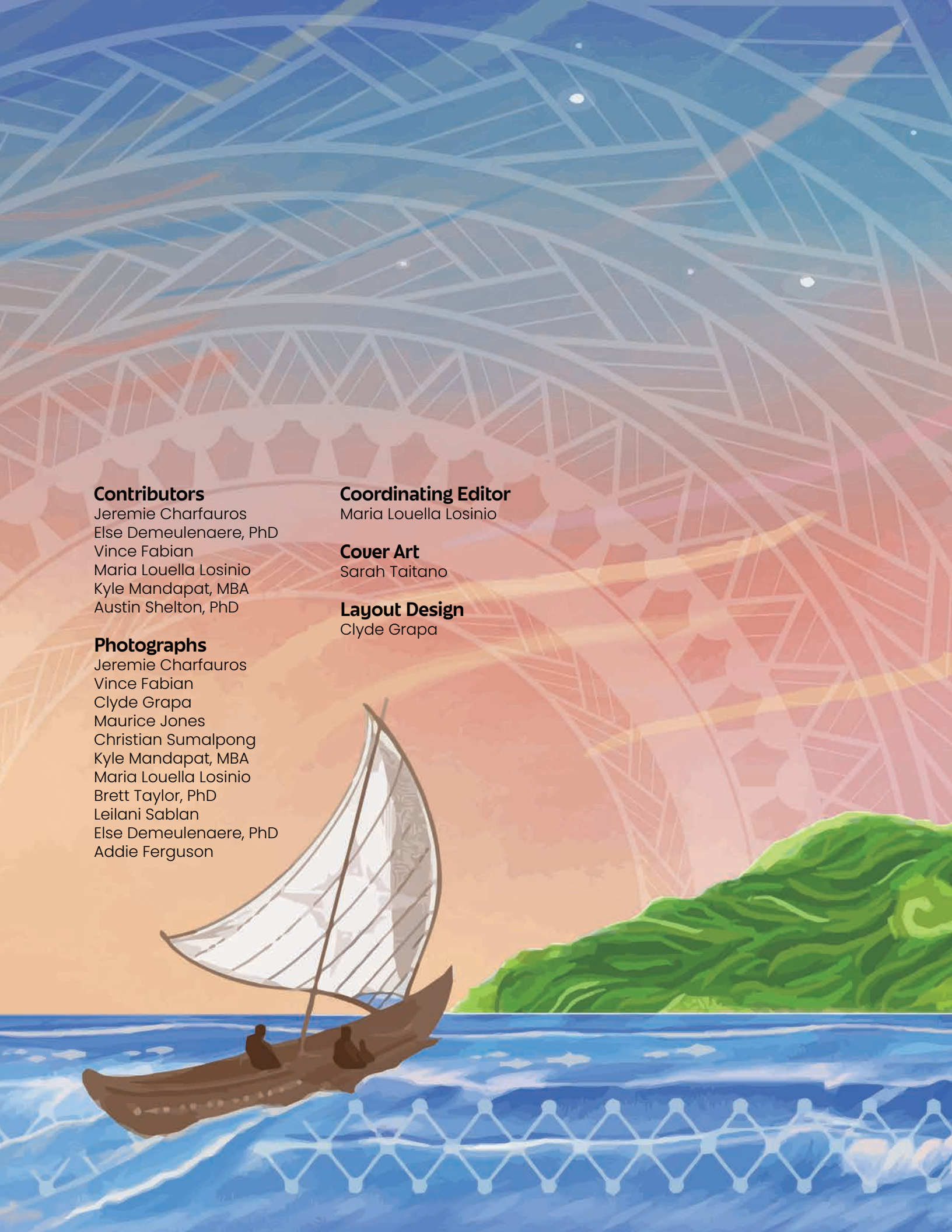
UNIVERSITY OF GUAM
CENTER FOR ISLAND SUSTAINABILITY

Sea Grant
UNIVERSITY OF GUAM

IMPACT 2024



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Impact Report 2024

University of Guam Center for Island Sustainability & Sea Grant

Welcoming Remarks

Håfa Adai,

As President of the University of Guam, I am proud to present the 2024 Impact Report from the UOG Center for Island Sustainability and Sea Grant. The accomplishments outlined in this report reflect the university's unwavering commitment to sustainability and our growing leadership in research, education, and outreach for Guam and the broader Micronesian region.

These efforts align with our 2024–2029 strategic plan, Tulos Mo'na, and demonstrate meaningful progress across all four of UOG's institutional pillars—especially in enriching academic programs and supporting student success. Through fellowships, internships, and hands-on learning opportunities, the UOG Center for Island Sustainability and Sea Grant is preparing our students to become innovative problem-solvers and future STEM leaders who are deeply rooted in service to their communities.

This past year, the UOG Center for Island Sustainability and Sea Grant maintained strong visibility at national and international forums. Our faculty, staff, and students represented Guam at Sea Grant Week and major sustainability conferences, sharing locally driven research and outreach while amplifying the unique voice and perspective of our island.

Collaboration remains key to this work. UOG Center for Island Sustainability and Sea Grant partners with academic units across the university, including the College of Natural & Applied Sciences, the College of Liberal Arts and Social Sciences, and its CHamoru Studies program to integrate sustainability and traditional knowledge into teaching and research. Partnerships with the UOG Marine Laboratory and the Palau International Coral Reef Center have also advanced regional research in coral reef health, climate change, and ocean conservation.

Looking ahead, I have full confidence that the UOG Center for Island Sustainability and Sea Grant will continue to be a driving force for sustainable development and resilience in our region.

On behalf of the University of Guam, I would like to thank the faculty, staff, students, and partners whose passion and collaboration make this work possible. I invite our community to explore this report and see the impact we are making—together.

Anita Borja Enriquez, DBA
President, University of Guam

Håfa Adai!

The UOG Center for Island Sustainability and Sea Grant delivered an impactful 2024, despite navigating the lingering effects of Typhoon Mawar from 2023. We're pleased to share these achievements, which highlight the growing progress of our initiatives.

"Sustainability Endures" was the theme of our 2024 UOG Conference on Island Sustainability, where we heard directly from our regional partners. We were honored Palau President Surangel Whipps Jr. and CNMI Gov. Arnold Palacios participated as keynote speakers. They offered valuable insights into the resilience of their communities and demonstrated how resource management and environmental sustainability can be deeply linked to traditional cultural practices.

In the first quarter of 2024, we delivered on a major commitment from 2023: putting a $1.4 million grant to work. Secured by our program and the University of Hawai'i Sea Grant from the U.S. Department of State via the National Oceanic and Atmospheric Administration (NOAA) National Sea Grant College Program, this funding was designed to advance the Local2030 Islands Network and help other islands establish their own Green Growth initiatives.

This investment immediately led to the launch of two new Green Growth hubs in our region—a significant advancement for regional sustainability efforts. The CNMI Green Growth initiative officially launched in Saipan in January, followed by the inauguration of Palau Green Growth in Koror in February. Officials from the Guam Green Growth (G3) initiative and the Local2030 Islands Network lauded both efforts as crucial steps toward advancing the United Nations Sustainable Development Goals across Micronesia.

Our regional partnerships further expanded in 2024, reaching into the wider Asia-Pacific with a groundbreaking collaboration involving the South Korea Gyeonggi Sea Grant program. This unique partnership introduces advanced digital twin technology to U.S. marine science research, bringing South Korea's sophisticated numerical modeling expertise to the United States through Guam Sea Grant. Digital twin technology enables the creation of virtual models for real-time simulations and predictive analysis. Integrating the Gyeonggi Sea Grant program's capabilities with the UOG Center for Island Sustainability and Sea Grant's extensive marine and fisheries data, this partnership will significantly enhance research, improve data sharing, and strengthen international collaboration.

Reinforcing our role as a major research hub in the region, six researchers were awarded the 2024–2026 UOG Sea Grant Competitive Research Funding in 2024. This funding will support projects addressing critical challenges in Micronesia's coastal ecosystems, communities, and economies, with a focus on promoting healthy coastal ecosystems, enhancing environmental literacy, fostering workforce development, promoting sustainable fisheries and aquaculture, and building resilient communities and economies.

These highlights represent just some of our team's significant accomplishments in 2024. We'd like to invite you to explore the full details of our significant impact within the pages of this report.

Si Yu'os Må'ase to our valued partners across local, regional, and global communities. We look forward to continuing our collective efforts to lead and support a sustainable future for our island, region, and the world.

Austin J. Shelton III, PhD
Director, UOG Center for Island Sustainability and Sea Grant

Hafa Adai,

The entire team here at the UOG Center for Island Sustainability and Sea Grant are so excited to share with you our impact report. This report highlights the work we have done within the past year and reflects our commitment to serving our island communities.

The UOG Center for Island Sustainability and Sea Grant is dedicated to addressing the unique challenges faced by island communities, including ocean changes, resource management, and economic development. We work to promote a balance between human needs and the preservation of our fragile island ecosystems. This report showcases the numerous ways in which our programs, research, and partnerships have made a positive impact.

Within these pages, you will find stories of resilience, innovation, and collaboration. You will read about the work our team has done to promote sustainable fisheries and aquaculture, support healthy coastal ecosystems, advance environmental literacy and workforce development and foster resilient communities and economies.

The work of the UOG Center for Island Sustainability and Sea Grant is made possible by the support of our many partners, including the University of Guam, local and regional organizations, government agencies, and community members. Together, we are working to create a more sustainable and resilient future for Guam and the Micronesian region.

Thank you for your interest in our work.
We invite you to read this report and learn more about our ongoing efforts, but also to join us for our roadside cleanups, our watershed restoration work in Ugum and everywhere else you will find us all over the island.

Si yu'os ma'åse,

Fran Castro, MS
Associate Director for Operations & Development
UOG Center for Island Sustainability and Sea Grant

Buenas yan Håfa Adai!

We are so excited to share just a glimpse into the hard work that goes into the programs here at the UOG Center for Island Sustainability and Sea Grant. We have had a great year with our partners, team and community members and hope you can share in our work and participate in our community outreach in the future.

In 2024, we focused on several key initiatives that underscore our commitment to a sustainable future for Guam and our Micronesian brothers and sisters. From groundbreaking research that addresses critical environmental challenges to community engagement programs that empower local residents, our work reflects the interconnectedness of our island ecosystems and the well-being of our people.

Inside, you'll find stories of resilience, innovation, and collaboration. You'll read about how our Sea Grant program is fostering sustainable fisheries and aquaculture, ensuring food security for our island. You'll discover how our Center for Island Sustainability is leading the charge in promoting green growth and building climate-resilient communities. And you'll see how we're working with the next generation to cultivate environmental stewards through education and outreach.

This report is more than just a summary of our accomplishments; it's a reflection of our unwavering belief in the power of collective action. We recognize that the challenges we face require a multifaceted approach, one that integrates scientific knowledge with traditional wisdom and community participation.

As you delve into the pages of this report, I hope you'll be inspired by the progress we've made and the potential for even greater impact in the years to come. We are deeply grateful for your continued support, which enables us to advance our mission of fostering thriving, sustainable islands.

Thank you for being a part of our journey.

Si Yu'os Ma'åse,

Kyle Mandapat, MBA
Associate Director of Communications and Community Engagement
UOG Center for Island Sustainability and Sea Grant

Håfa Adai,

In 2024, our team proudly established the Island Conservation Lab, an interdisciplinary research unit focused on terrestrial conservation, ethnobotany and policy. Our lab's mission centers around protecting and restoring Guam's rich biocultural diversity, and this year, we made remarkable progress. A special thank you to Vince Fabian, our program manager, whose guidance and support were instrumental in the creation of the lab and in driving our mission forward.

We expanded the number of native and endemic plant species in our rare plant nursery to 72, including eight species listed under the Endangered Species Act. One of our most memorable moments as a team was the rescue of epiphytic endangered orchids *Dendrobium guamense* and *Bulbophyllum guamense* at Mount Lam Lam. We hiked up the mountain together to save clumps from a massive fallen yoga tree. These unique orchids were later featured in an art exhibit by our G3 Makerspace and Innovation Hub, using upcycled materials, at T Galleria by DFS in Tumon, an inspiring fusion of conservation and creativity.

Throughout the year, we shared our research and conservation efforts at local conferences, in schools and at the Educators' Symposium of the Northern Guam Soil and Water Conservation District. Internationally, we presented at the International Botanical Congress in Madrid, placing Guam's conservation work on the global stage.

We continued to collaborate with the Department of Agriculture on the development of the Habitat Conservation Plan and initiated the revision of the State Wildlife Action Plan. Both plans aim to protect species vital to Guam's natural heritage and cultural identity, work that deeply involves and benefits our community.

I also had the privilege of piloting an ethnobotany course, welcoming a dynamic first cohort of students who explored the traditional uses of plants for food and medicine.

To our incredible staff, thank you. Your dedication, heart and expertise drive this work forward. I'm deeply grateful to the entire team for this inspiring and impactful year.

Saina ma'å'se'

Else Demeulenaere, PhD
Associate Director for Natural Resources,
UOG Center for Island Sustainability and Sea Grant

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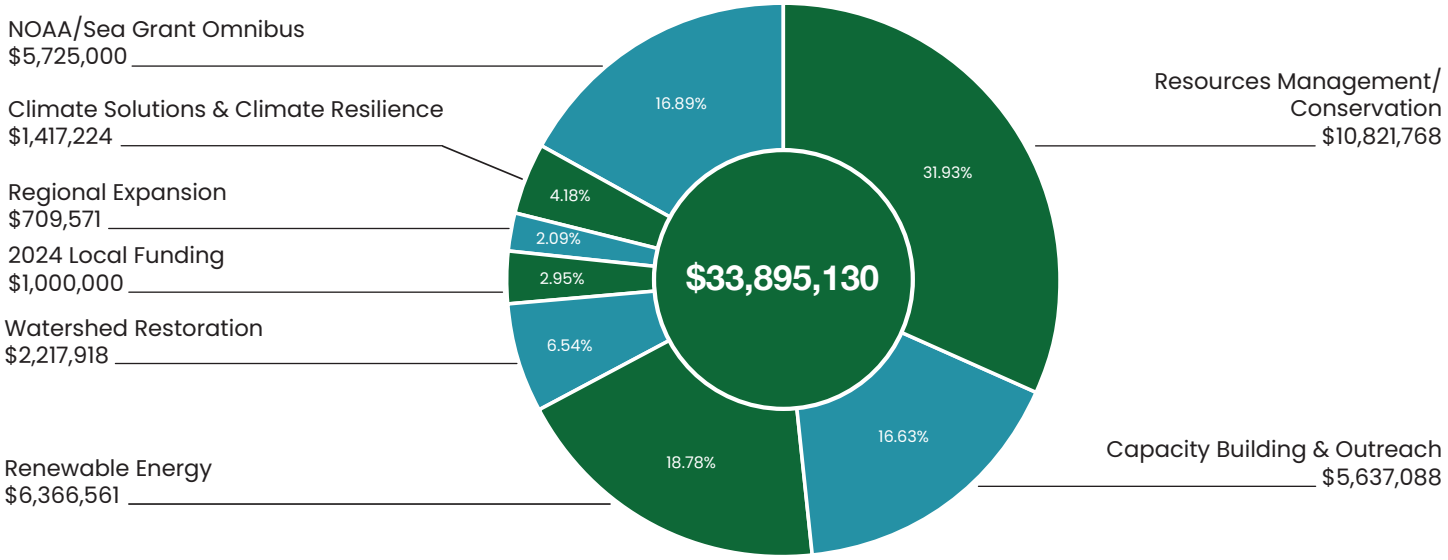
BY THE NUMBERS **2024**

Total Current Funding Awarded to University of Guam Center for Island Sustainability and Sea Grant

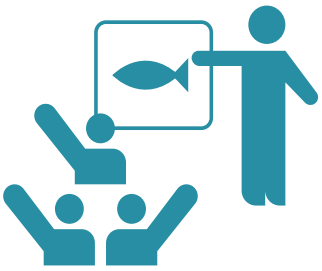


33.9x Return on Investment (ROI) - For every $1 in local funding, UOG CIS & SG leveraged $33.90 in external funding.

OUTREACH

4,221
SCHOOL PARTICIPANTS

12,236
*TOTAL NO. OF PARTICIPANTS



*Total number of outreach participants includes students, teachers, and the general public.

933
Total No. of Volunteers

7,892
Volunteer Hours

141
PARTNERSHIPS
from local and federal government, private sector, non-profits, and other organizations

GUAM GREEN GROWTH CIRCULAR ECONOMY AND MAKERSPACE INNOVATION HUB IMPACTS

58
Members of the Guam Green Growth Conservation Corps who graduated and now gainfully employed or have returned to school to further their education.

5,322
TOTAL PARTICIPANTS
Total number includes G3 Makerspace & Innovation Hub members, drop-ins, tour participants, and presenters

7
BUSINESSES EXPANDED

3
BUSINESSES STARTED

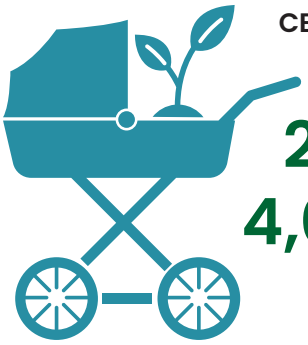
213
New G3 Makerspace Members

SCIENCE COMMUNICATION

1,529
No. of social media posts as of 2024

1,234,736
Post impressions on one social media

16,775
Social media engagements



CENTER FOR ISLAND SUSTAINABILITY NATIVE PLANT NURSERY

2,027 SEEDLINGS OUTPLANTED

4,000+ PLANTS PROPAGATED

46 DIFFERENT SPECIES PROPAGATED

NUMBER OF ENDANGERED AND THREATENED SPECIES

234+ SALVAGED

211 PROPAGATED

60 OUTPLANTED

1,644 SURVEYED

PLANTS MONITORED AND MAINTAINED

4,224

RESTORATION IN ACTION

Facilitated by Guam Restoration of Watersheds (GROW) Initiative

464 NATIVE & PIONEER SPECIES PLANTED

332 VOLUNTEERS

12 PLANTING EVENTS

16 ACRES SURVEYED
for endangered and threatened species

8,000+
TOTAL TREES PLANTED (GROW & CIS-ICL)

INVASIVE AND ENDANGERED SPECIES

Key impact metrics facilitated by Center for Island Sustainability - