropical marine organisms, emphasizing conservation and management;
2. To share expertise through peer-reviewed publications, technical reports, educational materials, public lectures, and useful digests of relevant marine issues; and
3. To educate UOG students in the biological sciences program. Although small in size, UOGML plays a profound role in promoting the university as a focal point for discovering, understanding, and teaching others about Micronesia's coral-reef resources. UOGML's professional footprint is evidenced by the wealth of peer-reviewed publications, presentations to local and regional audiences, memberships on local and regional science advisory boards for numerous conservation efforts and grant funding passing through this research unit over the past four decades

The University of Guam Marine Lab has established research focus areas that range from understanding how gene expressions, diseases, coral symbiosis, and entire coral-reef assemblages are linked with natural environmental regimes, human stressors, and the predicted consequences of future climate change.

The following are a list of ongoing research programs offered at the UOG Marine Lab:

1. Conservation biology and reef management- Quantitative assessments of algal, coral, macro-invertebrate and fish species on reefs throughout the Pacific provide insights into the community structure of coral reefs and the biotic diversity found within these unique ecosystems. Studying the ecology of coral disease and developing novel methods of reef rehabilitation by stimulating natural recovery processes.



2. Chemical Ecology and Marine Natural Products Drug Discovery is the study of naturally occurring chemicals involved in structuring the interactions among living organisms, and how these bioactive compounds can be used to treat human diseases.
3. Systematics is the formal study of the diversity of life and how organisms are evolutionarily related. Coral reefs are the most diverse ecosystems in the marine realm. Studies at the marine lab on the phylogenetic systematics and taxonomy of coral-reef organisms have led to the discovery of many new species.
4. Coral Reef Ecology and Biology is the study of ecology, evolution, and physiology of coral reef organisms, and how changes in the environment could possibly drive a global redistribution of marine species.

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WATER & ENVIRONMENTAL RESEARCH INSTITUTE OF THE WESTERN PACIFIC (WERI)

WERI is one of 54 similar water research institutes set up by U.S. Congressional legislation at each Land Grant University in the United States and in several territories.

WERI carries several federal and local mandates. In 1998, WERI was given local mandates by the 24th Guam Legislature to administer the Guam Hydrologic Survey (GHS) and the Comprehensive Water Monitoring Program (CWMP). WERI's current mission under its national charters and local mandates is to consolidate, foster, retain and make available expert knowledge on local and regional water resources and to seek solutions to problems associated with location, production, distribution, and management of freshwater in Guam, the CNMI, and the FSM.

The Institute provides its regional stakeholders (Guam, CNMI, and FSM) with technical expertise in water resources related fields spanning the entire natural water cycle and spectrum of human water use, including tropical climatology, surface water hydrology, rainfall catchment systems, groundwater modeling and management, water distribution systems, soil erosion and mitigation strategies, watershed management, and various aspects of water quality. Faculty members contribute significantly to both undergraduate and graduate teaching programs at the University of Guam (UOG) and conduct vigorous research aimed at improving economic conditions and the quality of life for citizens of Guam and the regional island nations.

The specialties of WERI faculty are meant to address the elements of the natural hydrologic cycle and human water use such as:

1. Precipitation,
2. Surface stream flow,
3. Groundwater recharge and flow,
4. Drinking water production, and water quality management,
5. Storm water management,
6. Wastewater treatment and discharges of surface,
7. Ground and wastewaters into the coastal zone.



Dr. Joseph Rouse, Wastewater Engineer at the University of Guam Water and Environmental Research Institute (WERI) conducts a field inspection.

WERI Highlights:

1. WERI was recently evaluated and praised from the U.S. geological for its "Significant Research Accomplishments" and "Impact on public policy and water management throughout the region."
2. WERI Guam recently ranked in the top eight of the nation's 54 water resource research institutes in 2014 and its faculty and students have recently received national recognition for high- quality research relevant to local needs
3. WERI team conducted research that explored the feasibility of developing a separate surface water supply system for agricultural use in Southern Guam.



WERI WINS NATIONAL AWARD

The University of Guam Water and Environmental Research Institute (WERI) was recently awarded the 2013 National Institutes for Water Resources (NIWR) National Impact Award for the project entitled "Comprehensive Analysis of Salinity Trends in the Northern Guam Lens Aquifer" written by WERI's Dr. John Jenson, and Mark Lander, who served as Principal Investigators and Ms. Christine Simard, M.S. Environmental Science.

From left to right: Jenson, Simard and Dr. Shahram Khosrowpanah, WERI Director.

