CONCEPT TO IMPLEMENTATION:

ACHIEVING A SUSTAINABLE COMMUNITY

REGIONAL ISLAND SUSTAINABILITY CONFERENCE

APRIL 15-16 2014

UNIVERSITY OF GUAM EXCELSIOR

Center for ISLAND SUSTAINABILITY

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Center for
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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 opportunities for everyone to become an engaged and informed part of our society and environment and therefore become active citizens for the island.

WELCOME TO THE 5TH REGIONAL CONFERENCE ON ISLAND SUSTAINABILITY

Message from the President

Hafa Adai!

On behalf of the University of Guam, welcome to the 2014 Regional Island Sustainability Conference. This is the fifth conference that the Center for Island Sustainability (CIS) has spearheaded and its continued success comes from the involvement of community leaders and partners throughout the planning process. I want to congratulate the CIS and the members of the planning committee for providing this opportunity to share international knowledge and experience in promoting small island sustainability to our region.

This year's theme, Concept to Implementation: Achieving a Sustainable Community, speaks to the need for communities to take ideas from the planning stage and put them into action. This is a core goal of the Center for Island Sustainability. Through education, global lessons are tested and modified to fit our unique community needs and resources. Active community engagement and partnership then lead to implementation.

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. Maila' ya ta sustieni i lina'la-ta kumu taotao isla.

Biba CIS! Biba UOG!

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

STEERING COMMITTEE MEMBERS

2014 Island Sustainability Conference Steering Committee
Pictured seated from left: Bill Hagen, Frank Camacho, John Peterson, and Robert Underwood; standing from left: Peter Houk, Eloise Sanchez, Phil Cruz, Cheryl Sangueza, Leah Beth Naholowaa, Noel Enriquez, Desiree Masterson, Keith Aguero, Scott Hagen, Carlos Taitano and Elvie Tyler.

Thanks to our 2014 Island Sustainability Conference Steering Committee members

Dr. Robert A. Underwood
Elvie N. Tyler
Dr. John A. Peterson
Keith A. Aguero
Laura Filimon Biggs
Frank Camacho
Phillip John R. Cruz
Noel Enriquez
Bill Hagen
Scott Hagen
Manny Hechanova
Peter Houk
Romina King
Lucy Kono
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Artemio S. Perez
Sherry Perez
Eloisa R. Sanchez
Cheryl R. Sangueza
Carlos Taitano

Special thanks to the President's Office Staff
Norman Analista
Chris Mabayag
Jonas Macapinlac
Louise Toves

Conference Staff
Center for Island Sustainability
Antonio Endaya
Francisco Palacios
Roxanna Miller

And special thanks to the
UOG Green Interns

PRE CONFERENCE ACTIVITIES

GREEN DREAM HOME COMPETITION

The Green Dream Home High School Competition is designed to engage high school students in sustainable construction practices and create awareness of sustainable issues among our island's youth. Students fully utilize their creativity and green design knowledge to create sustainable model homes suitable for island communities in Micronesia.

Student teams from Guam's high schools were tasked with planning, designing, and constructing a model of a unique sustainable home. The competition incorporates a variety of academic areas into the project including science, technology, engineering, math, art and writing.

A total of 16 teams representing nine different high schools submitted entries to the 2014 competition. Viewing of the models and the judging process began Monday, April 14 at the Hyatt Regency Guam Ball Room. During the competition, students explained features of their sustainable home models to a panel of judges. Teams were evaluated on a number of criteria including practical use of sustainable technologies, creativity, and oral presentation. Winners will be announced during the 2014 Island Sustainability Conference.

PRECONFERENCE

COASTAL VULNERABILITY ASSESSMENT WORKSHOP

Sea Grant
University of Guam

Monday, April 14

8 a.m.	Sign-in and Introductions
9 a.m.	Survey Results *Dawn Kotowicz & Laura Biggs*
9:45 a.m.	Question and Answers
10 a.m.	Climate Trends and Predictions *Chip Guard & Mark Lander*
10:45 a.m.	Short Break
11 a.m.	Climate Trends and Predictions *Chip Guard & Mark Lander*
11:45 a.m.	Question and Answers
12 p.m.	Lunch
1 p.m.	Working Groups *Action Planning to address Gaps and Vulnerability*
3 p.m.	Final thoughts and closing

Participants will learn about climate change, coastal storm impacts, and the vulnerabilities of coastlines in Guam and the Western Pacific region. Results of a recent vulnerability assessment survey of community perceptions and awareness regarding coastal storms will be reported which will guide the development of action plans to address vulnerabilities and ultimately increase resilience by communities in the region to coastal storms and climate change impacts. Regional climate experts Chip Guard and Dr. Mark Lander will highlight current research and implications for the region.

Laura A. Biggs, PhD

Laura A. Biggs, Ph.D. is an Assistant Professor of Extension and Education with University of Guam Sea Grant. She has worked to create a Sea Grant presence on Guam through the development of educational curriculum.

Mark Lander, PhD

Mark Lander's primary research interests center on water quantity with emphasis on tropical rainfall, El Niño/Southern Oscillation (ENSO), tropical climate and climate variability, and tropical cyclones. He leads the UOG component of the Pacific ENSO Applications Center (PEAC) at WERI and is currently providing operational one-year forecasts of rainfall and typhoon activity for the U.S. affiliated Pacific Islands.

Chip Guard

Charles 'Chip' Guard is the Warning Coordination Meteorologist at the Weather Forecast Office at Tiyan, Guam. He coordinates with weather and disaster management offices all over Micronesia. He also provides annual training focusing on tropical cyclones, disaster preparedness, the causes of regional weather events, tsunamis, climate, volcanoes, climate change and other geophysical items throughout the region.

Dawn Kotowicz, PhD

Dawn Kotowicz is a Social Science Program Manager for University of Hawai'i & NOAA Fisheries, Pacific Island Fisheries Science Center in Hawaii. She studies social resilience in coastal communities around the Pacific Islands region. Her research focuses on social and cultural aspects of fishing in coastal communities that make them resilient to disasters and other environmental and policy changes, including the impacts of climate change.

CIS YEAR IN REVIEW

CONFERENCE AGENDA

PRECONFERENCE ACTIVITIES

Monday, April 14, 2014

Green Dream Home High School Competition

Open to the public
8 a.m. to Noon
Hyatt Regency Main Ballroom

Coastal Vulnerability Workshop sponsored by Sea Grant Guam

Invitation Only
8 a.m. to 4 p.m.

UOG Pacific STEM Coalition Meeting

Invitation only
8 a.m. to 4 p.m.

Guam Power Authority Meeting

Invitation only
8 a.m. to 4 p.m.

Planning for the 2014 CIS Conference at the University of Guam earlier this year.

Tuesday, April 15, 2014

8 a.m.	Sign-in	
8:30 a.m.	Opening Remarks	
9 a.m.	Keynote Speaker	Ronald Jumeau
10 a.m.	Plenary Panel 1	*Climate Change in the Pacific Region*
11:15 a.m.	Break featuring exhibits	
11:30 a.m.	Keynote Speaker	Tony de Brum, Minister-in-Assistance to the President of the Marshall Islands
12 p.m.	Lunch Speaker	
	Martin Roush, General Manager, GWA	
1 p.m.- 2 p.m.	Breakout Session A	
2:15 p.m.- 3:15 p.m.	Breakout Session B	
3:30 p.m.	Plenary Panel 2	*Strategies to Respond and Mitigate Climate Change*
4:40 p.m.	Table Exhibit	
6 p.m.	Reception	
		The Micronesia Conservation Trust, the Nature Conservancy and the Guam Tourism Foundation

Wednesday, April 16, 2014

8 a.m.	Sign-in	
8:30 a.m.	Keynote Speaker	Richard Wallsgrove Blue Planet
9:45 a.m.	Plenary Panel 3	*Guam's Real Energy Future*
10:45 a.m.	Break featuring posters and sponsor exhibits	
11:45 A.M.	Lunch	
	Green Dream Home Competition Winners	
1 p.m.- 2 p.m.	Breakout Session A	
2:15 p.m.- 3:15 p.m.	Breakout Session B	
3:30 p.m.	Plenary Panel 3	*Perception, Knowledge and Outcome/Action*
4:45 p.m.	Conference Overview	

TUESDAY, APRIL 15

PANEL

Peltin Olter Pelep
College of Micronesia
Federated States of Micronesia

Vasemaca Savu
College of Marshall Islands

Robert Ramanui
Dean of Academic Affairs, Palau Community College

John Peterson, PhD.
Assistant VP for Graduate Studies, University of Guam

Jonita Kerr
Asst. Professor & Sustainability Coordinator
Guam Community College

8 a.m.	Sign-in
8:30 a.m.	**Opening Remarks** **The Honorable Judith Won Pat,** Speaker, 32nd Guam Legislature **The Honorable Eddie B. Calvo,** Governor of Guam **Robert A. Underwood,** President, University of Guam
9 a.m.	**Keynote Speaker** **Ronald Jumeau**
10 a.m.	**Panel** ***Climate change in the pacific region*** Peltin Pelep - College of Micronesia-FSM Robert Ramanui - Palau Community College Vasemaca Savu - College of Marshall Islands Jonita Kerr - Guam Community College John Peterson, PhD. - University of Guam
11:30 a.m.	**Plenary Speaker** ***Majuro: This is a now issue, not the future*** **Tony de Brum** Minister-in-Assistance to the President of the Marshall Islands
12 p.m.	**Lunch Speaker** **Martin Roush** General Manager, Guam Waterworks Authority

Martin Roush

General Manager
Guam Waterworks Authority

Martin Roush, MPA, P.E., has over 25 years of public management experience including 15 years in water system operations. He is an expert in water system operations, financing, and planning. He has a thorough understanding of the water issues facing water systems in Guam and the western United States. During his leadership, Roush stabilized GWA revenues, earned the confidence of the EPA through timely compliance of court ordered deadlines, and restored public confidence in the water utility.

KEYNOTE SPEAKER

Ronald Jumeau

Seychelles Ambassador for Climate Change and SIDS Issues

Ronald (Ronny) Jumeau has been the New York based roving Ambassador for Climate Change and Small Island Developing State Issues of the Republic of Seychelles since 2012.

He started his career as a journalist and then chief editor of the Seychelles Nation newspaper.
He became Secretary to the Cabinet in the Office of the President of Seychelles in 1992 before holding several ministerial posts from 1998 to 2007 including that of Minister for Environment and Natural Resources, which included responsibility for climate change, biodiversity and conservation, water, forestry, agriculture and fisheries. Jumeau was posted to New York in 2007 as Seychelles' Permanent Representative to the United Nations and Ambassador to the United States, Canada, Brazil, Cuba and several Caribbean islands until 2012 when he became a globe-trotting activist for the survival of his and other island nations. He is also the lead spokesman for the Alliance of Small Island States and chair of the steering committee of the Global Island Partnership.

BREAKOUT SESSION A

Solar Power Purchase Agreements: Power Generation as a Business

William Hagen

Energy ***Ballroom C***

Solar Power Purchase Agreements are starting to gain popularity on Guam as a means to install Solar Photovoltaics, save money, and make money all at the same time.
Attendees will learn the basics of financial and legal hurdles, documentation required, as well as the financial incentives available. Guam already has a handful of Solar Power Purchase Agreements and a real life working business model will be presented. Attendees will walk away with a better understanding of the PPA business model.

William Hagen

William H. Hagen is a 1971 Graduate of the University of Guam and the founder of Pacific Solar & Photovoltaics, Inc. His family's company, Hagens Inc. won the 2014 SBA "Family-Owned Business of the Year" award.

Transformation of a Coastal Industrial City towards Sustainable Development: The Case of Changwon, Korea

Jung-woon Kang, Ph.D., Changwon National University

Economy ***Ballroom A***

Changwon, a coastal city in South Korea, is undergoing transformation from an industrial city to a sustainable one. The city was recently designated as a United Nations Regional Center of Expertise for sustainable development education. Professor Kang discusses how the city introduced sustainable development policies and programs as well as the challenges and implementation tasks city officials had to manage in order to make urban sustainability work. Sustainability is now a priority within the city's policy networks and coastal sustainability and tourism are among the top concerns addressed by Changwon's strategic plans.

Jung-woon Kang, Ph.D.

