
# 2015
# ISLAND SUSTAINABILITY CONFERENCE

APRIL 15-16, 2015

HYATT REGENCY GUAM

Center for ISLAND SUSTAINABILITY

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The first ever Sustainable Tourism Contest was offered to students to encourage a new way of thinking about Guam's main economy. The goal of the contest was to encourage students to examine the potential impacts of having 2 million visitors by the year 2020. This is the goal set by Guam's tourism leaders and will mean a great deal for the future of our island, economically and environmentally. Students participated by submitting essays and videos related to this topic.

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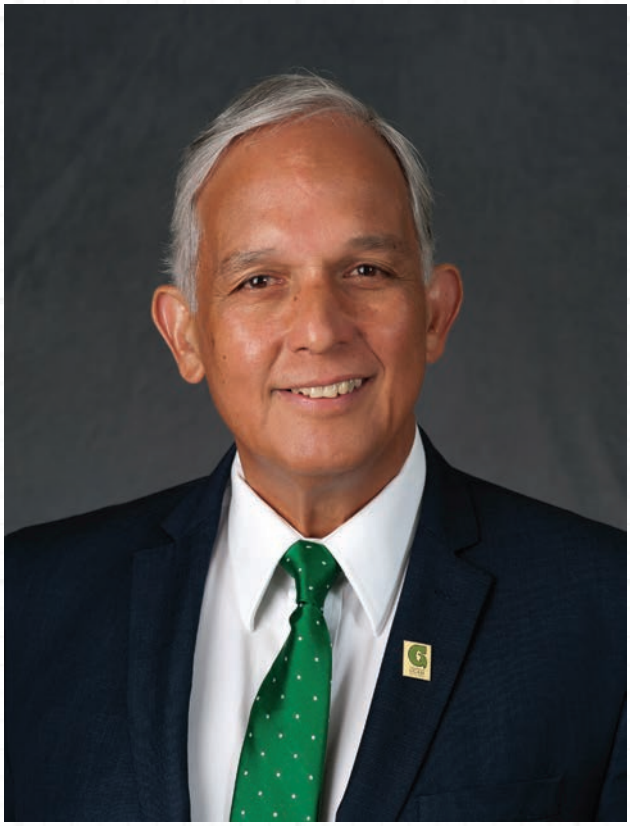
Center for ISLAND SUSTAINABILITY

The Mission of the University of Guam Center for Island Sustainability (CIS) is to create and implement renewable and sustainable technologies that are suitable for island use and communities, that will also incorporate indigenous aspects and alternatives, and allow for replicable research and adaptation to meet the needs of the region's island communities in the areas of environment, economy, society, and education.

Our goal is to educate, demonstrate and provide opportunites for everyone to become an engaged and informed part of our society and environment and therefore become active citizens for the island.

# PRESIDENT'S WELCOME



Hafa Adai!

On behalf of the University of Guam, welcome to the 2015 Regional Island Sustainability Conference. This is the sixth conference that the Center for Island Sustainability (CIS) has spearheaded and its continued success comes from the involvement and support of our community partners and sustainability champions. Congratulations to the CIS and the members of the planning committee for organizing another outstanding event. I also extend a special Sen Dangkulu na Si Yu'us Ma'ase to Pacific Solar & Photovolatics and Brown and Caldwell in recognition of their annual sponsorship of the CIS conference since its inception.

This year, we welcome the Society of American Military Engineers for joining us at the conference this year. The Association of Waste Water Works- Western Pacific Region also joins us and are sponsors of the two-day pre-conference "Operational Challenges in the Pacific Islands" with the intent of developing a regional professional network.

The CIS conference theme this year, " Building Resilient Island Communities," speaks to the means by which we can address the issues faced by island communities in the effort to become independently sustainable. As a region, we share both struggles and successes and rely on institutions of higher education to help to develop evidence-based best practices for application in our unique environments through research and experimentation.

Sustainability for small island societies presents unique challenges, but also great opportunities. Even as we are on the front line of climate change and sea level rise, we can also teach others the consequences of ignoring the sustainability of our resources. We are both learners and teachers in dealing with the conditions that we confront. Together, we will not just make the islands safe for future generations, but provide models for others to learn from.

Your participation today and efforts in the future are key to building a sustainable region. Thank you for making the University of Guam your natural choice in promoting access to higher education. Remember, there is no place like home. Mail a' ya ta sustieni i lina'la-ta kumu taotao isla.

Biba CIS! Biba UOG!

Robert A. Underwood, Ed.D.
President, University of Guam

# CONFERENCE OVERVIEW

## MONDAY, APRIL 13 — PRECONFERENCE

Pacific Island Climate Change Advisory Committee Meeting
Pacific Island Climate Change Advisory Student Presentation

American Waterworks Association - Western Pacific Region
Water and Wastewater Conference

## TUESDAY, APRIL 14 — PRECONFERENCE

American Waterworks Association - Western Pacific Region
Water and Wastewater Conference

Coral Reef Symposium

## WEDNESDAY, APRIL 15
## THURSDAY, APRIL 16 — MAIN CONFERENCE

### Wednesday, April 15

| | |
|---|---|
| 8 a.m. | Sign in |
| 8:30 a.m. | Opening remarks |
| 9 a.m. | Keynote speaker |
| 9:30 a.m. | Plenary Panel 1 |
| 10:30 a.m. | Plenary Speaker |
| 11 a.m. | Breakout Session A |
| 12 p.m. | Lunch |
| 1 p.m. | Breakout session B |
| 2 p.m. | Breakout Session C |
| 3:15 p.m. | Plenary Panel 2 |
| 4:30 p.m. | Poster and Table Exhibits |
| 6 p.m. | Networking reception |

### Thursday, April 16

| | |
|---|---|
| 8 a.m. | Sign in |
| 8:30 a.m. | Plenary Speaker |
| 9 a.m. | Plenary Panel 3 |
| 10 a.m. | Two Million Too Many? |
| 10:45 a.m. | Plenary Speakers |
| 11:45 a.m. | Lunch |
| 12 p.m. | Luncheon Speaker |
| 1 p.m. | Breakout Session D |
| 2 p.m. | Breakout Session E |
| 3 p.m. | Poster and Table Exhibits |
| 3:30 p.m. | Plenary Panel 4 |
| 4:30 p.m. | Conference Overview |

## FRIDAY, APRIL 17 — FIELD TRIP

The University of Guam's Water & Environment Research Institute of the Western Pacific (WERI) and Office of Professional & International Programs (PIP) will be offering the Professional Tour of the Northern Guam Lens Aquifer led by Dr. Jenson. Participants will experience a "hands-on" explanation of our islands' most important natural resource. Please visit the registration table for more information.

# AGENDA

## MONDAY, APRIL 13

Moderators: Dr. John Peterson, Romina King

### PICSC STRATEGIC PLANNING MEETING

**8 a.m. Registration**

Continental Breakfast

**8:30 a.m. Introductions**

What is PICSC?

UOG CIS and PICSC Partnership

Aim of the Meeting

**9 a.m. Guest Speakers**

Government of Guam and Climate Change Update (Sheena Black)

Current El Nino, Recent Typhoons and 2015 Outlook (Mark Lander)

Economics of Adaptation - VTC (Dr. Kirsten Oleson)

**9:45 a.m. Break**

**10 a.m. Overview of Discussion Notes from POETS**

**10:15 a.m. Sticky Note Exercise**

KJ Method

Step 1: Focus Questions

What do Guam and Micronesia need to adapt to the impacts of climate change?

What are some of the barriers to adaptation (e.g., information gap)

**11 a.m. Voting with Dots**

**11:30 a.m. Tally and Presentation of Final Results**

**11:45 a.m. Next Steps**

**12 p.m. Lunch and Conclusion**

### EPSCOR WORKSHOP

Moderator: Joe Danek, The Implementation Group (TGI)

**1:30 p.m. Grant Writing Workshop**

**5 p.m. Conclusion**

# MODERATORS

## Dr. John Peterson

*University of Guam Assistant Vice President of Graduate Studies, Research, and Sponsored Programs*

John A. Peterson earned a masters and a doctorate in Anthropology from the University of Texas at Austin. He is the former director of the Richard F. Taitano Micronesian Area Research Center, University of Guam. Before moving to Guam in 2006, he was active in Museum Studies in Texas and in the Philippines, and was director of a Living Historical Farm and Agricultural Museum in Ohio, as well as having contributed to the initiation of the Kabilin Heritage Center at the University of San Carlos Museum in Cebu, Philippines.

Peterson served as director of the Anthropology Research Center and the Asian Studies Development Program, as well as on the Anthropology faculty at the University of Texas at El Paso. As an archeological investigator, Peterson has conducted archeological and ethnographical research projects in the American Southwest, Texas, California, northern Mexico, the Philippines, Guam and Hawai'i, along with innumerable cultural resource management projects and has contributed to projects in Jiangxi Province, China, Ecuador, and Palau. As both faculty and scholar at the University of Texas at El Paso, Peterson's focus and accomplishments were on teaching and research of historical ecology, technology and society and archeology. His research and extensive publications include investigations and articles on the historical archeology of the Southwest and northern Mexico, Hawaiian archeology, and the history and archeology of the Philippines.

## Romina King

*University of Guam College of Liberal Arts and Social Sciences Faculty and Center for Island Sustainability Pacific Islands Climate Change Center Coordinator*

Romina King is an environmental geographer and is currently pursuing her Ph.D in Geography at University College Cork Ireland. Her dissertation examines the vulnerability of small island communities with regard to climate change and uses Guam as a case study. She is scheduled to finish by June 2015. Romina has an M.A. in Micronesian Studies from the University of Guam. Her thesis examined attitudes and perceptions of Micronesian migrants with regard to Guam's marine preserves.

Romina also has an M.Sc in Geographic Information Systems from the University of Southampton, UK. Her thesis compared the quality of volunteered geographic information with proprietary geographic information. Romina was born in the Philippines and was raised on Long Island, New York. She moved to Guam shortly after undergraduate studies at Boston College where she earned a degree in economics, with a focus on the environment.