4. With the anticipated military build-up, the Northern Guam Lens Aquifer will require additional production, while the ongoing economic growth will increase demand. This study aims to estimate the maximum natural capacity of the Northern Guam Lens Aquifer.
5. WERI developed a program, "teaching teachers" about Guam's Water Resources and "Guam Water Kids" in water related subjects
6. The Expansion of the "Guam Water kids" prepares High School student for Service-learning Opportunities that are beneficial to freshwater resources. The program provides five service-learning modules.
7. After the WWII Japanese invasion in 1944, there were remnants of chronic environmental mercury contamination that was encountered in an urban run-off. The WERI team examined mercury levels in fish that was found from storm water discharges from the southern part of the Saipan lagoon
8. WERI team created a digital resource website, <http://www.hydroguam.net/> that entails data related to the physical and environmental characteristics of northern and southern Guam. The purpose of the website is to provide accurate and readily available information to the public.
9. Under the guidance of Section 6217, the watershed restoration action is a strategic move that should include assessment and identification of opportunities to reduce nonpoint sources pollution. This project will assess the Turbidity in the Geus River Watershed in Southern Guam.

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CANCER RESEARCH CENTER

The fight against cancer.

The UOG Guam Cancer Research Center was established in 2009 and has an NCI-funded partnership with the University of Hawaii Cancer Center (UHCC). Together they focus on Pacific Islanders because they are a highly underserved minority with a significant amount of health disparities.

The cancer center focuses its efforts on enhancing awareness and prevention of cancer, and strives to ultimately reduce the impact of cancer on the population in the Territory of Guam.

Through the Partnership grant with the University of Hawaii Cancer Center, the University of Guam Cancer Center aims to:

1. Increase the cancer research activities and the number of faculty engaged in cancer research at UOG.
2. Increase the number of minority scientists of Pacific Islander ancestry engaged in cancer research pertinent to students
3. Further strengthening the research focus at UHCC on cancer health disparities with particular emphasis on aspects of particular relevance from people of Hawaii and the Pacific.
4. Enhance the awareness of cancer and prevention, ultimately, to reduce the impact of cancer on the population in the territory of Guam, neighboring U.S. –associated Pacific Island jurisdictions, and Hawaii.

The following list of research publications are a sample of the types of studies being conducted at the University of Guam Cancer Research Center:

1. Haddock RL. Oral cancer incidence disparity among ethnic groups on Guam. *Pac Health Dialog*. 2005 Mar;12(1):153-4. PMID: 18181481.
2. Leon Guerrero RT, Chong M, Novotny R, Wilkens LR, Badowski G, Blas M, Murphy S. Validity and reliability of a quantitative food frequency questionnaire (ffq) for use in Guam. *Food & Nutrition Research*. 2015;59:26276;DOI:10.3402/fnr.v59.26276.
3. Haddock RL, Talon RJ, Whippy HJ. Ethnic disparities in cancer mortality among residents of Guam. *Asian Pac J Cancer Prev* 2006 Jul-Sept;7(3):411-414. PMID: 17059333.
4. Haddock RL, Talon RJ, Whippy HJ, Montano MV. Ethnic disparities in cancer

5. Incidence among residents of Guam. *Asian Pac J Cancer Prev*. 2009 Jan-Mar;10(1):57-62. PMID: 19469625. NIHMS675352.
6. Haddock RL. Shining light on cancer in the Pacific. *Hawaii J Med Public Health*. 2013;72(3):107-108. PMID: PMC3602951.
7. Paulino YC, Novotny R, Miller MJ, Murphy SP. Areca (betel) nut chewing practices in Micronesian Populations. *Hawaii J Pub Health*. 2011;3(1):19-29. PMID: PMC4322768.
8. David AM, Lew R, Lyman AK, Otto C, Robles R, Cruz GJ. Eliminating tobacco-related disparities among Pacific islanders through leadership and capacity building: promising practices and lessons learned. *Health Promot Pract*. 2013;14 (Suppl 6):10S-7S. PMID: PMC3846162.
9. Paulino YC, Hurwitz EL, Warnakulasuriya S, Gatewood RR, Pierson KP, Tenorio LF, Novotny R, Palafox N, Wilkens LR, Badowski G. Screening for oral potentially malignant disorders among areca (betel) nut chewers in Guam and Saipan. *BMC Oral Health*. 2014;11(14):151. PMID: PMC4292829.
10. Leon Guerrero RT, Badowski G, Yamanaka A, Blas-Laguana M, Bordallo R, et al. University of Hawai'i Cancer Center connection: The vital role of cancer registries in the recruitment of an understudied minority population into a breast cancer study: Breast Cancer Risk Model for the Pacific. *Hawaii J Med Public Health*. 2014 Oct;73(10):335-40. PMID: PMC4203456.

Funded projects/programs during the current U54 cycle include:

1. Full Project 1: Development of a Breast Cancer Risk Model for the Pacific, by R. Leon Guerrero (UOG) and R. Novotny (UHCC). This project's aim is to develop a risk model for breast cancer appropriate for Pacific Islander women.
2. Pilot Project 1: Development of Protocols for Studying Oral Precancerous Lesions and Other Health Risks Among Betel Nut Users in Micronesia, by Y. Paulino (UOG) and E. Hurwitz (UHCC). This project aims to identify oral precancerous lesions in betel nut chewers.
3. Pilot Project II: Socio-cultural Factors affecting Betel Nut Chewing among Pacific Islanders on Guam, by J. Moss (UOG). This behavioral research study aims to understand betel nut chewing behavior, reasons for chewing, factors affecting chewing behaviors, as well as quitting or quitting attempts.



U54 PSC Presentations Year 4 were held at the University of Guam.

4. Pilot Project III: Identification and Quantification of Alkaloids or Areca (Betel) Nut consumed on Guam, by N.K. Suleman (UOG) and A. Wright (UHCC). This study aims to establish methods to identify the alkaloids in betel nut and to accurately determine their concentrations.
5. Pilot Project IV: The influence of Areca (Betel) nut chewing on the Oral microbiome in Micronesia, by Y. Paulino (UOG) and B. Hernandez (UHCC). This study aims to identify differences in the oral microbiome between betel nut chewers and non-chewers.
6. Pilot Project V: Health Information Trends and needs in the Pacific: A test of the respondent-driven sampling method, by L. Somera and G. Badowski (UOG) and HR Lee (UHCC). This project aims to collect data on cancer information seeking behaviors as well as basic cancer relevant knowledge among adults in Guam and Hawaii, testing the efficacy of the respondent driven sampling (RDS) method in minority and hard to reach populations.
7. Pilot Project VI: Health information-seeking patterns among pacific youths, by L. Somera and G. Badowski (UOG) and HR. Lee (UHCC). This project aims to document communication ecology among Micronesian youth in Guam and Hawaii, focusing on cancer relevant knowledge, attitudes and behaviors as well as health related decision-making.
8. Pilot project VII: Functional assessment of Molecular components of Areca Nut involved in Pro-Inflammatory Mechanisms of Immune Cells, by N. Suleman (UOG) and R. Penner (UHCC). This project aims to identify components in betel nut that are involved in the activation of pro-inflammatory immune cells.

Other Achievements:

- The establishment of the now fully operational Guam Cancer Registry created with U56 & U54 support, represents an asset for both public health in Guam and research support for UOG investigators.
- Collectively, 54 investigators and students have authored 60 publications and presented 76 abstracts at national and international meetings since 2009.
- Under the leadership of Dr. Annette David (UOG), involved the passage of several pieces of important policy legislation by the Guam Legislature. The legislature passed Public Law 30-80 in February 2010, which increased the cigarette tax from \$1.00/pack to \$3.00/pack. A major portion of the tobacco tax revenue was devoted to the prevention and treatment of diseases caused by smoking. (The Healthy Futures Fund), as well as the creation of the Guam Cancer Trust Fund (GCTF), which is administered by UOG.
- Two additional laws passed were:
 - Public Law 31-102, which prohibits smoking in cars when a minor is present
 - Public Law 30-66, which prohibits smoking within 20feet of building entrances and exits.

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College of Natural & Applied Sciences

COOPERATIVE EXTENSION & OUTREACH

Like any place in the U.S., there is an opportunity for a college to help its surrounding communities thrive; after all, that is where our employees live. Guam is a small place just 212 sq miles and is a mix of rural and urban settings; mostly rural. The College of Natural & Applied Sciences' (CNAS) Cooperative Extension & Outreach (C-E&O) activities reach farmers, businesses, schools, families, and individuals in Guam's 19 villages. While smaller in manpower than in the past, with just seven faculty and about 50 others on various forms of soft and softer money, dedicated men and women serve a variety of needs in the community. These services and projects include:

Children's Healthy Living Program (CHL)

This \$25M consortium project, with the Pacific Rim Land Grants, aims to make a major impact on childhood health and obesity in the region. Guam-based initiatives include higher degree support for two Guam-based candidates, plus education of three Micronesian students at the University of Guam. Height and weight data is being collected on children in some villages, along with food prices, and that data is being submitted as part of a larger regional dataset. CHL's Healthy Weight Initiative is on-the-ground engagement with families and individuals in healthier living.

Coconut Rhinoceros Beetle Project

Coconut trees are important to Guam because of the food, building materials, and beauty that coconut trees provide. The coconut rhinoceros beetle, a large invasive species is killing coconut trees by boring into the crown of the tree for sustenance. The hole that the beetle makes eventually makes the palm fronds fall off and the tree dies. This soft money project has provided great support in developing the science of rhino-beetle management.

Food Product Development and Training

Our food scientists and educational specialists have worked with local businesses and evolving entrepreneurs to develop or improve foods they want to sell to the public. Much of the outreach is done through other programs, like the New Farmer Program, as we want to encourage the use of Guam-grown food ingredients. This effort also addresses the growing need to teach how to handle and prepare food more safely. Our Master Food Preserver program responds to community needs for more advanced training.

Ironwood Tree Survival

It may not be obvious, but one of Guam's traditional trees, the ironwood (*Casuarina eqisetifolia* ssp. *eqisetifolia*) is on the decline due to a still undefined pathogen or pathogens. Extension research work has been on going for a few years and there is a race against time to protect this important species. Collaborators from around the globe are helping our scientists to understand, and perhaps, solve this mystery.



Tomato Production Trials

Tomato viruses abound in tropical environments. Guam's humid climate and year-round pests can make growing tomatoes a real challenge. Yet, tomatoes are good for us and are a favored food in many dishes. Field trials on farmer's fields are being conducted to see which varieties are best suited for Guam's environment as well as the marketplace. Early results look promising for a few varieties.

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FISHING FOR RHINOS WITH TEKKEN

Roland Quitugua and Dr. Aubrey Moore from the University of Guam are currently developing the tekken trap as a novel, cost-effective tool for monitoring and managing rhino beetle populations. "As a barrier for potential or active breeding sites, the tekken trap is an affordable and easy to use method of reducing rhino beetle populations in residential areas," said Quitugua. The original idea was to cover compost piles being used as breeding sites to suppress the emergence of adults, which damage nearby palms.

College of Natural & Applied Sciences

WESTERN PACIFIC TROPICAL RESEARCH CENTER (WPTRC)

The University of Guam is the largest land-grant institution in the Western Pacific. As such, the University's mandate is to assist in safeguarding the region's environmental, social, and economic resources. The Western Pacific Tropical Research Center (WPTRC) is the research division within the College of Natural and Applied Sciences associated with the national land-grant system.

Scientists working at WPTRC are finding solutions to issues faced by the people and ecosystems of Guam. Island residents benefit from this research in the form of new and improved foods and plants, a healthy and safe environment, and enriched lifestyles and communities. Research conducted through WPTRC underlies both academic and extension programs.

WPTRC specializes in research designed to:

- Enhance agricultural profitability
- Stimulate economic development using natural resources
- Improve the quality and safety of food products
- Sustain and protect the environment with ecologically sound practices
- Improve the quality of life for the people of Guam

Mission Statement

Excellence in research in support of the land-grant mission of discovery, learning and engagement. We excel in the areas of tropical agriculture, environmental and life sciences.

Fields of Study

Entomology

The Entomology Laboratory scientists and research team are engaged in research with practical applications in controlling invasive species and pest management using integrated control methods. The laboratory receives insect specimens for identification from local farmers, government agencies and the general public.

In recent years, WPTRC entomologists have been working on the control of several invasive insects including the coconut rhinoceros beetle, *Oryctes rhinoceros*, which is threatening the island's coconut trees and the little fire ant, *Wasmannia auropunctata*. They have also been busy gathering data to determine the overall health of Guam's honeybees in a national survey funded by USDA-APHIS.

Plant Physiology

The Plant Physiology & Fruit Science Laboratory research team focuses on understanding the responses of plants to the typical abiotic stresses of the Mariana Islands. This work is primarily whole





HONEY BEE SURVEY

Scientists have been concerned about the health of honeybees worldwide for years. In 2013, Dr. Ross Miller's Entomology Lab at the University of Guam Western Pacific Tropical Research Center (WPTRC) began the first honeybee health survey in the region with funding provided by USDA-APHIS.

plant physiology. This horticultural research aims at improving production practices of tropical fruit species and native woody perennial tree species including Guam's only cycad, the endangered *Cycas Micronesia*.

Horticulture

Horticulture Laboratory researchers are energetically involved with the Guam Plant Extinction Prevention Program (GPEPP) collecting and managing wild plants and establishing new populations to reverse the trend toward extinction. Guam's rarest tree, *Serianthes nelsonii* is the focus of GPEPP outplanting efforts to establish seedlings in their native habitat.

Plant Pathology

The Plant Pathology Laboratory is engaged in research on the diseases of traditional Pacific Island plant crops as well as other plants currently used in agriculture in the islands. Research on diseases of coconut, taro, banana, papaya, and areca nut is of great importance to local farmers.

Soil Science

The Soil Science Laboratory is involved in research, instruction, soil quality improvement, and organic waste management. This lab has recently been involved in successfully employing vetiver grass as a sediment trap and documenting its effect on water quality improvement and as mitigation for coral reef degradation. The lab has also studied the application of organic waste to different soil types on island to improve soil conditions and provide nutrients needed for plant production.

Turf Science

The primary role of the Turf Science Laboratory is to conduct research to serve the needs of Guam and the Western Pacific region and to generate information that is beneficial to the scientific community outside of Guam. Most recently, the lab has been investigating the use of turf to create rooftop gardens, which have been shown to substantially reduce electric bills.

Research Infused Instruction

CNAS professors design experiments for their lab classes based on their research, which includes evaluating the effects of common pesticides on the reproductive function of fish and investigating the dynamics of litter decomposition among native and non-native tree species in southern Guam. Students gain research experience by gathering data and conducting experiments for these projects.

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College of Natural & Applied Sciences

UOG SEA GRANT

Sea Grant is a sister program to the Land Grant system and is situated within the University of Guam, College of Natural and Applied Sciences (CNAS) building. Faculty at UOG Sea Grant (UOGSG) aim to enhance the understanding of coastal processes in ways that promote sustainable human activities through extension and education activities; improved conservation, protection, and perpetuation of coastal resources and property; provide scientifically accurate data and methods to inform management and policy; identify and involve stakeholders in community based management efforts, play a leadership role by developing across-sector strategies for addressing major issues affecting delicate coastal marine ecosystems, and empowering businesses to make sustainable decisions that are socially, environmentally, and economically profitable.

UOGSG established focus areas that model the National Sea Grant Program:

1. Healthy Coastal Ecosystems
2. Sustainable Fisheries and Aquaculture
3. Resilient Communities and Economies
4. Environmental Literacy and Workforce Developments

UOGSG transitioned from project to program status in 2012, a significant elevation within the National Sea Grant College network. The program approaches extension and education through integrated extension work in the Pago Watershed. The watershed is well utilized for recreational fishing, biking, off-roading, hiking, and encompasses one of the fastest growing villages on Guam. The Builders of A Better Bay campaign aims to engage community members to ensure that the watershed continues to sustain the community long into the future in a multitude of ways. In working with community partners, and deploying water quality monitoring sensors in the rivers and bay, Sea Grant is able to provide accurate data that enables informed decision making in this priority watershed (Pago).



Sea Grant is also developing a Marine Science Certificate program that will provide an interdisciplinary approach to marine science at UOG and offer undergraduate students the opportunity to engage in marine science in the absence of a marine biology undergraduate degree major or minor. The program will encompass new specialized in-water courses as well as established courses in other University departments. A 'Gateway to Marine Science' course is offered over the summer to serve as a bridge program for incoming freshmen.



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Seven UOG Graduate Students Receive Sea Grant Fellowships

Above Photo from left to right: Adrian Kense, Devin Resko, Travis Reynolds (2014 fellow), Andres Reyes, Jacques Idechong, Valeri Lapecek and Anna Simeon. Students receive between \$6,000 to \$12,000 for their research and continued studies.

Sea Grant also implements competitive research fellowships at UOG on a yearly basis to support community coastal development. The following are a list of research priorities that are aligned with other governmental plans in an effort to support other ongoing management, education, and extension efforts through competitive Sea Grant Research Fellowship that is offered on a yearly basis to graduate students. This Fellowship will be open to faculty in the Fall 2015.

1. Climate change

- Ocean acidification impacts model species, communities, and ecosystems.
- Modeling impacts at local scales for sea level rise and sea surface temperature]
- Management and risk assessment of nuisance, invasive species, and harmful algal blooms.
- Oceanographic data gathering and analyses

2. Land based sources of pollution

- Impacts of pollution on reef life
- Reef restoration and testing of organisms for pollution
- Improving GIS data availability, and aquifer sustainability

3. Fisheries

- Local mapping of resources (species and communities) and stock assessment of key species.
- Comparing catch rate methods and marketing traditionally caught fish.

4. Watersheds

- Watershed monitoring-effects of restoration/ degradation and improved modeling.
- Community-based management projects
- Island and community sustainability leading to improved watershed health

5. UOGSG also collaborates with:

- NOAA Coastal Storms Program
- National Sea Grant Invasive Species Network
- eProjects 2.0
- National Sea Grant Climate Change Network
- NOAA Pacific Risk Management Ohana (PRIMO)
- Palau Conservation Society
- Pacific Integrated Ocean Observing System (PACIOOS)
- Guam Soil and Water Conservation Districts
- University of Hawaii
 - Marine Options Program
 - Sea Grant



FR. SOLORZANO SKULL AND MANUSCRIPTS

UOG anthropology professor Dr. David Atienza studies letters written by Jesuit priest Manuel Solorzano in the 17th century about his time in Guam.

UOG held *I Ilun Pâle': Discussions Before the Skull of Solorzano* at the College of Liberal Arts and Social Sciences (CLASS) Lecture Hall in January 2015 included the following academic presentations and discussions:

Introduction to Fr. Manuel de Solorzano by Professor Manuel Lopez Casquette, University of Loyola Andalucia (Sevilla-Cordoba) in Spain and heir to the skull of Manuel de Solorzano.

A 17th Century Missionary's Motivation by Father Francis Hezel, Jesuit Priest

The Cosmo-vision of a 17th Century Chamorro by Professor Michael Lujan Bevacqua, Chamorro Studies, UOG

Discussions Before the Skull Panel Discussion featuring Dr. Robert Underwood, UOG President, Dr. David Atienza, UOG Professor of Anthropology, Father Francis Hezel, Dr. Michael Lujan Bevacqua, Dr. Manuel Lopez Casquette and Dr. Andres Oyola Fabian, Member of the Real Academia de Extremadura de las Letras y las Artes Casquette presented documents written by Solorzano to the University of Guam for its historical archives.



Dr. Andres Oyola Fabian (left) and Manuel Lopez Casquette (right) with the skull of Fr. Manuel de Solorzano.

RICHARD F. TAITANO MICRONESIAN AREA RESEARCH CENTER (MARC)

Through preservation and education, MARC strives to acquire, preserve, and provide access to collections of archival maps, photographs, texts, and cultural materials. It is the premier center for social sciences and humanities research in the western pacific. It was established in 1967 and is one of the oldest research units within the university of Guam.

The collection constitutes one of the most extensive repositories of Guam and the Micronesia library materials in the world. The collection holds over 40,000 volumes, including 800 dissertations and theses, news clippings, brochures and transient material related to the geographical region of Micronesia.

MARC has a variety of units such as:

1. Electronic Databases,
2. Chamorro Genealogies
3. Photograph & Map Collection
4. Spanish Documents Collection
5. Manuscript Collection
6. Archaeological & Historical Preservation studies in Cultural Resource Management

MARC Highlights

- MARC & Guampedia collaborate to continuously update MARC documents on the Guampedia website, an online encyclopedic resource about the history, culture and contemporary issues
- MARC renewed the archaeological and historical publications in the region with monographs and volumes on projects and sites in Guam and the Marianas, the Non Nok Tha site in Thailand, and America Samoa.
- Within the last five years, MARC has received ≈18,846 patrons, with 6,933 visitors
- MARC collaborated with regional and international researchers to study and document the Chamorro language.
- A blanket agreement with the NavFac Pacific to conduct various cultural resource management projects on Guam and in the region launched recent archaeological research by MARC. Projects included U.S. Navy construction and archaeological testing excavations at Futenma MCAS Okinawa and archaeological resource investigations for local, territorial, federal and grant-funded undertakings.

- MARC produced the first comprehensive traditional cultural properties studies for Guam, Tinian, Saipan, and Pagan Islands in the Northern Marianas
- MARC has conducted archaeological field schools at Ritidian Refuge, United States Fish and Wildlife Services (USFWS), since 2007 and is the leading center for archaeological studies in the region.



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CENTER FOR EXCELLENCE IN DEVELOPMENTAL DISABILITIES EDUCATION, RESEARCH & SERVICE (CEDDERS)

Serving the island as the Center for Excellence in Developmental Disabilities Education, Research, and Service, CEDDERS provides training and technical assistance in the Pacific Basin Region. It is the largest training, service, and technical assistance center at the University of Guam.

CEDDERS supports targeted training for medical professionals, allied health providers, social service providers, employers, educators and a wide range of public and nonprofit organizations. CEDDERS' wide ranging impact is in keeping with the university's mission, and operationalizes UOG's role as a land grant institution of higher education.

Many of the top universities in the US have centers that focus on the area of disability and most also have Centers that also focus on young child development, the aging, minority issues, civil rights, civic engagement, and economic development for the poor.

CEDDERS was established at UOG in 1992 and has brought in more than 120 million in external funding to help UOG do what is best for the public good in the area of supporting individuals with disabilities. It is viewed by the public as one of the University's best programs, and an exemplary model of community engagement given CEDDERS role in needs assessment, evaluation, program development, training, technical assistance, grant writing, and policy development and research. This is in keeping with not only the university's mission, but also in actively meeting the challenges as a land grant institution of higher education.

CEDDERS has been at the forefront of developing data sharing and interoperability protocols on Guam; assistive technology demonstration and the development of loan program funding for devices and supports; cultural and linguistic competence in behavioral health and disability arenas; alternate assessment; the provision of services and supports to individuals with disabilities; the offering of much needed training programs in speech pathology, visual impairment, disability studies, integrated primary care and behavioral health supports, aging and disabilities; targeted research and policy development; and has been the leader in piloting teleaudiology within the Pacific.

Mandated by the Developmental Disabilities Assistance and Bill of Rights Act of 2000, Guam CEDDERS is committed to providing assistance and support to improve and enhance the quality of life of individuals with developmental disabilities and their families.



Transportation: Guam DOE Special Education drivers practiced approved safety standards in lift operation under the supervision of Ginger Porter, Community Transportation Association of America (CTAA) Instructor and Guam CEDDERS Initiative Area Coordinator, during the June 2013 CTAA Passenger Service and Safety Workshop. Nineteen drivers earned CEUs from the University of Wisconsin, Milwaukee School of Continuing Education, and attained national certification.

Funded Grants and Subcontracts include:

- Center for Disease Control (CDC): Guam Early Hearing Detection & Intervention (EHDI) –Guam Child link Data Tracking and Surveillance
- Commonwealth of the Northern Mariana Public School System (CNMI PSS) Individuals with Disabilities Education Act (IDEA) Part B & C Technical Assistance
- Federated States of Micronesia (FSM) --- Project Realize, Empower, and Apply Locally (REAL) IV
- Guam Department of Education (GDOE) Character Education Positive Behavioral Interventions and Supports (PBIS)
- Guam Department of Education Part B and C Technical Assistance
- Guam CEDDERS- CORE Grant from US Department of Health and Human Services
- Guam System for Assistive Technology (GSAT) funded by US Department of Health and Human Services



Hearing Screening: Veneranda Leon Guerrero (right) holds her infant prior to undergoing teleaudiology testing to determine whether or not her infant has a hearing loss. Technology enabled Dr. Erica Schicke (on computer screen upper left) at Children’s Hospital-Colorado to operate the diagnostic audiological equipment remotely from Colorado, after Bobbie Maguadog (center), audiometrist, Department of Education and Dr. Susan Dreith (left), audiologist, Children’s Hospital-Colorado prepared the parent and infant for testing on Guam.

- Guam’s Early Childhood Home visiting program. Project Bisita I Familia, MCH
- Guam’s Early Childhood Home Visiting Program Project Bisita I Familia & Early Childhood Mental Health Project Kariñu Database Development
- Hawaii School of Medicine Maternal Child Health Leadership Education in Neurodevelopmental and Related Disabilities (MCH LEND) Program
- Health Resources and Services Administration (HRSA) Guam Early Hearing Detection and Intervention (GEHDI) Phase IV – Project Rikohi
- LAUNCH- Primary Care and Behavioral Health for Young Children At Risk funded through SAMHSA and MCH
- Mid-continent Research for Education and Learning (McREL) Pacific, IES funded
- National Center & State Collaborative (NCSC) General Supervision Enhancement Grant (GSEG) Project
- No Wrong Doors- Aging and Disabilities Planning funded through HHS Administration on Aging
- Pacific Vision Instruction Project (Pacific VIP) USDOE
- Pacific Island Microcredit Institute (PIMI) Get Guam Teleworking Program
- PepNet2 Deaf and Hard of Hearing Connecting People, Building Capacity
- Project Kariñu – Cultural & Linguistic Competency (Infant Mental Health)
- Project Kariñu – Evaluation (Infant Mental Health)
- Project Kariñu – Technical Assistance & Training (Infant Mental Health)
- Project Tinituhon Phase III MCH-SECCS/Building Health through Integration Comprehensive Systems, HRSA
- Transit Training for Paratransit Drivers



For more information contact:
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CENTER FOR ISLAND SUSTAINABILITY

In 2009, under the leadership of UOG President Dr. Robert Underwood, the Center for Island Sustainability was established to tackle issues that the Pacific islands are faced with such as global climate change, alternative renewable and sustainable energy solutions, peak oil, bio-security, and indigenous peoples rights.

It is the focal institute at the University of Guam for adapting and modeling sustainable technologies that meet the needs of island communities.

The Center for Island Sustainability is located at Deans Circle, House #32.

House # 32 was originally built in the 1960's at the University of Guam and was retrofitted as a model for low-carbon emission and full island sustainability.

House #32 features:

- 6 Kilowatt (kW) Photovoltaic (PV)
- High "e" energy efficient windows and sliding doors
- Water Catchment System
- Kerosene Hybrid Refrigerator
- High 17 SEER AC Units
- LED Large Screen displays
- Permaculture Garden Models
- 1 kW Wind Turbine

The Center for Island Sustainability leads change through outreaches, hands on demonstrations, and alternate energy models designed to instruct and inform students, and others in the public arena and the Micronesian Region, about critical challenges and opportunities our island communities

House #32 Model Home



President Robert Underwood meets with former Republic of Palau President Johnson Toribiong at the 2015 Regional Island Sustainability Conference at the Hyatt Regency Guam April 14-16.

Programs:

Western Pacific Coral Reef Institute (WPCRI)

Regional Assistance Development (RAD)

Micronesian Bio-Security Plan (MBP)

Projects:

1. EcoFeed - Converting Food waste into Animal Feed and Plant Feed
2. Tasi beach guidelines is a Community Education and Outreach Program supporting Guam's coral reefs.
3. The UOG Green Initiative was established to develop a sustainable campus environment that can serve as a model for Guam and the region.
4. Pacific Island Climate Science Center (PICSC) Support for the Coordination of Climate Change Strategic Science Research & Capacity Building in the US-Affiliated Pacific Islands

For more information contact:

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UNIVERSITY OF GUAM SCHOLARS AND RESEARCH CENTERS

UOG scholars and research centers provide consulting support as well as academic research and teaching. These are coordinated through each center and the Graduate Studies, Research and Sponsored Programs.

For more information, please contact the following research centers:

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1. Heidi San Nicolas, Ph.D. (Developmental Disabilities Education, Research and Service)

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1. Maria Kottermair, M.S. (GIS Specialist)
2. Richard Randall (Professor Emeritus of Marine Biology)

College of Natural & Applied Sciences

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1. L. Robert Barber, Jr., Ph.D. (Agricultural Economics)
2. James R. Hollyer, M.S. (Agriculture & Resource Economics)
3. Manuel V. Duguies, D.V.M. (Animal Science)
4. Hui Gong, Ph.D. (Aquaculture)
5. Rachael T. Leon Guerrero, Ph.D. (Nutrition)
6. George Curt Fielder, Ph.D. (Zoology)
7. Mohammed H. Golabi, Ph.D. (Soil Science)
8. Gena A. Rojas, M.P.A. (Community)
9. Thomas Marler, Ph.D. (Fruit Science, Forestry)
10. Jian Yang, Ph.D. (Food Science)
11. Robert L. Schlub, Ph.D. (Plant Pathology)
12. Prem Singh, Ph.D. (Agricultural Engineering)
13. Alicia C. Aguon, Ph.D. (Mathematics)
14. Grazyna Badowski, Ph.D. (Mathematics)
15. Han-Tower Chen, M.S. (Mathematics)
16. Martin K. Debeer, M.S. (Mathematics)
17. Anatole F. Grishin, Ph.D. (Mathematics)
18. Hideo Nagahashi, Ph.D. (Mathematics)
19. Aurora S. Trance, Ph.D. (Mathematics)
20. Zoltan Szekely, Ph.D. (Mathematics)
21. Peter Barcinas, M.S. (Community Systems)
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24. John W. Howerton, U.S. Army, M.S. (Military Science)
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30. Subir Ghosh, Ph.D. (Biology)
31. Christopher S. Lobban, Ph.D. (Biology)
32. Katharine L. Lofdahl, Ph.D. (Biology)
33. Kathleen A. Moots, Ph.D. (Biology)
34. Wei Xiao, Ph.D. (Biology-Terrestrial Botany)
35. Daniel Lindstrom, Ph.D. (Zoology-Freshwater Biology)
36. George Curt Fielder, Ph.D. (Zoology)
37. Daniel Lindstrom, Ph.D. (Zoology)

38. Fenglien Lee, Ph.D. (Computer Science)

39. Carl T. Swanson, JR., Ph.D. (Computer Science)

40. Yousuo Joseph Zou, Ph.D. (Computer Science)

41. Mari Marutani, Ph.D. (Horticulture)

42. James McConnell Ph.D. (Horticulture)

43. Timothy L. Righetti, Ph.D. (Horticulture)

44. Naushadalli Suleman, Ph.D. (Chemistry)

45. Maika Vuki, Ph.D. (Chemistry)

46. Lee S. Yudin, Ph.D. (Entomology)

47. Ross Miller, Ph.D. (Entomology)

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1. Terry Donaldson, Ph.D. (Ichthyology- Behavior, Ecology, Biogeography, historical ecology, evolution, systematic, conservation biology, and fisheries biology of marine and insular freshwater fishes)
2. Jason S. Biggs, Ph.D. (Toxicology- Biochemical ecology and pharmacological potential of Venomous marine mollusks)
3. Peter Houk, Ph.D. (Spatial and temporal dynamics of coral-reef assemblages)
4. Alex Kerr, Ph.D. (Marine Biology- Evolution and Systematic of invertebrates)
5. Richard H. Randall, M.S. (Systematic of scleractinian corals)
6. Laurie Raymundo, Ph.D. (Marine Biology- Conservation biology and diseases of coral)
7. Rob Rowan, Ph.D. (Marine Biology- Ecological physiology of coral-algal symbioses)
8. Tom Schilis, Ph.D. (Marine Biology- Biogeography and systematic of marine algae)

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1. John Peterson, Ph.D. (Anthropology, Archaeology, Cultural Resources & Micronesian Studies)
2. Mike Carson, Ph.D. (Cultural Resources & Archaeology)
3. Agnes Griffin M.A. (Anthropology- Historical preservation & Cultural studies)
4. William Jeffery, Ph.D. (Maritime Archaeology)
5. Rlene Santos Steffy (Ethnographer & Oral Historian)

WERI Tel: (671) 735-2685

6. Mark Lander, Ph.D. (Meteorology- Tropical meteorologist)
7. John Jenson, Ph.D. (Geology- Groundwater Geologist, GIS Specialist)
8. Shahram Khosrowpanah, Ph.D., P.E. (Civil Engineering- Hydraulics engineer)
9. Gary Denton, Ph.D. (Marine Zoology- Aquatic Toxicology & Environmental Toxicology)
10. Joseph D. Rouse, Ph.D., P.E. (Civil Engineering- Wastewater engineer)
11. Yuming Wen, Ph.D., (GIS- GIS Specialist)