Professor, Dept. of Public Administration, College of Social Sciences, Changwon National University

Sustainable and Healthy Communities

Rosanne Jones, PhD, Economics, University of Guam

Economy ***Santa Rita***

This study began with a question –– Do we have an adequate supply of health care workers to meet the needs of Guam's population? This question framed early discussions about the factors, which contribute to the supply and demand of Guam's health care workforce. The study team noted some of the challenges unique to a small island economy with documented health disparities. We also noted that while Guam may not have as resourceful a supply of health workers as other US communities, it fared far better to what was available in the neighboring island region that attracted many to migrate to Guam for health care. Understanding local demand for health services was complicated by trends, which showed that Guam residents sought and received health services in Asia and in the United States. This collective review, from the initial research question –– Do we have an adequate supply of health care workers to meet the needs of Guam's population? –– framed early understandings of the dynamic flow of supply and demand for Guam's health care workforce and further questions about the sustainability of healthy communities in this region.

Roseann Murphy Jones

Jones is a professor of economics at the University of Guam. She is also an author and lecturer on the subjects of regional economic development and health care.

Leadership for Sustainable Development

Peter Barcinas, Program Leader for the K@GI

Environment ***Ballroom B***

Knowledge@Guam Initiative (K@GI) offers an opportunity for policy makers and community members a way to conceptualize what vibrant communities look like and understand how the Community Capitals Framework (CCF) tool can be used to help address public issues. This will be an interactive session, which includes an overview of the CCF, with an introduction to how this is applied at the community level. The Knowledge@Guam Initiative strives to identify both government and community data and trends that describe what is important to our community. This session can help the various data gatekeepers plan, strategize and monitor community development initiatives.

Peter Barcinas

Barcinas is a Program Leader for the Communities, Youth, Families, Food and Nutrition (CYFFN) unit with the University of Guam Cooperative Extension Service. Barcinas also holds a faculty rank of Assistant Professor/Cooperative Extension Agent III with the College of Natural and Applied Sciences, University of Guam.

Achieving A Sustainable Community for the Pacific Islands

Pacific Postsecondary Students Council

Education ***Magellan***

1 P.M. TO 2 P.M.

Coral reef futures in the face of climate change, disturbance events, and localized stressors: Evidence from monitoring programs across Micronesia

Dr. Peter Houk, University of Guam Marine Laboratory

Environment

Coral-reef ecosystems are inherently linked with social livelihoods and economic prosperity. Localized stressors acting alone, or synergistically with disturbance cycles, represent key threats to coral-reef resiliency. Two localized stressors of concern throughout Micronesia are land-based pollution and the reduction of grazers. Both stressors serve to impede coral recovery following disturbance events.

Climate change exacerbates this situation by increasing the frequency of disturbances to coral reefs.In order to cope with the predicted future environments, it will be imperative for managers to define the economic and ecological needs of their reef ecosystems, and set a path towards managing localized stressors to match these goals.

Peter Houk
Peter Houk is a coral-reef ecologist and a faculty member at the University of Guam Marine Laboratory.

The influence of water quality and herbivory on algal communities within Laolao Bay, Saipan

Dr. Ryan Okano, Commonwealth of Northern Mariana Islands Bureau of Environmental and Costal Quality

San Vicente

Water quality and herbivory are considered to be primary factors that influence tropical algal communities. Water quality constituents, in particular increased nutrient loading can fuel algal growth and result in the proliferation and dominance of opportunistic species. Herbivores play a key functional role by feeding upon algae, limiting the growth and presence of algal species. Yet, our understanding of the context-dependent roles of water quality and herbivory remains limited. The recent Laolao Bay Watershed Restoration Project funded by the American Recovery and Reinvestment Act has provided the CNMI's Marine Monitoring Program with a unique dataset to understand the contribution of water quality and herbivory across two distinct habitats, the reef flat and slope.

Ryan Okano
Ryan Okano is an Ecologist with the Commonwealth of the Northern Mariana's Bureau of Environmental and Coastal Quality.

Co-existence of sustainable fisheries and high-functioning coral-reef ecosystems on Namdrik Atoll, Republic of the Marshall Islands

Matthew McLean

Santa Rosa

Recently, assessments have been completed for three RMI atolls: Rongelap - minimal human influence, Majuro - highest human population density in RMI, and Namdrik. This presentation uses Rongelap and Majuro as interesting endpoints to assess the unique situation found for Namdrik Atoll. Namdrik is a small atoll (8.6 km2) with a population of 700 people. Due to its size and low natural primary productivity levels, there is a lower potential for fishery resource development. Yet, we report similar fish biomass between Majuro and Namdrik, with both being substantially lower than Rongelap.

Matthew McLean *Matthew McLean is a graduate student at UOG Marine Laboratory studying the drivers of ecosystem function and resiliency in Micronesian coral reefs.*

Enhancing STEM through Sustainable Agriculture Education

Hauhouot Diambra-Odi, Ph.D., College of Natural and Applied Sciences, University of Guam

Education

Santa Rosa

The science of agriculture embraces all areas of STEM (Science, Technology, Engineering and Mathematics) and offers opportunities to enhance teaching science with practical activities and relevant topics of island sustainability, aiming at secondary science education curriculum in Guam and Micronesia. The division of Agriculture and Life Sciences is engaged in a variety of sustainable agriculture research activities that could be incorporated in science education ranging from entomology to plant pathology, plant science, soil science, animal science, aquaculture, molecular biology, food and nutrition and agroforestry. Any of these topics could be used as a module to develop a comprehensive lesson plan in science education,adapted to Guam and Micronesia. Some examples are discussed in the presentation.

Hauhouot Diambra-Odi
Ph.D. College of Natural and Applied Sciences, University of Guam

BREAKOUT SESSION B

Regulatory Framework and Management Strategies Adopted by Guam Waterworks Authority for the Sustainable Production of Safe Drinking Water from the Northern Guam Lens Aquifer

Gary R.W. Denton and Carmen M. Sian-Denton

Economy ***Ballroom C***

Guam has one of the finest limestone aquifers in the world. Located in the northern half of the island, this vital underground resource supplies the local community with ~80% of its drinking water needs. The great majority of island residents live in northern Guam and the US military has occupied large tracts of land here since WWII. The risks of groundwater contamination are, therefore, relatively high given the magnitude of human activity in this region and rapid recharge rates to the underlying aquifer. Since April 1996, Guam Waterworks Authority (GWA) has regularly monitored the island's drinking water resources for chemical and biological contaminants in accordance with the requirements of the Safe Drinking Water Act. This presentation examines water quality data sets for groundwater collected from all active GWA production wells over a 15 year period (1996-2010). Emerging trends of importance are briefly discussed along with management strategies currently adopted by GWA for the sustainable production of high quality drinking water.

Gary Denton
Ph.D. Professor of Environmental Toxicology, WERI. Denton is interested in water quality including contaminant transport, bioindicators and toxicity.

Carmen Sian-Denton
MSPH, Lab Administrator Guam Waterworks Authority. Denton monitors Guam water quality to make sure that water from the tap is safe to drink.

Renewable feedstock for biofuel production; Can local plants produce biofuel in Guam?

Mari Marutani and Mario Martinez

Economy ***San Vincente***

Two common types of bio-energy, ethanol and biodiesel, are studied, developed and utilized in many counties. For regions such as Guam and other Pacific Islands, there is an increased need to develop locally available resources that can increase island sustainability.
Two species were studied for their potential production of biodiesel in Guam: Calophyllum inophyllum (da'ok) and Jatropha curcas (tuba-tuba). Da'ok is widely cultivated in all tropical regions including Guam as a landscape plant, windbreak, and coastal plant because it tolerates salt spray and strong wind, while J. curcas is a small tree that thrives in a wide range of environmental condition and is grown in Guam as a landscape plant. Oil extracts from nuts of these two species were collected in Guam and characterized for their quality as biodiesel.
Alternative sources of biofuel would be diesel oil production from algae and waste vegetable oils.

Mari Marutani
Marutani is the Advisement Liaison for the Tropical Agriculture Science Program offering a degree in Tropical Agriculture Degree which is designed to provide students with knowledge in agricultural and natural resources and to prepare students for careers in natural resources and plant/animal industry.

Small Island Sustainability via the Implementation of the One Village One Product Strategy

Denise Mendiola-Hertslet, Dr. Fred Schumann, Dr. Annette Santos, Anita Borja-Enriquez

Economy ***Santa Rita***

In this study, small island economies are defined as island states with less than one million inhabitants and less than 2,000 square miles (or 5,000 km2) in area. There are close to fifty small island economies in the world today including Guam. The island's tourism industry has served as an engine for its economic growth. This presentation presents a case study of efforts on the island of Guam to inventory agricultural clusters by village, encourage the creation of value-added products by village residents, and introduce the One-Village-One-Product (OVOP) strategy through the linking of village agriculture and heritage tourism. This strategy is being implemented on Guam so that Guam residents may benefit economically from the tourism industry by building up linkages with goods and services suppliers on Guam for commercial activities involving signature products from each village.

Fred R. Schumann
Associate Professor of Global Resources Management at UOG.

Anita Borja-Enriquez
Interim Senior Vice President of Academic and Student Affairs at UOG

Denise Mendiola-Hertslet
Small Business Development Center

Anette Santos
Interim Dean of School of Business and Public Administration, UOG

2:15 P.M. TO 3:15 P.M.

Energy Initiatives on Navy Base Guam and Andersen Air Force Base

Desiree Masterson, Regional Energy Program Manager, Joint Region Marianas & Derek Briggs, Naval Base Guam Installation Energy Manager

Energy ***Ballroom B***

Joint Region Marianas has numerous energy initiatives in place to meet federal and Navy energy reduction and renewable energy goals and mandates. The region has funded more than $50 million dollars in energy projects since 2012 and in planning to spend several million more over the next few years. They have also created strategy to implement large scale renewable energy. Navy and Department of Energy's National Renewable Energy Laboratory are conducting a Joint Technology Demonstrations at Navy Base Guam and Andersen Air Force Base. The scope is to demonstrate multiple high potential newly commercialized energy improvement technologies at DoD facilities in Guam. The tasks are to select technologies, plan design, purchase and conduct the demonstrations, then prepare the final report and roll-out plans, plus train site for O&M or remove the equipment. Four projects selected include a combined photovoltaic/thermal (PV-T) system, a Liquid Desiccant Cooling (LDAC) system, a plug load study and an energy efficiency study replacing conventional hot water heaters with heat pump water heaters.

Desiree A. Masterson
Joint Region Energy Program Manager Civil Engineer

"If you can't beat 'em, Join 'em!" Streamlining Climate Adaptation with Competing Land Use Management Priorities in the CNMI

Robbie Greene, NOAA Coastal Management Fellow CNMI Division of Coastal Resources Management

Education ***Santa Rosa***

Recent scientific collaboration at regional, sub-regional, and local scales has enabled many Pacific Island communities to carefully evaluate the threats and potential impacts of climate change. Unfortunately, assessments of climate change impacts and vulnerabilities do not necessarily translate into actionable plans for climate adaptation, nor do they remove barriers to plan implementation. In 2013 the CNMI Climate Change Working Group designed and conducted a climate change vulnerability assessment (VA) for the island of Saipan which attempted to address two of the largest barriers to adaptation: (1) uncertainty of future climate impacts and (2) the competition posed by more immediate resource management priorities. This presentation demonstrates the design and results of the Saipan VA, highlighting specific components of the Assessment that address uncertainty and competing management concerns. Emphasis will be placed on the geospatial methods employed to accommodate uncertainty, as well as opportunities that the VA identified to integrate climate change into compatible land use management projects and plans.

Robbie Greene
Robbie is a NOAA Coastal Management Fellow working in the CNMI to assist the Division of Coastal Resources Management with climate change adaptation planning.

Adrienne Loerzel
Adrienne is NOAA's coral management liaison and coastal specialist for Guam.

Sustainability of Effective Wastewater Treatment Practices on Yap Island

Joseph D. Rouse, Associate Professor, University of Guam

Environment ***Magellan***

Inadequate treatment of sewage in the Pacific Islands has been responsible for serious environmental and human health problems. The reasons can often be attributed to the lack of functional technologies for wastewater treatment. On Yap Island in the Federated States of Micronesia, the treatment being provided at the centralized wastewater treatment plant with over 300 household connections is clearly insufficient with essentially raw wastewater being discharged to the ocean. Improved management of this potential resource is urgently needed.

Dr. Joseph D. Rouse
Rouse is a professional engineer and associate professor of water resources and environmental engineering at the Water and Environmental Research Institute (WERI) of the Western Pacific of the University of Guam.

Local Early Action Planning (LEAP): Planning for Climate Change on Guam

Roxanna Miller, Adrienne Loerzel, Valerie Brown

Environment ***Ballroom A***

Guam recently hosted a workshop entitled "Adapting to a Changing Climate"to learn about Local Early Action Planning (LEAP) and Management Planning for Climate Change Impacts. The LEAP process helps communities identify activities that may lessen the impacts of climate change on their natural and social resources.

Valerie Brown
Brown is a Fishery Biologist for the National Marine Fisheries Service's Habitat Conservation Division and a Fisheries Management Liaison for the NOAA Coral Reef Conservation Program.

Roxanna Miller
Miller is the Guam Marine Invasive Species Coordinator through the UOG Center for Island Sustainability.

TUESDAY, APRIL 15

PANEL

Ronald Jumeau
Seychelles Ambassador for Climate Change

Evangeline "Vangie" D. Lujan
Sr. Regulatory Analyst
GWA

Fran Castro
Coastal Resources Management, CNMI

Peter Houk, PhD.
Faculty
University of Guam

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

Strategies to respond and mitigate climate change

Ronald Jumeau - Seychelles Ambassador for Climate Change
Evangeline Lujan - Guam Waterworks Authority
Fran Castro - DEQ Commonwealth of the Northern Marianas
Peter Houk, PhD. - University of Guam

6 p.m. **Reception Sponsored by:**

The Micronesia Conservation Trust, the Nature Conservancy and the Guam Tourism Foundation

About the Micronesia Challenge

The Micronesia Challenge is a commitment by the Federated States of Micronesia, the Republic of the Marshall Islands, the Republic of Palau, Guam, and the Commonwealth of the Northern Marianas Islands to preserve the natural resources that are crucial to the survival of Pacific traditions, cultures and livelihoods.

The overall goal of the Challenge is to effectively conserve at least 30% of the near-shore marine resources and 20% of the terrestrial resources across Micronesia by 2020.

This ambitious challenge far exceeds current goals set by international conventions and treaties, which call for countries to conserve 10% of terrestrial and marine resources by 2010 and 2012 respectively.

By the numbers:

- 6.7 million: area in square kilometers of the Pacific ocean. The Challenge represents more than 20% of the Pacific Island region and 5% of the largest ocean in the world.
- 66: number of species in Micronesia recorded on the IUCN Red List
- 1,300: species of fish living in the waters of Micronesia
- 483: species of corals (60% of all known corals)
- 1400: species of plants (200 endemic)
- 85: species of birds (50% endemic)
- 104: number of the 218 recognized Endemic Bird Areas confined entirely to islands around the world.
- $2 billion: annual net benefits to the Pacific from coral reefs
- $800 million: benefits annually distributed across Micronesia from coral reefs
- $12 million: initial funding goal for the Micronesia Challenge ($3 million committed thus far).

WEDNESDAY, APRIL 16

PANEL

Capt. Glenn Shephard
NavFacMar

Simon Sanchez
Commissioner
Guam CCU

Jeff Voacolo
Guam Renewable Energy Association

Warren Doi
Energy Excelerator
Hawaii PICHTR

Bill Hagen
Owner
Pacific Solar and Photovoltaics, Inc

8 a.m.	Sign-in	
8:30 a.m.	**Plenary Speaker**	**Richard Wallsgrove**
9:45 a.m.	**Plenary Panel**	
	Guam real energy future	
	Capt. Glenn A. Shephard, Commanding Officer, Naval Facilities Engineering Command Marianas	
	Simon Sanchez, Commissioner, Guam Consolidated Commission on Utilities	
	Jeff Voacolo, GREA	
	Warren Doi, Energy Excelerator/Hawaii PICHTR,	
	Bill Hagen, Pacific Solar	
10:45 a.m.	**Poster Exhibit and Sponsor Exhibit**	
11:45 a.m.	**Lunch**	
	Green Dream Home Competition Winners	

KEYNOTE SPEAKER

Richard Wallsgrove

Program Director
Blue Planet

Richard Wallsgrove formerly worked as an attorney in Honolulu, handling complex litigation on a wide range of issues. He has also worked with the Center for Island Climate Adaptation & Policy at the University of Hawai'i, analyzing climate-adaptive tools for managing water resources.

He has lectured on legal issues to future technological and social entrepreneurs at U.H.'s law, business, and engineering graduate schools, and he has authored papers on shoreline issues, renewable energy resources, and other topics. Richard graduated summa cum laude from the William S. Richardson School of Law, where he was Editor-In-Chief of the U.H. Law Review.

While at U.H., he also performed field and laboratory research on biochemical markers of climate change.

BREAKOUT SESSION C

The Approach to the Establishment of Climate Change Policies for Achieving Sustainable Development in Jeju Island

Dai-Yeun Jeong PhD (Emeritus Prof. of Environmental Sociology at Jeju National University)
Director, Asia Climate Change Education Center

Environment ***Ballroom A***

Jeju Island, a Special Self-Governing Province, is promoting a project titled World Environmental Hub. The goal to be certified by UNEP in 2020. The project is composed of 12 strategies with 63 individual projects aiming at the achievement of sustainable development in Jeju Island on the basis of an integrated framework including economy, society, and environment. The strategy responding to climate change is one of the 12 strategies.

This presentation will cover the framework of World Environmental Hub project, and introduce the approaches to the establishment of climate change policy focusing on the maximization of its efficiency and effectiveness.

The presentation explains the framework Jeju Island developed to respond to the impact of climate change. Information about how the components of climate change policy were formed, including a discussion about how priorities were selected, and how to mobilize to achieve goals, will be presented.

The presentation will focus on the system of governance to establish climate change policy.

Dai-Yeun Jeong
Emeritus Professor of Environmental Sociology at Jeju National University and the Director, Asia Climate Change Education Center

Application of Composted Organic Waste for Improving Soil Quality and Agricultural Sustainability, and for Preserving Environmental Quality in Guam

Ferdinand Galsim, Mohammad H. Golabi and Clancy Iyekar

Environment ***Santa Rita***

The low fertility of agricultural soil in Guam and other Pacific regions is one of the problems faced by farmers today. On the other hand, major nutrients (i.e., N and P) from the application of synthetic fertilizers can drain to underground water reservoir and/or runoff the soil surface into the streams and rivers polluting the environment and specifically the marine ecosystem. The use of composted organic material is an excellent alternative to synthetic fertilizer because of its nutrient availability necessary for plant growth. Furthermore, the land application of compost helps with the enhancement of organic matter content which in turn improves the physical and chemical properties of Guam's poorly structured soil.