WATER/WASTEWATER CONFERENCE

American Water Works Association

Hawaii Section

Western Pacific Sub-Section

*WESTERN PACIFIC SUBSECTION*

# *WATER AND WASTEWATER CONFERENCE*

# AGENDA

## MONDAY, APRIL 13

### WESTERN PACIFIC SUBSECTION WATER AND WASTEWATER CONFERENCE

**8 a.m.** **Sign In**

Continental Breakfast

**9 a.m.** **Welcoming**

Joseph T. Duenas
Chairman, CCU

Paul Kemp
Chair of the Western Pacific Subsection of AWWA

**9:30 a.m.** **Team Activity and Ice Breaker**

**10 a.m.** **Keynote Speaker**

Joe Diego
USDA Fundings Information

**10:30 a.m.** **Break**

**10:45 a.m.** **Technical Presentation**

Brian Bearden
Mapping and Predicting Nitrite Concentration in Groundwater on the Island of Saipan

**11:30 a.m.** **Hosted Lunch**

Introduction to AWWA-HIWPS

**1 p.m.** **Technical Presentation**

Joe Rouse
FSM with a Focus on Yap

**1:30 p.m.** **Technical Presentation**

John Blas
Managing the Collection System at Guam Waterworks Authority

**2 p.m.** **Break**

**2:15 p.m.** **Vendor Presentation and Demonstration**

Christina Wieselman
UV Cured Fiberglass Lining-Process and Products Protecting the Future

**3:15 p.m.** **Water and Wastewater Facilitated Forum**

**4:30 p.m.** **Mixer**

# AGENDA

## TUESDAY, APRIL 14

### WESTERN PACIFIC SUBSECTION WATER AND WASTEWATER CONFERENCE

**8 a.m.** **Sign In**

Continental Breakfast

**9 a.m.** **Keynote Presentation**

Eassie Miller

**9:30 a.m.** **Break**

**9:45 a.m.** **Technical Presentation**

Yvonne Cabrera
Assessment of the Maui 1 & 4 Shaft Wells, Saipan

**10:15 a.m.** **Technical Presentation**

Kevin Peacock
Improving Aging Infrastructure: Case Study of Barrigada Tank

**10:45 a.m.** **Technical Presentation**

Rick Zimmer
UCMR3 - A Summary of the Result from EPA's Latest National Wide Survey of Unregulated Containments

**11:30 a.m.** **Hosted Lunch**

Introduction to AWWA-HIWPS

**1 p.m.** **Technical Presentation**

Justin Martinez and Melissa Schaible
FOG Management Practices on Guam

**1:30 p.m.** **Vendor Presentation**

Rob Craw
Guam Fusible PVC

**2 p.m.** **Break and Travel to Northern District WWTP**

**2:30 p.m.** **Vendor Demonstration**

Rob Craw
Guam Fusible PVC

**3 p.m.** **Tour of Northern District WWTP**

American Water Works Association
Hawaii Section
Western Pacific Sub-Section

## Message from the Chair –Paul Kemp

Established in 1881, the American Water Works Association (AWWA) is the largest nonprofit, scientific and educational association dedicated to managing and treating water, the world's most important resource. With approximately 50,000 members, AWWA provides solutions to improve public health, protect the environment, strengthen the economy and enhance our quality of life.

AWWA serves to:

- Offer education to water professionals
- Advocate for safe and sustainable water
- Collect and share knowledge
- Create volunteering opportunities

As the Chair of Western Pacific Subsection and former Chair of the Hawaii Section, it has been one of my continuing aspirations to share the benefits of AWWA membership to all of the Pacific Basin. The choice of location for the subsection is based on the nature of regional travel, since most of us in the Western Pacific area come through (or originate on) Guam to reach any other location either in or beyond our region.

With the support of the American Water Works Association, the Hawaii Section of AWWA, the Guam Consolidated Commission on Utilities and Guam Waterworks Authority, the Subsection was formed on October 10, 2014. At that time the subsection adopted the following mission statement:

> **"The purpose of this Subsection shall be the advancement and dissemination of knowledge concerning the improvement of practice in the design, construction, operation and management of water works and all related activities, and supporting skill based training and an open exchange of experiences throughout Guam, the Commonwealth of the Mariana Islands, the Republic of Palau, and the Federated States of Micronesia."**

The Subsection workshop, April 13-14, 2015, is the beginning of the activities that the Subsection is planning in order to meet the objectives of our commitment to our region. The subsection welcomes all interested persons in, or supporting this geographic region; working in, supporting, or with interest in water and waste water as well as the environments they affect and in which they function. The Subsection would also like to encourage everyone to join AWWA (which automatically makes you a voting member of the Subsection) but our emphasis is to support the needs of our geographical area.

We hope that those attending the Subsection Workshop entitled "Challenges of Operating Water and Wastewater Systems in a Pacific Island Environment" will find it has supported your needs and interests. The Subsection will be most appreciative of input from attendees and persons from the Western Pacific region and any suggestions for future activities that help us serve the region will be taken seriously.

# AGENDA

## TUESDAY, APRIL 14

### CORAL REEF SYMPOSIUM

**8:30 a.m.** **Registration**

**9 a.m.** **Introductions**

Lorilee Crisostomo,
Director, Bureau of Statistics and Plans

Dr. Anita Enriquez,
UOG Senior Vice President

**9:30 a.m.** **Plenary Speaker**

Charles Birkeland
UOG Professor Emeritus
Evolutionary Responses of Corals to Climate and Ocean Chemical Changes

**10:30 a.m.** **Break**

**10:45 a.m.** **Emerging Research**

Exploring Unrecognized Algal Diversity in the Western Pacific

Colony Shape Influences Disease Lesions in Reef Corals

**11:25 a.m.** **Managing Land-Based Sources of Pollution**

What's Going on in Geus?

Discussion Of Restoration Efforts In Talakhaya Watershed, Rota

Manageability of Environmental Mercury Sources in Saipan

**12:30 p.m.** **Lunch and Poster Session**

**1:30 p.m.** **Human Dimension**

Heritage Preservation and Environmental Conservation: A Natural Approach to Address Community Achievements

**1:50 p.m.** **Managing Reefs in a Changing Climate**

Quantifying Coral Bleaching Impacts in Guam's Species Rich Shallow Reef Zone

Back-To-Back Bleaching Episodes Result in Extensive Loss of Shallow Staghorn Acropora in Guam

Coral Reefs in a High-Co2 World: Insights From Maug Island

**2:50 p.m.** **Break**

Let the Reef Be Your Guide: Adaptive Monitoring Techniques

Consecutive Thermal Stress Events Devastate Shallow-Water Coral

Assemblages Across the Remote Northern Mariana Islands

Assessing Relative Resilience Potential of Coral Reefs in Saipan, Tinian and Rota

**4:10 p.m.** **Concluding Comments**

# PLENARY SPEAKER

### Evolutionary Responses of Corals To Climate and Ocean Chemical Changes

*Charles Birkeland (Biography on page 17)*

The recent geologic period was the finest corals have ever experienced for reef production. The 140 million years previous to the present Neogene Period hosted a diversity of reef-building corals but very meagre reefs. There may be a cap on ocean temperatures at 35°-36°C which is within the adaptive range of corals. It is reasonable to hope we will retain a diverse array of scleractinians. However, corals have never adapted to withstand bioerosion at low pH. If a buildup of atmospheric CO2 continues, we may keep many corals, but we will lose ecosystem services of reefs.

# EMERGING RESEARCH

### Exploring Unrecognized Algal Diversity in the Western Pacific: A Case Study of the Genus Actinotrichia

*Anna E. Simeon, Tom Schils*

Non-native algae introductions are concerning to marine resource managers because of their potential to become invasive. To assess the risk of introducing non-indigenous marine macroalgae and to detect those already present, we need to thoroughly understand the species richness of island floras. Traditional morphological identification can be expensive and cumbersome, but modern genetic techniques –like DNA barcoding– provide fast and cost-effective methods for algal identification and cryptic species recognition.

In this study, we use the red algal genus Actinotrichia to examine algal species diversity in Micronesia and the western Pacific, and demonstrate how DNA barcoding can be used to characterize marine floras in the region. Sequence analysis using the genetic markers COI-5P and rbcL reveals a high degree of cryptic diversity in Actinotrichia, with as many as six undescribed species occurring in the region. These results suggest the marine flora of Micronesia is substantially more diverse than currently recognized and further study of this diversity will aid resource managers in detecting potentially harmful invasive species.

### Colony Shape Influences Disease Lesions in Reef Corals

*Alex Kerr*

Many marine invertebrates live together as clones in highly integrated colonies that display a bewildering variety of shapes. Explanations for colony shape have been framed primarily as a response to trade-offs in selection for structural integrity while maximizing feeding, reproductive success or competitive superiority in fluid flow. This study explores how colony morphology mediates mortality from disease in reef corals. Spatially explicit polyp-based simulations indicate that colonies with simple morphologies incur significantly larger disease lesions and higher disease prevalence than do erect, more complex forms given constant area, polyp-to-polyp transmission rate, and the arrangement and size distribution of polyps. These results suggest that colony shape, by modulating colony-level rates of mortality, are important for understanding the epidemiology of colonial organisms.

# MANAGING LAND-BASED SOURCES OF POLLUTION

## What's Going On In Geus? A Study Of Baseline Conditions In The Geus River Watershed.

*Dr. Shahram Khosrowpanah and Bill Whitman*

In February 2014, the National Oceanic and Atmospheric Administration (NOAA) announced the designation of Manell-Geus Watersheds as a Habitat Focus Area because it is valuable as a natural resource to the coastal community of Merizo. As a Habitat Focus Area more resources are dedicated to the development and implementation of watershed management plans and conservation actions. To implement effective watershed management practices, it is important to a) have a better understanding of the available information about the watershed, b) have baseline information of the hydrologic conditions (ie., stream flow, stream level, turbidity, and precipitation over time) and, c) understand the behavior of the watershed. This is a presentation on the status of on-going work on the Geus River Watershed. This study was funded by NOAA through the University of Guam Water and Environmental Research Institute (WERI) via the Guam Bureau of Statistics and Plans, Guam Coastal Management Program.

## Discussion Of Restoration Efforts In Talakhaya Watershed, Rota

*Dana Okano*

Talakhaya watershed on Rota is one of CNMI's priority coral management sites. In 2011 a Conservation Action Plan was created for Talakhaya that identified the need to increase vegetative cover and reduce soil loss. Revegetation efforts have been ongoing and various partners including NOAA Coral Reef Conservation Program, DLNR Rota Foresty, University of Guam, CNMI Bureau of Environmental and Coastal Quality, and Mariana Islands Nature Alliance, among other partners, have been contributing to these efforts. A comprehensive discussion of the conservation activities occurring in the watershed and their results will be presented including; revegetation, soil and water quality assessments, social marketing campaign, and marine monitoring.

## Manageability Of Environmental Mercury Sources In Saipan, CNMI: The Good, The Not So Good And The Downright Ugly.

*Gary Denton, Ph.D.*

While the 1944 invasion of Saipan by US troops unquestionably marked the turning point of WWII, it left behind a legacy of mercury contamination that remains on Saipan to this day. Stemming from the standard use of fulminated mercury as the primary explosive in primers and detonators of artillery shells and percussion caps of ammunition, as well as elemental mercury switches employed in certain types of rockets and other projectiles used at the time, this highly toxic metal was liberated widely along Saipan's western seaboard as the invasion mounted. Currently superimposed upon this diffuse scattering are contributions associated with the clean-up and rebuilding efforts that took place in Saipan at the end of WWII, as well as other inappropriate waste disposal practices of more recent times. Examples of all three mercury sources are considered here and briefly discussed in terms of their current impact on fisheries resources and management potential.

# HUMAN DIMENSION

### Heritage Preservation and Environmental Conservation: A Natural Approach to Address Community Achievements

*Joe Quinata, Humåtak Community Foundation Community-Based Conservation Program*

The Umatac Coral Reef Ambassadors (UCRA) is a conservation program created to provide the community with a life-long learning experience in the conservation our natural resources through awareness, personal growth, teamwork, leadership, skills, and a traditional and environmental mindset for the future.

The UCRA program is comprised of adult and youth mentors and community youth ambassadors that are provided with the environmental conservation and traditional knowledge, leadership and advocacy skills to sustain our natural resources in the municipality of Humåtak.

# MANAGING REEFS IN A CHANGING CLIMATE

### Quantifying coral bleaching impacts in Guam's species rich shallow reef zone

*Travis Reynolds, Jordan Gault, David Burdick, Peter Houk, Laurie Raymundo*

The projects genesis involved members NOAA, NPS, UOG, EPA, and GCM coming together to opportunistically study the 2013 coral bleaching event. The sites for this project were determined following a 2011 NOAA CRED survey around the island. In 2014 another bleaching event effected reefs around the island. Following the 2015 ISC, members of this bleaching task force will resurvey these sites to examine reef resilience around Guam, comparing both the fish and coral communities before and after two consecutive years of intense coral bleaching. Additional project support provided through the UOG Sea Grant program.

### Back-to-back bleaching episodes result in extensive loss of shallow staghorn Acropora in Guam

*Laurie Raymundo, David Burdick, Valerie Lapacek*

Staghorn acroporids have declined on Guam for decades due to multiple stressors. While certain populations are gone and others greatly reduced, a few have thrived, providing essential habitat. Total areal cover was 333,126 m2 in 2012. In 2013 and 2014, Guam reefs experienced sequential bleaching events; temperatures were >0.5oC warmer than average for 1 to 3 mo. Surveys in 2015 showed that all sites suffered bleaching mortality from 20% to 99%. Sites with mortality of 20-30% (n=8) showed some regrowth by 2015. However, 7 sites lost 75-100% of live tissue. Surviving colonies were often infested with Drupella or brown band disease. Using previous areal cover overlain with mortality estimates, cumulative mortality was between 49% and 67%. In light of continued warming trends, this does not bode well for remaining staghorn populations. Management is focusing on determining genetic connectivity and reproductive cycles, resolving taxonomic issues, and culturing resilient populations.

### Coral Reefs in a High-CO2 World: Insights from Maug Island

*Lyza Johnston; Contributing authors: Ian Enochs, Ryan Okano, John Iguel, Steven Johnson, David Benavente, & Derek Manzello*

Ocean acidification (OA) resulting from the absorption of anthropogenic CO2 into the ocean is expected to negatively impact coral reef ecosystems in the coming century. The volcanically acidified system at Maug Island, CNMI provides a rare glimpse into the future, from which we can gain valuable insights into ecosystem-scale effects of OA on coral reefs. Here, we present the first chemical and ecological characterization of the coral reef ecosystem surrounding the CO2 vent at this unique site. We found that acidification significantly affected coral reef community structure as the presence and abundance of various taxa shifted across the CO2 gradient. Overall, the community exposed to high CO2 conditions was dominated by fleshy macroalgae whereas corals and other calcifying organisms became more abundant as CO2 levels declined to ambient. These findings indicate that OA alone can result in a shift from a coral to an algal-dominated state on coral reefs.

# MANAGING REEFS IN A CHANGING CLIMATE

## Let the reef be your guide: Adaptive monitoring techniques

*David Burdick; Roxanna Miller*

Long-term monitoring programs are essential to determine which path a reef ecosystem will take after a disturbance event. Starting in 2010, the GLCRMP has conducted comprehensive monitoring of reef ecosystem condition at several high priority reef sites around Guam; a total of six sites have been established and a seventh will be added in 2015. Utilizing standard coral reef monitoring techniques, coupled with a split-panel sampling approach, high density sampling, and adaptive site determination, the GLCRMP is afforded greater statistical power to detect the desired level of change in reef condition. Adaptive site determination has been crucial to the program and allowed for site boundaries to be redrawn in Tumon Bay after preliminary data analysis of 2010 data suggested distinctly different benthic communities within the original site boundaries. As the monitoring program is relatively young, it is afforded the opportunity to practice this adaptive monitoring strategy.

## Consecutive Thermal Stress Events Devastate Shallow-Water Coral Assemblages Across The Remote Northern Mariana Islands

*Lyza Johnston, R. Okano, S. Johnson, J. Iguel, D. Perez, D. Benavente*

In 2013, the Mariana Archipelago experienced a prolonged period of abnormally high sea surface temperatures (SSTs) and low wind speeds. Subsequently, widespread bleaching and mortality of corals was reported across the inhabited islands of Guam, Rota, and Saipan. Although satellite data suggest that elevated SSTs extended farther north, the geographic extent of the bleaching event was unknown due to difficulties in accessing the remote northern islands. In the summer of 2014, we conducted two expeditions to survey the coral reef habitats of seven of the northern islands. We observed mass mortality of shallow water coral assemblages, likely due to the 2013 event, as well as extensive active bleaching and mortality. These consecutive mass bleaching and mortality events across a region with relatively little anthropogenic influence highlight the importance of managing for coral reef resilience to climate change in the future.

## Assessing Relative Resilience Potential Of Coral Reefs In Saipan, Tinian And Rota

*Steve McKagan*

Reducing coral reef vulnerability to climate change requires that managers understand and support the natural resilience of coral reefs. To assist these managers a team of researchers came together to assess ecological resilience in the Commonwealth of the Northern Mariana Islands (CNMI) and collaboratively develop a decision-support framework for resilience-based management.

The team used an approach that included surveys of 78 sites along reefs surrounding the most populated islands in the CNMI (Saipan, Tinian/Aguigan, and Rota), data from environmental monitoring satellites and computer models and an assessment of proxies of anthropogenic stress. The project resulted in a set of scores for relative resilience potential and allowed the team to rank the survey sites within and among the islands from high to low resilience and develop a set of custom criteria for a decision-support framework that can identify sites that warrant management attention.

# POSTERS

### Evolutionary Trends In The Acquisition And Loss Of Photosymbiosis In Stony Corals (Anthozoa: Scleractinia)

*Jordan Gault*

The relationship between scleractinian (stony) corals and their algal endosymbionts is an integral component of tropical reef ecosystems. With reef corals threatened by bleaching due to warming oceans, most research has focused on the maintenance and breakdown of the coral-algal relationship. However, the absence of a well-resolved, comprehensive phylogeny of stony corals has hindered studies of the deep history of photosymbiosis amongst this group. Here, using a supertree phylogeny of 1295 species, we present preliminary findings of the broad evolutionary patterns of acquisition and loss of photosymbiosis. Ancestral state reconstruction via parsimony recovered the basal node of Scleractinia as azooxanthellate. Photosymbiosis was gained independently by three large clades. Generally, photosymbiosis appears to be a stable trait that is seldom lost. However, one clade exhibits an unusually high rate of transition between the two states. This suggests that corals have evolved several distinct mechanisms for the acquisition and maintenance of photosymbiosis.

### Tasi Beach Guides Program

*Phillip John R. Cruz, Enrika G. Espiritu, Marcel G. Jardeleza, and Michael D. Petitte*

The Tasi Beach Guides Program is a coral reef outreach project hosted by the Center for Island Sustainability (CIS) through MOU with the Bureau of Statistics and Plans (BSP). The projects main objective is to build awareness of the importance of protecting Guam's coral reefs to the community through outreach. The UOG Green Interns, along with assistance from CIS and BSP staff, are conducting outreach to both local and tourist beachgoers at various beaches around Guam. Outreach is done by offering presentations explaining what coral is, why it benefits Guam, and ways we can protect it from recreational impacts, including littering, snorkeling, diving, reef walking, etc. This project is funded by the National Oceanic and Atmospheric Administration (NOAA) under federal award NA-13NOS4820012.

# SPEAKER INFORMATION

## Charles Birkeland

Charles Birkeland received his doctorate in Zoology at the University of Washington in 1970. He has been doing research on coral reef ecology and management since 1970 when he was a post-doc at the Smithsonian Tropical Research Institute in Panama. He was a professor at the University of Guam Marine Laboratory from 1975 to 2000 and was Director of the Laboratory from 1979 to 1982. In 2000, he took a position with the U.S. Geological Survey at the University of Hawaii. He retired in 2010 and is now UOG Professor Emeritus. The main focus of his research has been the factors that determine reef resilience or capacity for reef systems to recover. He has also been especially interested in how life history characteristics of species affects their role in the system, e.g., why the crown-of-thorns starfish has such an effect, and how the older individuals in populations of fishes can have disproportionate effects on the ecosystem and on the resilience of their own populations.

## Phillip Cruz

Phillip John R. Cruz, graduate of the University of Guam, is an Extension Associate II at the Center for Island Sustainability (CIS). He became passionate about environmental awareness while he was a UOG Green Intern and wants to continue to help the island move into a more sustainable future.

## Gary Denton

Gary Denton is Professor of Environmental Toxicology and former Director of the Water and Environmental Research Institute (WERI) of the Western Pacific at the University of Guam. He has worked on environmental issues for over 40 years, the last 25 of which have been on Guam. Dr. Denton's primary research interests center on water quality with emphasis on contaminant transport, fate and toxicity. He leads the Pollution Monitoring and Assessment Program at WERI and is currently evaluating the impact of human activities on fisheries resources in the CNMI.

## Enrika Espiritu

Enrika Espiritu is a 2013 graduate from the Academy of Our Lady of Guam and a second year Biology major at UOG. Espiritu's work at CIS has sparked her passion for conservation biology. She hopes to attend graduate school and ultimately make a significant contribution to her field of study, espeicially on a local scale

## Jordan Gault

Jordan Gault is a graduate student at the UOG Marine Lab studying the evolutionary history of corals.

*Speaker Information Continued*

## Marcel Jardeleza

Marcel Jardeleza, a biology major and a freshman at the University of Guam. Marcel became very passionate about conservation after attending the 2014 Island Sustainability Conference. She is currently involved with the TASI Beach Guides program.

## Lyza Johnston

Lyza Johnston is the lead biologist for the long-term marine monitoring program within the CNMI Bureau of Environmental and Coastal Quality. She came to the CNMI in 2013 from Florida where she received a PhD in coral reef ecology from the University of Miami Rosenstiel School of Marine and Atmospheric Science. She is excited to be in a position that allows her to contribute to coral reef conservation through science-based management.

## Alex Kerr

Alex Kerr is an associate professor of zoology at the University of Guam Marine Laboratory. He is interested in the evolution and ecology of reef corals and balati. He is married to Jonita Quenga Kerr, a professor at GCC. They have three children. They've all been meaning to go on a dive trip to Palau this summer.

## Dr. Shahram Khosrowpanah

Dr. Shahram Khosrowpanah (Dr. K), Director of WERI, is a professional civil engineer and professor of water resources engineering with more than 25 years of experiences in research, teaching, and engineering practices in the area of water resources in Guam and the other islands of the Western Pacific. His research interests include surface water hydraulics, computer modeling of water distribution system, GIS application, watershed management, and erosion & sedimentation.

## Steven McKagan

Steve McKagan is a fisheries biologist for NOAA Fisheries Habitat Conservation Division, working out of the CNMI field office based on Saipan. Steve received his masters degree from the Bren School of Environmental Science at UCSB in 2000 where he helped to manage a biological oceanography lab until 2006. In 2007 Steve moved to Saipan to work for the CNMI Division of Fish and Wildlife before transferring to NOAA in 2009, where he acts as both the CNMI Coral Reef Conservation Program fisheries liaison and Essential Fish Habitat coordinator.

## Roxanna Miller

Roxanna Miller has been living on Guam for the past 8.5 years and graduated with her Master's in Biology in 2011 from the University of Guam. Upon graduation, Miller worked for a Previously a NOAA Coral Fellow, and then Marine Invasive Species Coordinator, she is currently the Monitoring Technician for the Guam Long-term Coral Reef Monitoring Program.

## Dana Okano

Dana Okano has a PhD in Natural Resources and Environmental Management from the University of Hawaii at Manoa, and is a member of the American Institute of Certified Planners. She works as a Coral Management Liaison for the National Oceanic and Atmospheric Administration, providing grant oversight and programmatic technical support to three CNMI natural resource agencies, as well as to partners throughout the Pacific Region. She is originally from Hawaii, and has been living with her husband and two sons on Saipan for the past five years.

## Michael D. Petitte

Michael D. Petitte is a 2014 graduate of Father Duenas Memorial School and currently a student at the University of Guam. He is a UOG Green Intern at the Center for Island Sustainability. Born and raised in this Pacific paradise known as Guam, Mike has a vested and ardent interest in conserving the environment, especially the marine ecosystems, and helping to create a more sustainable future for Guam.

## Joe Quinata

Joe Quinata is the Chairman and a Founder of the Humåtak Community Foundation, a non-profit volunteer organization. Mr. Quinata currently heads the Guam Preservation Trust with accomplished highlights to include being recently awarded the National Asian and Pacific Islander American for Historic Preservation's Pioneer in Preservation Award. Under his administration in 2011, the Guam Preservation Trust received the National Trust for Historic Preservation Trustees' Organizational Excellence in Historic Preservation Award.

## Laurie Raymundo

Laurie Raymundo joined the faculty of the UOG Marine Lab in 2004. She is a coral biologist, and her work focuses on management issues pertaining to coral health and disease, culture and rehabilitation. Prior to her move to Guam, she spent 16 years in the Philippines working in coral reef management, having begun her interest in marine biology as an undergrad, studying early life history of sea turtles.

## Travis Reynolds

Travis Reynolds is a graduate student with UOG's Marine Lab. Reynolds' upcoming thesis defense will further characterize the 2013 bleaching event by examining bleaching patterns within and between reefs around Guam.

## Anna Simeon

Anna moved to Guam in 2011 to pursue her Master's in biology at the UOG Marine Lab. With her project nearly completed, she was hired by the Bureau of Statistics and Plans earlier this year as the Coral Reef Watershed Coordinator where she helps manage outreach and conservation efforts island-wide. Outside of work, Anna is the assistant coach of her paddling team, serves on the board of the non-profit organization Pacific Motion Alliance, and has performed in many musical productions around Guam.

## Bill Whitman

Bill Whitman graduated from G.W. High School in 2003. He received his bachelor degree in Environmental studies from the University of Hawaii, at Manoa, 2008. In 2013, he joined the UOG Environmental Science Program and has been working at the Water and Environmental Research Institute (WERI) under the direction of Dr. Shahram Khosrowpanah for the past 2 years.

# BUILDING RESILIENT ISLAND COMMUNITIES

# AGENDA

## WEDNESDAY, APRIL 15

Emcee: Jonas Macapinlac, Director, Integrated Marketing Communications

**8 a.m. Sign In**

Continental Breakfast

**8:30 a.m. Opening Remarks**

The Honorable Ray Tenorio,
Lt. Governor of Guam

The Honorable Benjamin J. F. "B.J." Cruz
Vice-Speaker, 33nd Guam Legislature

Dr. Robert A. Underwood
President, University of Guam

Video: Gina McCarthy
Administrator, U.S. EPA

Kathy Jitnil-Kijiner
Poet, Marshall Islands

**9 a.m. Keynote Speaker**

Virginia Burkett
Chief Scientist for Climate and Land Use Change
U.S. Geological Survey

**9:30 a.m. Plenary Panel 1**

Climate Change Science and the Challenges
Facing the Pacific Islands

**10:30 a.m. Plenary Speaker**

Charles Birkeland
Biology Trumps Management: Natural History
Guidance for Effective use of Resources

**11 a.m. Breakout Session 1**

**12 p.m. Lunch**

**1 p.m. Breakout Session 2**

**2 p.m. Breakout Session 3**

**3:15 p.m. Plenary Panel 2**

Sustainability for the Region: Resource Connections
and Government Linkages

**4:30 p.m. Poster and Table Exhibits**

**5:30 p.m. Networking Reception**

Sponsored by SAME

2015 ISLAND SUSTAINABILITY CONFERENCE

# KEYNOTE SPEAKER

CLIMATE CHANGE: TRENDS, PROJECTIONS, AND IMPACTS ON LOW-LYING COASTS AND SMALL ISLANDS

9 A.M. TO 9:30 A.M.

MAIN BALLROOM

## Virginia Burkett

*Chief Scientist for Climate and Land Use Change, USGS*

Virginia Burkett is the Chief Scientist for Climate and Land Use Change at the U.S. Geological Survey. She was formerly Chief of the Forest Ecology Branch at the USGS National Wetlands Research Center in Lafayette, Louisiana. Burkett has also served as Secretary/Director of the Louisiana Department of Wildlife and Fisheries, Acting Director of the Louisiana Coastal Zone Management Program, and Assistant Director of the Louisiana Geological Survey. She has published extensively on the topics of global change and low-lying coastal zones.

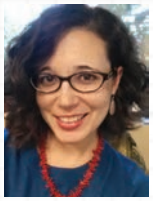
She has served as a Lead Author of the United Nation's Intergovernmental Panel on Climate Change (IPCC) Third, Fourth and Fifth Assessment Reports (2001, 2007, 2014) and the IPCC Technical Paper on Water (2008). She was a lead author of the First, Second, and Third National Climate Assessments (2001, 2009, 2014) produced by the United States Global Change Research Program. She has co-authored reports for The Wildlife Society (2004), the United Nations Convention on Biodiversity (2005), the Everglades Task Force (2007), the U.S. Department of Transportation (2008) and the National Oceanic and Atmospheric Administration (2012) that address climate change impacts and potential adaptation strategies. Burkett has been appointed to over 60 Commissions, Committees, Science Panels and Boards during her career. She serves on the Editorial Board of the journal Ethics in Science and Environmental Policy and is a Senior Editor of the journal Regional Environmental Change. Burkett received her doctoral degree in forestry from Stephen F. Austin State University in Nacogdoches, Texas in 1996.

# PLENARY PANEL 1

CLIMATE CHANGE SCIENCE AND THE CHALLENGES FACING THE PACIFIC ISLANDS

9:30 A.M. TO 10:30 A.M.

MAIN BALLROOM



## Victoria Keener, Ph.D.

*Communicating Uncertain Impacts of Future Climate on Water Resources to Diverse Decision Makers*

## Bob Shambach

*Guam Drinking Water Source Assessment And Protection Program And Wellhead Protection Plan*

## Dr. Yuming Wen

*GIS-based Analysis of Groundwater Quality Data on Guam*

## Dr. Stephen B. Gingerich

*Water Resources on Guam: Potential Impacts and Adaptive Resopnse to Climate Change*

# PLENARY SPEAKER

BIOLOGY TRUMPS MANAGEMENT: NATURAL HISTORY GUIDANCE FOR EFFECTIVE USE OF RESOURCES

10:30 A.M. TO 11 A.M.

MAIN BALLROOM

## Charles Birkeland

*University of Guam Professor Emeritus*

Charles Birkeland received his doctorate in Zoology at the University of Washington in 1970. He has been doing research on coral reef ecology and management since 1970 when he was a post-doc at the Smithsonian Tropical Research Institute in Panama. He was a professor at the University of Guam Marine Laboratory from 1975 to 2000 and was Director of the Laboratory from 1979 to 1982. In 2000, he took a position with the U.S. Geological Survey at the University of Hawaii. He retired in 2010 and is now UOG Professor Emeritus. The main focus of his research has been the factors that determine reef resilience or capacity for reef systems to recover. He has also been especially interested in how life history characteristics of species affects their role in the system, e.g., why the crown-of-thorns starfish has such an effect, and how the older individuals in populations of fishes can have disproportionate effects on the ecosystem and on the resilience of their own populations.

# BREAKOUT SESSION 1

## 11 A.M. TO NOON - BREAKOUT ROOMS

### BALLROOM A

### Coordinating and Integrating Resilience as a Planning Concept in Managing Guam's Coastal Zone

*Edwin Reyes*

For over 30 years, Guam Coastal Management Program (GCMP), a division of the Bureau of Statistics and Plans, has operated under the terms of the Coastal Zone Management Act of 1972 (P.L. 92-583, as amended). GCMP implements its goal in partnership with network agencies and the community, to address the protection, conservation, restoration, and enhancement of Guam's coastal resources. This session will highlight the unique pressure Guam faces with the military buildup and other nissological challenges felt by no other pacific territory or freely associate state in the Pacific region. Participants will learn about GCMP's objectives and how the program's interface with local and state organizations strive to ensure a balance of economic development with environmentally and culturally prudent use of coastal resources for sustaining a quality of life for current and future generations.

### BALLROOM C

### Vulnerability an Adaptation to Climate Change in the Manell and Geus watersheds, Southern Guam: A case-study of perceptions, attitudes, behaviors, and knowledge of a rural community towards their watershed

*Romina King*

This paper argues that examining the attitudes, perceptions, behaviors, and knowledge of a community towards their specific watershed can reveal their social vulnerability to climate change. Understanding and incorporating these elements of the human dimension in coastal zone management will lead to efficient and effective strategies that safeguard the natural resources for the benefit of the community.

Thus, a case-study of the community residing in the Manell and Geus watersheds was conducted on the island of Guam. Gathering this social science information revealed what was most important to this particular community—flooding. Coastal zone managers can incorporate this valuable information into strategic watershed plans. Water collection is an ecosystem service. By improving the terrestrial ecosystem (e.g., restoring native forests), it is possible to increase overall water collection. Thus, with a decreased amount of surface water, the severity of downstream flooding events may be lessened.

### BALLROOM B

### From Ridge to Reef: Conserving Fish Habitat and Engaging Communities

*Valerie Brown*

NOAA Fisheries will share their latest efforts to address coral reef conservation in Guam through the NOAA Habitat Blueprint and Guam Community Coral Reef Monitoring Program (GCCRMP). This presentation will explain how the Manell-Geus Watershed was selected as one of only 10 Habitat Focus Area Sites in the country, provide an overview of the program, highlight natural features of the watershed and reefs, and discuss both the progress made so far and plans for the future. In addition, the presentation will show how the GCCRMP has increased community engagement in coral reef management and science since its inception in 2012 through community trainings, service learning opportunities for students, and the recent Adopt-a-Reef program.

### Tasi Beach

*Enrika Espiritu*

The Tasi Beach Guides Program is an outreach project hosted by the Center for Island Sustainability through MOU with the Bureau of Statistics and Plans and funded by the National Oceanic and Atmospheric Administration under federal award NA13NOS4820012. The project's main objective is to build awareness of the importance of protecting Guam's coral reefs. That is, informing the masses of its cultural, economic, and natural importance. The UOG Green Interns, along with assistance from CIS and BSP staff go out to the different beaches on Guam to conduct the outreach. Outreach is done by offering presentations explaining what coral is, why it benefits Guam, and ways we can protect it from recreational impacts, including littering, snorkeling, diving, reef walking, etc. The presentation will feature details of the outreach project itself, the data collected thus far, and the future of the project.

### Heart of the Village: Community Garden

*Juanita Blaz*

Island Girl Power celebrated its one year anniversary for their community garden in Dededo. It currently has 23 garden plots that are 8' x 4'. Out of the 23 plots 3 will be available in April. They are looking to gather support to expand into phase#3 for another 10 plots withing the next 2 years. Community Gardens offer Recreational Therapy, a venue to build a community of gardeners and provide participating families an affordable way to grow and access fresh produce. Their goal is to offer training to other community organizations, schools, or establishments to help increase the availability of community gardens throughout Guam.

# BREAKOUT SESSION 2

## 1 P.M. TO 1:55 P.M. - BREAKOUT ROOMS

### BALLROOM A

#### Improving Sustainability within Business Operations

*Sea Grant Working Group*

Guam businesses work to protect and increase the island's major economic drivers. This working group will identify emerging sustainability issues among the business community. At this session, we will brainstorm strategies and partners to address our unique island challenges and concerns for the next one to five years. We especially look forward to business operators participating in this discussion.

#### Crafting a Sustainability Policy for the Island of Guam

*Romina King*

One main goal of sustainable island development is to enable residents to satisfy their basic needs and strive toward a better quality of life without compromising natural resources for the use of future generations.

In an effort to determine an appropriate course of action for Guam, the Center for Island Sustainability at the University of Guam contracted Romina King and Isa Baza to research and write a draft policy paper examining and outlining the pros and cons of overarching sustainability legislation for the island.

This policy paper examines the pros and cons of specific actions towards a local sustainability policy: doing nothing, creating an overarching sustainable island development policy, and creating sustainability policies according to sector. This policy also provides recommendations on which option to choose.

### BALLROOM B

#### Evaluating The Effect Of Long-Term Conservation Practices On Soil Carbon Dynamics As It Relates To Climate Change

*Mohammad Golabi, PhD, Clancy Iyekar*

Severely eroded lands of southern Guam are referred to as badlands. These badlands are exposed to overland flow, mainly rain causing severe erosion as the result of rapid runoff from the pitted, sloping sites with little or no vegetation cover. As a consequence the stored carbon in the soil emits into the atmosphere in the form of carbon dioxide due to the process of oxidation.

The challenges facing soil and agricultural scientists is to develop conservation and restoration strategies that address not only crop production needs within a framework of increasing environmental and financial constraints but also how to reduce the carbon emission by increasing carbon sequestration potential on these severely eroded soils of southern Guam and other islands in Micronesia.

The main objective of this project is therefore to evaluate cropping rotation and tillage management practices on the dynamics of soil carbon content of these severely eroded soils in southern Guam.

### BALLROOM C

#### Watershed Management Ugum, Piti-Asan, Manell-Geus Watersheds

*Dr. Shahram Khosrowpanah, Dr. Mark Lander, Bill Whitman, Sydonia Manibusan*

Erosion and associated sedimentation poses one of the primary threats to Guam's terrestrial and aquatic environment. Upland erosion rates on Guam are among the highest reported in the literature. This is a result of complex interactions among fire, vegatation, human activity and climate. According to President Clinton's 1998 Clean Water Initiative, the Southern Guam Watersheds were placed into four catagories based on their water quality.

WERI researchers completed studies of three major southern Guam watersheds: Ugum; Piti-Asan; and Manell-Geus. These studies provide important baseline data for the Clean Water Initiative. The existing physical and environmental components of each watershed were studied and their potential impact on the streams were identified. The dynamic behavior of each watershed was examined with respect to hydrological conditions. This information allows for an assessment of the possible impact of future development and climatic extremes. The importance of watershed assesment and project results will be presented at this conference.

# BREAKOUT SESSION 3

## 2 P.M. TO 2:55 P.M. - BREAKOUT ROOMS

### BALLROOM A

#### Improving Sustainability within Business Operations

*Sea Grant Working Group*

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#### Crafting a Sustainability Policy for the Island of Guam

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### BALLROOM B

#### Tourists' and Residents' Awareness and participation to Waste Separation in Guam: Analysis on Effects of Introduction Waste Recycling Bins

*Dr. Takeshi Fujiwara*

As a memorial event of a friendship city agreement, Okayama City donated waste separation bins to Guam in 2013 in order to promote waste separation and recycling. In the background, it was expected that Japanese tourists customarily separate waste even in Guam and it prompts waste separation behavior of the residents because Japanese tourists occupy more than 70% of all tourists in Guam. In this study, composition of the waste disposed to the waste separation bins installed in tourist areas of Guam was analyzed, and also questionnaire surveys on use of waste separation bins and awareness of waste separation were conducted for both tourists and residents. As a result of surveys, it was confirmed Japanese visitor customarily separate waste in Guam and on the other hand, it was found citizen's awareness to waste recycling was raised in spite of existing effects from tourist's behavior or not.

### BALLROOM C

Moderator: *Jung-woon Kang, Ph.D. Changwon National University, Korea*

#### Development of Ecofeed Program: recycling food waste from schools and business enterprises on the island of Guam

*Dr. Mari Marutani, Phillip Cruz*

The ECOFEED project sponsored by US Department of Interior was initiated at the University of Guam Center for Island Sustainability (UOG-CIS) with collaboration from the Guam Agricultural Experiment Station, to turn food waste into "FEED FOR FARM ANIMALS" and "FEED FOR PLANTS." The project diverts food scraps to farms instead of sending to landfill, by converting food waste either to animal feedstock or to compost. During the first phase, we collected food waste from three restaurants and UOG cafeteria. From Jan. to March 2015, we collected about 600 lbs. food waste from the UOG cafeteria and 7,000 lbs. from three restaurants, with the weekly average of 630 lbs. from four sources.

#### Effective Construction Waste Diversion

*Margaret J. (Peggy) Denney*

In many parts of the world, construction waste generated on construction job sites is diverted from landfills or hardfills in an extremely efficient manner through reuse and recycling. Deconstruction, the selective dismantling of building components for the specific purpose of reuse or recycling, has become increasingly common in the states. In Guam this concept is relatively new and not easily accomplished. We will discuss waste diversion at the recently constructed Gloria B. Nelson Public Service building, which is the new headquarters for GPA and GWA. A waste diversion rate of 75% was achieved on this site through aggressive separation and recycling of common items such as steel and cardboard and mulching of wood. Reuse of more challenging items such as PVC, fiberglass insulation, carpet pieces, ceramic/slate tiles and plastic buckets will be highlighted to demonstrate the possibilities for reuse and, in some cases, sale of end products as a revenue-generating endeavor.

# PLENARY PANEL 2

SUSTAINABILITY FOR THE REGION: RESOURCE CONNECTIONS AND GOVERNMENT LINKAGES

3:15 P.M. TO 4:30 P.M.

MAIN BALLROOM

## CAPT Douglas W. King

*Civil Engineer Corps Executive Officer, NAVFAC Marianas*

A Rockford, IL native, Captain King joined the Navy in 1982, and served as a computer operator on USS Carl Vinson (CVN-70). He graduated from the University of Memphis with a Bachelor of Science in Mechanical Engineering in 1988 and was commissioned an Ensign in the Civil Engineer Corps. He earned a Master of Science in Engineering Management from the University of New Orleans in 2002 and completed the Senior Executive Fellows Executive Program at Harvard University in 2014. He is registered as a Professional Engineer in Wisconsin. Captain King's first assignments were Activity Civil Engineer, PWC Norfolk, Planning Officer, U.S. Naval Station Panama Canal, and AROICC, Great Lakes, IL. He then served with NMCB 25 from 1993-1998 and was recalled to active duty in 1998 where he worked as Seabee Support Officer, Commander Naval Surface Reserve Force.

## Joaquin Flores

*Sr. Advisor - Power, Pernix Group*

Joaquin Flores has 25 years of electric utility management experience with strong emphasis on planning and performance for the operations division of the Guam Power Authority in the areas of Engineering, Generation, Transmission & Distribution and Power System Control.

## Roland Quitugua

*University of Guam Extension*

Roland Quitugua is an Extension Agent with UOG College of Natural and Applied Sciences Extension and Outreach. Roland's primary endeavors are biosecurity and conservation which include leading the effort to develop and improve strategies to control the coconut rhinoceros beetle (CRB) for Guam, Micronesia and Hawaii. Roland also chairs the Micronesia Regional Invasive Species Council (RISC) which was integral in the development of the Regional Biosecurity Plan (RBP) for Micronesia and Hawaii. As the Chairman of the Northern Soil and Water Conservation District (NGSWCD), Roland works with local partners to reduce soil erosion and build soil heath to increase Guam's local food growing capacity to reduce our dependency on imported goods.

## Tino Aguon

*Guam Department of Agriculture Division of Aquatic and Wildlife Resources*

## Eric Palacios

*Administrator, Guam Environmental Protection Agency*

# POSTER SESSION

### Involving The Community In The Sustainability Process: Using The Ccf Framework To Address "How Might We Promote The Use Of Indigenous Plants And Trees" In Our Community Landscaping?" A Proposal For Urban Forestry

*Peter Roy Barcinas*

As a memorial event of a friendship city agreement, Okayama City donated waste separation bins to Guam in Involving the Community in the Sustainability Process: Using the CCF framework to address "How Might We Promote the Use of Indigenous Plants and Trees" in Our Community Landscaping?" A Understanding sustainability begins with making the natural connections to inviting the community (residents, businesses, agencies, or other organizations) to engage during the early "brainstorming" planning stage and conversations of program development to ensure citizens and participants engage and control the process.

This approach represents an education effort to promote the need to sponsor practical urban natural resources strategies that considers the community's natural capital (programs that support indigenous trees, plants, parks, landscaping requirements for facilities businesses and open spaces); and the remaining community capitals that require knowledge and data around our green industry. Join our poster presentation and help us craft a local indigenous plants and tree strategy using our community assets.

2015 ISLAND SUSTAINABILITY CONFERENCE

# BUILDING RESILIENT ISLAND COMMUNITIES

# AGENDA

## THURSDAY, APRIL 16

Emcee: Norman Analista, Director, Development And Alumni Affairs

**8 a.m. Sign In**

Continental Breakfast

**8:30 a.m. Plenary Speaker**

Sen. Tom Ada
Senator, 33rd Guam Legislature

**9 a.m. Plenary Panel 3**

Implementing Energy Solutions for the Region

**10 a.m. Plenary Speaker**

Too Million Too Many?
Pedro "Sonny" Ada
President, Ada's Trust and Investments

**10:45 a.m. Plenary Speaker**

Matthew J. Widlansky
Typhoons in Future Climate Change Simulations

**11:45 a.m. Lunch**

**12 p.m. Luncheon Speaker**

Brent Wiese
Preparing Campuses and Communities for a Changing Climate, Guam Tropical Building Code

**1 p.m. Breakout Session 4**

**2 p.m. Breakout Session 5**

**3:15 p.m. Poster and Table Exhibits**

**3:30 p.m. Plenary Panel 4**

Moving Forward to Action

**4:30 p.m. Conference Review**

Lessons Learned

# PLENARY SPEAKER

GOING OFF THE BEATEN PATH TO IMPROVE GUAM'S PUBLIC TRANSPORATION SYSTEM

8:30 A.M. TO 9 A.M.

MAIN BALLROOM

## Senator Tom Ada

*33rd Guam Legislature, Chairman of the Committee on Transportation, Infrastructure, Lands, Border Protection, Veterans' Affairs and Procurement*

Senator Tom Ada began his work as a senator in the Guam Legislature in 1993. He has served on the Committee on Public Safety, Infrastructure and Maritime Transportation as well as the Lands, Border Protection and Veterans' Affairs committees. He served in the U.S. Army from 1971 to 1977 and in the U.S. Army Reserves from 1977 to 1997.

He has worked with numerous private businesses and public agencies including SGS Guam, IT&E, Guam Power Authority, Guam Waterworks Authority and with the Office of the Governor of Guam.

Senator Ada has been involved with the Consolidated Commission on Utilities, the Outrigger Guam Canoe Club, the Reserve Officers Association and Big Brothers Big Sisters of Guam. He also participates in the Guam Chamber of Commerce, the Young Men's League of Guam and the Rotary Club of Guam.

# PLENARY PANEL 3

IMPLEMENTING ENERGY SOLUTIONS FOR THE REGION

9 A.M. TO 9:55 A.M.

MAIN BALLROOM

## Joseph T. Duenas

Policy

*Chairman, CCU*

*(Guam Consolidated Commission on Utilities)*

## Joe Bradley

Economics

*Senior Vice President*

*Bank of Guam*

## Bill Hagen

Energy

*Director*

*Pacific Solar and Photovoltaics, Inc.*

## Vangie Lujan

Environment

*Senior Regulatory Analyst*

*Guam Waterworks Authority*

# PLENARY SPEAKER

TOPIC: TWO MILLION TOO MANY?

10 A.M. TO 10:45 A.M.

## Pedro "Sonny" Ada

*Ada's Trust and Investment*

The first ever Sustainable Tourism Contest was offered to students to encourage a new way of thinking about Guam's main economy. The goal of the contest was to encourage students to examine the potential impacts of having 2 million visitors by the year 2020. This is the goal set by Guam's tourism leaders and will mean a great deal for the future of our island, economically and environmentally. Students participated by submitting essays and videos related to this topic.

# PLENARY SPEAKER

TOPIC: TYPHOONS IN FUTURE CLIMATE CHANGE SITUATIONS

10:45 A.M. TO 11:45 A.M.

## Matthew J. Widlansky

Typhoons threaten island nations and coastal ecosystems with destructive winds, storm surge, high waves, and torrential rainfall. For Guam and neighbor islands, water resources are also affected by substantial interannual variability of both mean rainfall and typhoons. The leading mode of natural climate variability in the Pacific is the El Niño-Southern Oscillation (ENSO) which, for Guam, is often associated with a swing from many typhoon threats in the season prior to the El Niño peak (e.g., 1997 had the highest number of super typhoons since 1965) to few storms the following year (e.g., 1998, which was also very dry). Using an objective tropical cyclone tracking algorithm, here we show that several present-generation coupled climate models capture the observed typhoon climatology and interannual variability associated with ENSO, but with notable biases in genesis location and storm tracks.

# LUNCHEON SPEAKER

TOPIC: WORKING TOWARDS THE 2014 GUAM TROPICAL BUILDING CODE APPROVAL

12 P.M. TO 12:55 P.M.

## Brent Wiese

*RIM Architects*

The Guam Building Code Council has been working hard to address the concerns, and include more people in the process. With the updated GTEC, we can have an energy code this year. Energy codes have been proven to increase property values, save on energy costs, and pay for themselves.

Brent has been a registered architect in Guam since 1996. He brings 30 years of expereince in project management, architectural working drawing production, building code and accessibility expertise, and construction management. With an extensive background in many types of projects and construction, his experience provides the basis for a successful project. Construction Administration can be a critical part of any project.

# BREAKOUT SESSION 4

## 1 P.M. TO 1:55 P.M. - BREAKOUT ROOMS

### BALLROOM A

#### Prioritizing Environmental Issues to Increase Resilience

*Sea Grant Working Group*

A changing climate places significant pressure on our natural resources. What are Guam's emerging environmental issues? What topics need more attention? How can education, extension and research address them? This session asks participants for ideas to address these issues over the next one to five years.

#### Crafting a Sustainability Policy for the Island of Guam

*Romina King*

One main goal of sustainable island development is to enable residents to satisfy their basic needs and strive toward a better quality of life without compromising natural resources for the use of future generations. Sustainable island development is relative; what this specifically means for one island may or may not be appropriate for another island and how this is implemented in one island may or may not be suitable for another island. In an effort to determine an appropriate course of action for Guam, the Center for Island Sustainability at the University of Guam contracted Romina King and Isa Baza to research and write a draft policy paper examining and outlining the pros and cons of overarching sustainability legislation for the island. Approximately 19 stakeholders were interviewed and surveyed in order to obtain their attitudes, perceptions, and knowledge on the current status of local sustainability policies and actions specific to some sectors of Guam's economy (e.g., energy, transportation, food security, and infrastructure). Due to the short amount of time given for the project and limited funds, other sectors of the economy were not addressed (e.g., tourism, water, and conservation). The results were compiled, analyzed, and presented back to a focus group. This policy paper examines the pros and cons of specific actions towards a local sustainability policy: doing nothing, creating an overarching sustainable island development policy, and creating sustainability policies according to sector. This policy also provides recommendations on which option to choose.

### BALLROOM B

#### The Micronesia Challenge: Assessing the relative contribution of stressors on coral reefs to facilitate science-to-management feedback loops in the face of climate change

*Dr. Peter Houk, Rodney Camacho, Steven Johnson, Selino Maxin, Jorg Anson, Eugene Joseph, Osamu Nedlic, Maston Luckymis, Katrina Adams, Don Hess, Emma Kabua, Anthony Yalon, Eva Buthung, Curtis Graham, Trina Leberer, Brett Taylor, Matthew McLean, Robert van Woesik*

Fishing and pollution represent chronic stressors on coral reefs that can prolong disturbance-and-recovery cycles, and contribute to ongoing ecosystem decline associated with climate change. While this ideology is generally accepted, management interventions are complicated because the relative contribution from individual stressors remains poorly understood. The Micronesia Challenge (MC) is a novel management strategy initiated by the political leaders of 6 nations to conserve at least 30% of marine resources, and 20% of terrestrial resources, by 2020. The first assessment of the MC marine conservation goals revealed only 50% of the major reef habitats across the Marshall Islands, Federated States of Micronesia, and Commonwealth of the Northern Mariana Islands exceeded conservation thresholds. Targeting comprehensive fisheries management upon these sensitive metrics, and isolating the management of pollution where needed, will best progress the Micronesia Challenge and preserve ecosystem services that coral reefs provide to societies in the face of climate change.

### BALLROOM C

#### Enhancing Green Infrastructure in the Community Through Plant Reintroduction

*Else Demeulenaire, Jonathan Kawika Davis, Dr. James McConnell*

Sustainable and resilient communities include green infrastructure consisting of a network of open space, woodlands, wildlife habitat, parks and natural landscape features that support healthy, functioning communities. By integrating plantings of rare and common native trees, the natural habitats will develop a supporting infrastructure of natural flora and fauna. In 2014 a network of 62 terrestrial monitoring plots was installed as part of the Micronesia Challenge terrestrial monitoring. The Plant Extinction Prevention Program (GPEPP) works to prevent species extinction by establishing new populations of rare, native plant species by outplanting seedlings of founder plants remaining in the wild. GPEPP works with local agencies like US Fish & Wildlife and the Guam Forestry Division, the Department of Defense and private landowners. Outplanting will not only enhance the resilience of our local ecosystems but also connect our people to these native plants that are only found in Guam and the Mariana Islands.

# BREAKOUT SESSION 5

## 2 P.M. TO 2:55 P.M. - BREAKOUT ROOMS

### BALLROOM A

**Prioritizing Environmental Issues to Increase Resilience**

*Sea Grant Working Group*

A changing climate places significant pressure on our natural resources. What are Guam's emerging environmental issues? What topics need more attention? How can education, extension and research address them? This session asks participants for ideas to address these issues over the next one to five years.

### BALLROOM B

**GPA Renewable Energy Interconnection Strategy**

*Dave Burlingame, P.E.,*
*Lorraine O. Shinohara, P.E., CEA, CEM, BA,*
*John J. Cruz Jr., P.E. CEA, MBA*

GPA's Renewable Energy Interconnection Strategy provides an action plan to track and manage the renewable resources added to the GPA grid. The Strategy consists of several main components: Interconnection Requirements – Development of the general interconnection requirements necessary for renewable energy projects to be added to the GPA system. The requirements consider existing GPA policy. Supporting discussion of IEEE 1547 and its potential impact on the requirements is provided. System Impact Study – Development of a set of general requirements to be used to evaluate proposed renewable energy projects and establish the requirements for customer funded SIS.

The criteria, scope, and estimated cost for an SIS are provided. Typical Interconnection Configurations – Interconnection configurations are provided and include detailed typical one-line diagrams for several types of projects. Renewable Energy Monitoring Plan – A REMP will provide guidelines for GPA to track and manage renewable generation for planning and operations purposes.

### BALLROOM C

**The Role of World Religions in Environmental Sustainability**

*Dr. Kim Skoog*

Central to preserving the environment and according our current way of life is shaping human attitudes and behaviors in relation to the world. Clearly discussions in most issues within social ethics have been impacted by different religious organizations. So it stands to reason that present and future discussions and policies regarding the environment will see religion play a part. Perhaps no single social force has had a greater influence on the world than religion. If we wish to change the attitudes and actions of humanity in regards to the protecting and respecting the environment, we need to look at religions and their established doctrines toward the environment and see what role then can play in achieving this goal.

Can we construct a cross-cultural, inter-religious set of spiritual and ethical principles that supports environmental sustainability? Finally, and perhaps most importantly, do religions have a spiritual and moral obligation to promote environmental sustainability?

# PLENARY PANEL 4

MOVING FORWARD TO ACTION

3:30 P.M. TO 4:30 P.M.

MAIN BALLROOM

**Doris Flores Brooks**
Policy
*Public Auditor*
*Office of Public Accountability (OPA)*

**John Benavente**
Energy
*General Manager*
*Consolidated Utilities Service*

**George Bamba**
Policy
*Secretary, CCU*
*Guam Consolidated Commission on Utilities*

**Jeffrey Voacolo**
Energy
*Vice President*
*Micronesia Renewable Energy*

# CONFERENCE REVIEW

LESSONS LEARNED

4:30 P.M. TO 5 P.M.

MAIN BALLROOM

**Bill Hagen**
*Pacific Solar and Photovoltaics, Inc.*

**Vangie Lujan**
*Senior Regulatory Analyst*
*Guam Waterworks Authority*

**Fran Castro**
*CNMI Bureau of Environmental and Coastal Quality*

**Noel Enriquez**
*Brown and Caldwell*

# Become a member of the Western Pacific Subsection of the Hawaii Section of the American Water Works Association by joining AWWA

Become a member of a professional water and wastewater organization.

Share knowledge with professionals throughout Guam, CNMI, Palau and FSM.

American Water Works Association
Hawaii Section
Western Pacific Sub-Section

To join: www.awwa-hi.org or www.awwa-hiwps.org

# Pago Bay

# Be a part of protecting your watershed

## Builders of a Better Bay

**Take action today to help protect Guam's watersheds with a few simple steps.**

- Join our mailing list by emailng BBBSeaGrant@gmail.com to see how you can participate in guided hikes, snorkels, educaitonal and restoration activities in the Pago Watershed.

- Talk to your family and friends about your environment. Go outside and enjoy the environment. This will help you make more informed decisions.

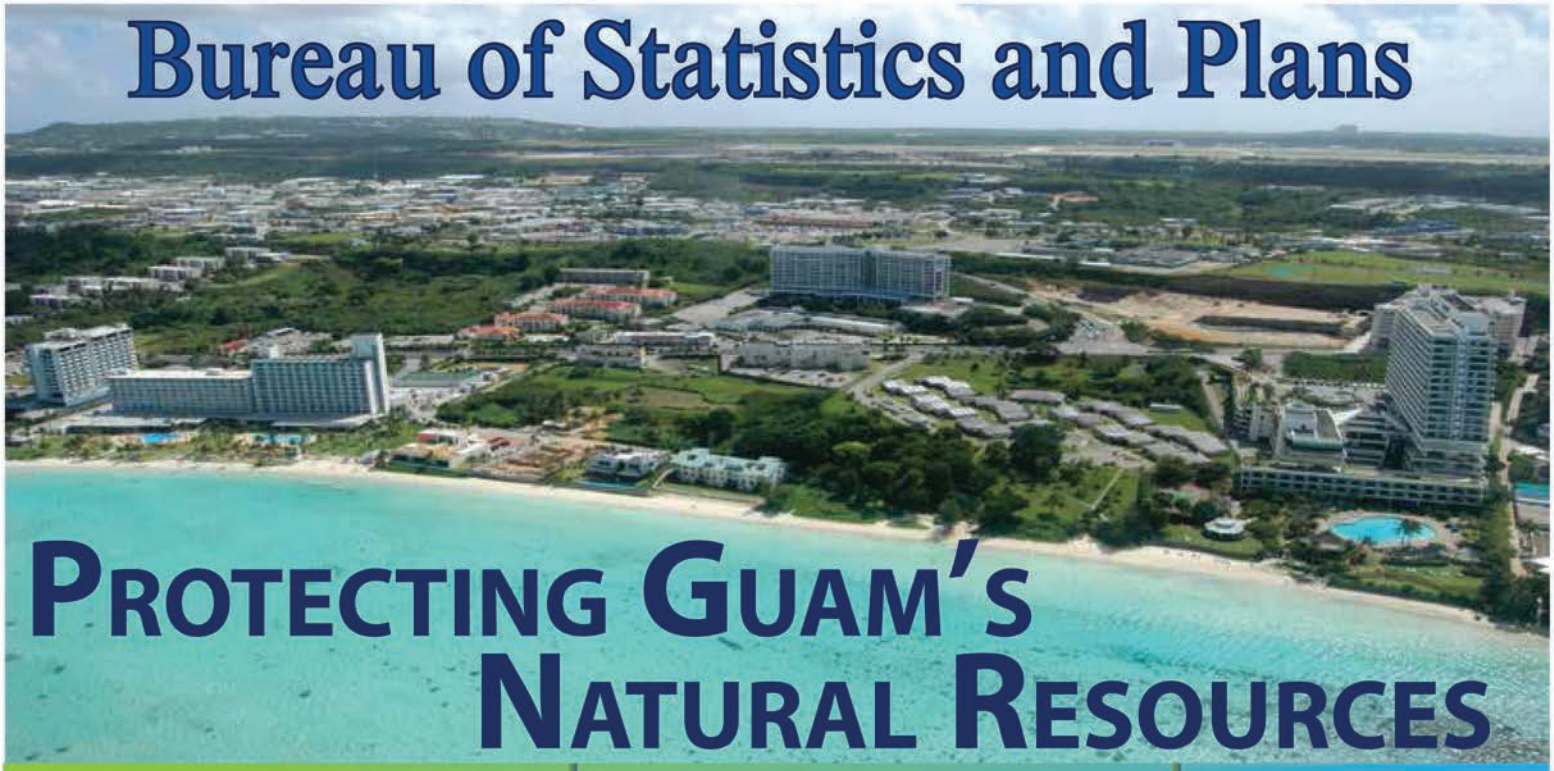
- Taking only what you need for today is planning for tomorrow. Leave the environment in better condition than how you found it. Text 688-DAWR to report practices that harm resources and practices that respect resources.

**Find us on facebook:**
www.facebook.com/BBBPagoWatershed

**Contact Team Sea Grant Builders of a Better Bay**
671.735.2146 or BBBSeaGrant@gmail.com

Sea Grant
University of Guam

# Bureau of Statistics and Plans



# Protecting Guam's Natural Resources

GCMP represents BSP's role at the Application Review Committee (ARC) providing technical analysis to Guam Land Use Commission (GLUC) on development activities requiring zone variances.

BSP/GCMP reviews federal consistency applications which comprises of federal agency activities, activities requiring a federal license or permit, and federal assistance to local government to ensure all proposed activities are consistent with GCMP policies.

Kika Clearwater campers

Guam's International Coastal Cleanup

## From Ridge to Reef

Photo by Dave Burdick

## Guam Coastal Management Program

This ad was made possible through grant award NA15NOS4190004 from the Office for Coastal Management (OCM), National Oceanic and Atomospheric Administration (NOAA), U.S. Department of Commerce.

For more information contact BSP/GCMP at (671) 475-9666.

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# HELP PROTECT GUAM CORAL REEFS

RIDGE TO REEF

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* REDUCE, REUSE & RECYCLE.
Help keep trash out of the oceans where it can have an adverse impact on water quality.

* CONSERVE WATER.
The less water you use, the less wastewater that ends up in the ocean.

NOAA's Coral Reef Conservation Program (CRCP) has funded several projects that support the effort to preserve Guam's Coral Reefs. Below are a couple of the projects funded by CRCP.

Photo by Dave Burdick

UOG Marine Lab continues the Comprehensive Long Term Monitoring Project that consist of surveys conducted at 38 sampling stations in Tumon Bay, East Agana and Piti Bay sites for the past couple of years to establish baseline data on coral reefs. More sampling stations have been added to the new sites, Achang Reef Flat Marine Preserve and Cocos Barrier Reef.

Photo by Christian Benitez

The Guardians of the Reef is a partneship with the Bureau of Statistics & Plans and the Guam Department of Education in which high school seniors and juniors are trained to conduct presentations to 3rd graders about the importance of protecting coral reefs.

NOAA CORAL REEF CONSERVATION PROGRAM

BUREAU OF STATISTICS & PLANS
SAGAN PLANU SIHA YAN EMFOTMASION

Photo by Dave Burdick

This ad was made possible using federal funds under award NA13NOS4820012 from the Office of Ocean & Coastal Resource Management, National Oceanic & Atmospheric Administration, US Department of Commerce.

# SI YU'OS MA'ÅSE'!

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**Better Water, Better Lives.**

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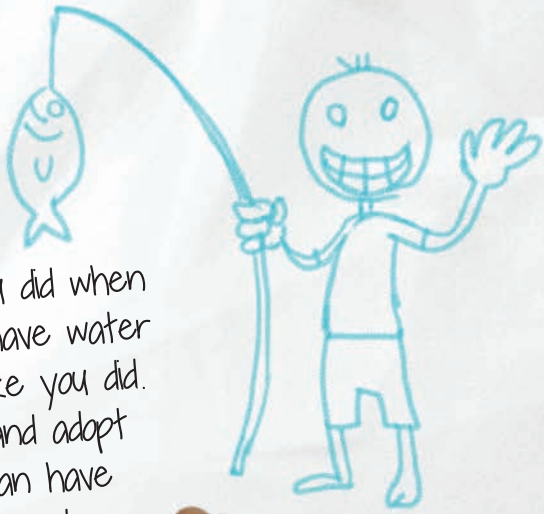
Dear Mom and Dad,
I want to have a clean ocean to swim in and to fish from like you did when you were growing up. I want to have water that I can drink from the tap like you did. Please do better by our island and adopt sustainable practices so that I can have the same quality of life you enjoyed when you were a kid.

Love, Daniel



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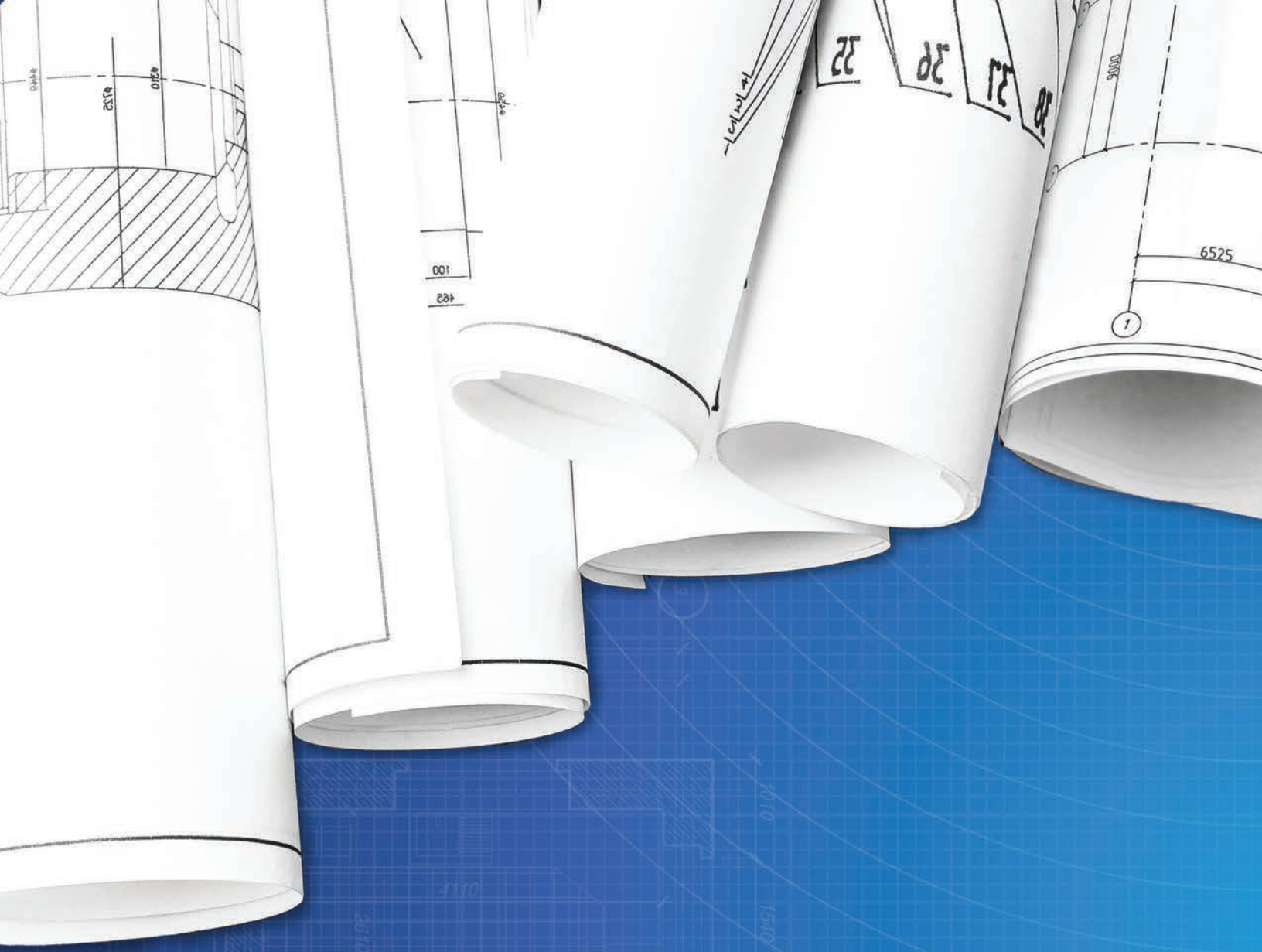

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