This project is focused on improving crop production, natural resources conservation, and preserving environmental quality.

Mohammad H. Golabi
Dr. Golabi is an Assistant Professor of Soil Science.

Micronesian Biosecurity: A Framework for Addressing Invasive Species

Frank A. Camacho, Biology Program, CNAS< University of Guam, Russell Campbell, Guam Department of Agriculture & Roland Quitugua, Agriculture Extension Services, CNAS, University of Guam

Environment ***Ballroom C***

Micronesia and Hawaii continue to face daunting challenges preventing and controlling the establishment of invasive alien species (IAS). A variety of terrestrial and aquatic threats have emerged that highlight the critical need to create a regional plan to address IAS. In response to this need, the University of Guam and the Secretariat for the Pacific Community have worked with their regional partners in Micronesia and Hawaii to develop the Micronesian Biosecurity Plan (MBP), which was funded through the U.S. Department of Defense. The final phase of the MBP is the recently completed Strategic Implementation Plan (SIP). The goals of the SIP are to create a regional management framework to more effectively prevent invasive alien species from establishing and to improve the response of insular governments to current and emergent alien threats.

Russel Campbell
Campbell is the Territorial Entomologist with the Guam Department of Agriculture.

Roland Quitugua
Quitugua is an Extension Agent with the Cooperative Extension Service at the University of Guam.

Frank A. Camacho, Ph.D.
Dr. Camacho is an Associate Professor of Biology at the University of Guam.

1 P.M. TO 2 P.M.

Using Retro-commissioning to Move an Existing Building Towards Efficiency

Ezra Gutschow, Senior Mechanical Engineer, Coffman Engineers, Inc.

Energy ***Ballroom B***

Retrocommissioning a building can be one of the fastest and most cost effective ways to reduce energy costs. Studies show that on average, the retrocommissioning process reduces energy costs in a building by an average of 16%. In addition, the non-energy savings benefits (including the health and comfort of building occupants) can be dramatically improved. The goal of this presentation is to illustrate what the retrocommissioning process is, how the retrocommissioning process works, and how to implement a retrocommissioning program. Real world examples and the cost benefits will be highlighted. Retrocommissioning is the systematic process of reviewing a building's requirements (space, environmental conditions, age) and comparing them with the current mechanical (HVAC, Plumbing, etc.) and electrical systems (Lighting, Security, etc.).
Periodically reviewing the building's operation through the retrocommissioning lens is the best tool available to restore the building to efficient operation.

Ezra Gutschow
Gutschow is a professional mechanical engineer. The last ten years of his career have been focused on performing commissioning, energy modeling, HVAC design and energy audits throughout the Pacific Rim.

Serianthes nelsonii, species recovery and research efforts on Guam

Ann Marie Gawel, Else Demeulenaere

Environment ***San Vicente***

Serianthes nelsonii, a rare leguminous tree, was listed as endangered in 1987. There is only one remaining tree on Guam. Time is pressing to rescue this species from the brink of extinction. The purpose of this panel discussion is to assess the present efforts towards recovery on Guam.

Ann Marie Gawel
Biologist, U.S. Fish and Wildlife Service (USFWS) - Ecological Services, Mariana Islands Team, Guam. She is the USFWS Mariana Islands Team recovery lead for S. nelsonii and is a local expert on the flora of the Mariana Islands.

Else Demeulenaere,
Research Associate II, University of Guam, College of Natural and Applied Sciences, Guam. Ms. Demeulenaere is a botanist and was part of the FIA (Forest Inventory Analysis) team in Guam and Palau. Currently she is working as the coordinator for Guam Plant Extinction Prevention Program (GPEPP).

Solar Photovoltaics on Guam: Fact or Fiction?

Scott Hagen

Energy ***Santa Rosa***

Take a look at Guam's first legal Solar Net Metered home that was installed in early 2009 and compare the technology of the equipment installed then to what can be installed today. Cost comparisons will be presented. Calculations for system performance will be shared and results after five years in operation will be given. We will wrap up by giving insight into what the Solar Net Metered home will look like in 2020. Is it Fact or is it Fiction? You decide.

Scott Hagen
Scott has been working overtime in the solar photovoltaic industry since 2008 and has been instrumental in the design and installation of over 100 solar projects on Guam ranging from small residential, to commercial, and on to military establishments. Scott is an alumni and perpetual student of Solar Energy International's curriculum and is currently working to bring SEI's courses to Guam to share with others interested in learning about renewable energy. Over the past 5 years Scott and his team have developed a solar panel racking method unique to Guam as well as other installation methods necessary for system efficiency and longevity.

BREAKOUT SESSION D

Hawaii's Energy Overview

Ron Richmond, Inter-Island Solar Supply, Hawaii

Energy ***Ballroom A***

A Solar Water Heater System's impact on fossil fuel consumption and generation capacity. In 2011 it was reported that since 1977 Hawaii had installed 103,000 solar water heating SWH systems. This same study determined that a SWH installed on a home saved the individual homeowner 2,065 kilowatt hours of power per year. The total impact on Hawaii's electrical consumption was to reduce total demand by almost 1.7%. Using charts, graphs and empirical data Mr. Richmond will show how if a homeowner on Guam, using SWH, were able to achieve the same level of savings, 2,065 kwh/year as Hawaii, it would mean a $599.00 per year savings in power and a $392.00 reduction in imported oil per year for each homeowner.

Ron Richmond

Richmond has specialized in the solar hot water and photovoltaic industry since 1978. Currently he has the dual role of Manager of Business Development at SunEarth, a leading U.S. manufacturer of flat plate, solar water collectors and at Inter-Island Solar Supply.

Sustainable Energy Solutions for Island Environments

Kyle Blickley, M.S. and Michael Reiley, Ph.D.

Energy ***Santa Rosa***

A key component of sustainable island communities is energy independence. Pacific islands boast an abundance of renewable energy resources, yet also present unique engineering challenges ranging from corrosive maritime environments and super typhoon wind levels, to high heat and humidity. Furthermore, relatively small electrical grids require careful consideration with regards to integrating variable renewable energy sources. A holistic approach involving energy conservation, generation and storage is therefore necessary to both address the challenges, as well as realize the opportunities, for island community energy independence.

Kyle Blickley, M.S.

HNU Energy: Hawaii, Guam and Micronesia

Michael Reiley, Ph.D.

HNU Energy: Hawaii, Guam and Micronesia

Guam Power Authority Putting It All Together

Energy ***Ballroom C***

GPA`s Integrated Resource Planning moves the utility to a new paradigm for energy production and grid operations including renewable energy, energy storage, LNG, more efficient generation, retirements of a large portion of GPA`s generation fleet. Furthermore, GPA`s Smart Grid initiative is our Customer engagement.

Is compost a better trap to catch more Rhino beetles than any other traps on island?

Lali Thundlyil, FB Leon Guerrero Middle School

Environment ***Santa Rita***

My ongoing project about the Compost Project with green, brown wastes and our cafeteria green wastes was originally designed to create quality compost to school gardening program to cultivate different ornamental plants for the school and the community. During this process we found out that compost attract beetles, and we began to notice the presence of several rhino beetles grubs. At present on an average weekly basis we collect and drown more than 50 grubs and one or two adults from the three out of the five compost piles in our school campus managed by my 7th grade students.

The climate of Guam and Micronesia: The historical record and 100-year projections

Mark Lander - Bio on Page 3

Environment ***Magallan***

The historical record of temperature, rainfall and sea level on Guam and throughout most of Micronesia is relatively short. A nearly complete daily record of these climatic elements exists from immediately post WWII.
This roughly 65-year record documents a long-term warming of temperature with substantial inter-annual and inter-decadal variations. Annual rainfall exhibits a long-term decline on islands east of Guam, with a slight increase on Guam and to the west. Sea level had no significant trend throughout Micronesia through 1997. In response to increasing Pacific trade winds, the sea level jumped to historically high levels in 1998 and has remained substantially above average through the present time.

2:15 P.M. TO 3:15 P.M.

Local Stream Bank Stabilization Methods

Claudine Camacho & Ken

Environment ***Ballroom B***

In 2011 Ken Rekdahl and Claudine Camacho (Duenas, Camacho & Associates) assisted the Marians Resource Conservation and Development Council in developing a natural approach to repairing and stabilizing stream banks on Guam. Various stream-bank stabilization methods have been used throughout the US, and until recently methods on Guam have been limited to traditional approaches such as rock-lining and using gabion walls.

Rekdahl and Camacho were given the opportunity to develop, design and implement stabilization techniques that use a more natural and softer approach than what was commonly done on Guam. Three different methods were developed, designed and constructed. The first repair method included a rip rap toe and coconut mat. The second repair method used a tree trunk and coconut mat.

Claudine Camacho

Community Outreach Coordinator/Environmental - Planner/Biologist.

Ken Rekdahl

University of Southern California/ 2002/ M.S. Civil Engineering

Mr. Rekdahl joined Dueñas Camacho & Associates, Inc. in October 2003, and served as an Environmental/Civil Engineer. Mr. Rekdahl presently serves as the chief of Special Projects.

Talakhaya Watershed Soil Loss Assessment (Rota, CNMI)

Sydonia Manibusan and Dr. Mohammad Golabi

Environment ***San Vitores***

Accelerated sedimentation from the unprotected watersheds of the Northern Marianas Islands is a growing economic and environmental concern for the region. When soil is disturbed sediment is moved by water and wind into rivers that empty into the ocean. The reefs at these outputs are being smothered by sediment, which kills organisms, and makes the reefs uninhabitable. Watershed systems are dynamic and adaptable to change; however the results are often incompatible with human land use. Human activities such as the use of off road vehicles, activities along unprotect upland areas, human-induced fire, and clear cutting often impact the watershed dynamics. In order to improve sustainability of these natural systems and ensure the preservation and increase of natural habitats there are ongoing efforts for revegetation of upland badlands of the Talakhaya Watershed and community education on human impacts this system.

The revegetation project is currently primarily using vetiver grass (Chrysopogon zizanoides) for their deep root system and sediment holding capacity. The project is also using Acacia, and Bahia grass for soil quality improvement and vegetative cover. The Talakhaya Watershed Soil Loss Assessment is a part this ongoing revegetation effort to improve the watershed and the coral reef system on the island of Rota, CNMI.

Sydonia Manibusan

Manibusan has previously worked on a GIS-Based Watershed Management Plan for the Piti- Asan Watersheds on Guam and currently on the Talakhaya Watershed Soil Loss Assessment on Rota.

Sustainable Agricultural Systems: Issues, Technology and Innovation-Development of a small-scale integrate farm system

Mari Marutani

Society and Culture ***San Vicente***

Construction of an integrated model farm at the University of Guam started in 2001 to demonstrate a small agricultural production enterprise. The main objective of maintaining the model farm is to show a "profitable" agricultural system while conserving natural resources and meeting consumer demand. Currently, the four-acre farm has three sections depending on characteristic of agricultural products and cultural practices: (1) aquaponics, a system combining aquaculture and hydro plant-culture, (2) horticultural crop production with fruit, vegetable and ornamental plants in the field, and (3) cage-free egg production in agroforestry. The integrated production system emphasizes biodiversity, a multiple cropping system, utilization of renewable farm resources, and soil and water conservation. This paper presents a case study on developing a small-scale integrated model farm in a tropical urban insular environment of Guam.

Mari Marutani

Marutani is the Advisement Liaison for the Tropical Agriculture Science Program offering a degree in Tropical Agriculture Degree.

WEDNESDAY, APRIL 16

3:30 p.m.	**Panel**
	Perception, knowledge and outcomes or action
4:45 p.m.	**Conference Overview and Conclusion**

PANEL

Simon Sanchez
Commissioner
Guam Consolidated Commission on Utilities

Warren Doi
Energy Excelerator
Hawaii PICHTR

Sen. Tom Ada
Senator
32nd Guam Legislature

Sen. Mike Limtiaco
Senator
32nd Guam Legislature

Richard Wallsgrave
Program Director
Blue Planet

Be a part of protecting your watershed

Connect

Talk to your family and friends about your environment. Identify things you can do in your village. Go for a hike, snorkel, swim or kayak. Take the family fishing. Attend a gardening workshop and start a garden.

Respect

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.

Protect

Start a marine monitoring project with Sea Grant and NOAA. Help control feral pig populations. Reduce water loss on your property by recycling rain water. Plant native or non-invasive plants to control erosion and reduce sedimentation on the reefs.

Learn more about how to protect the Pago Bay Watershed by visiting your local mayor's office or contacting University of Guam Sea Grant

Email laura.uogseagrant@gmail.com or visit
www.facebook.com/SeaGrantGuahan
or call 735-2145.

Sea Grant
University of Guam

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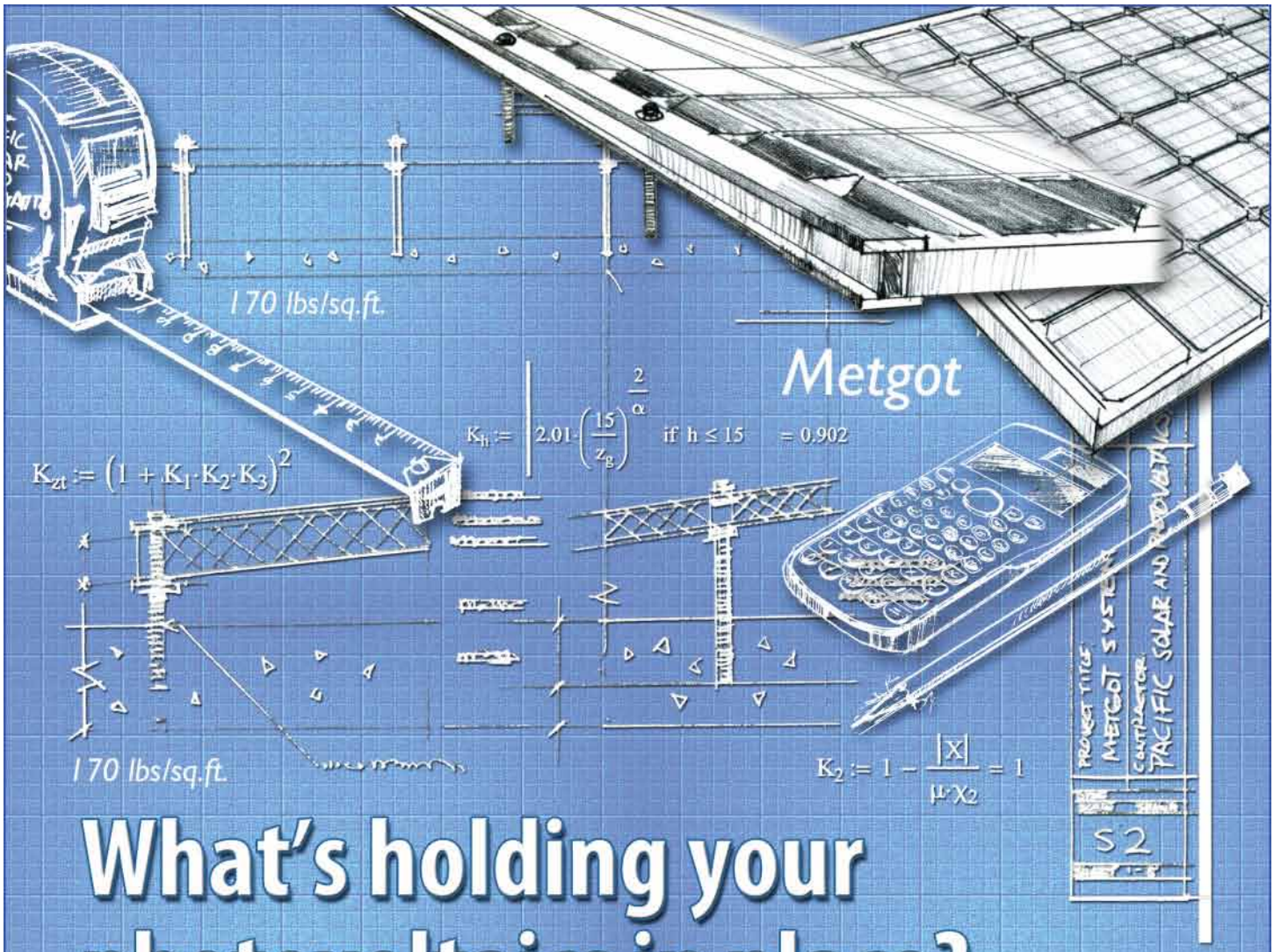

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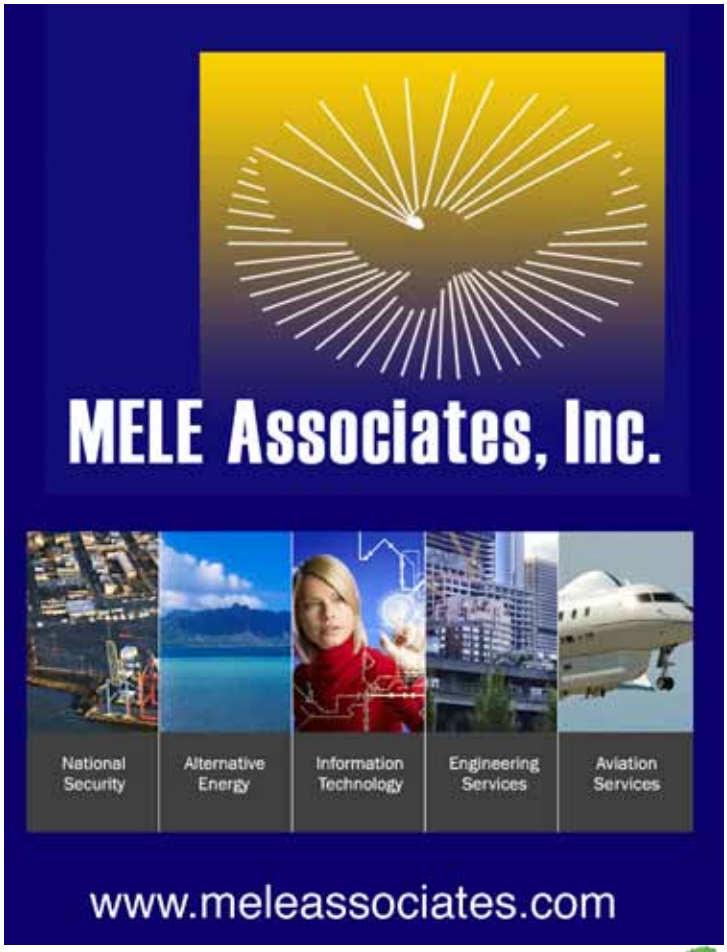

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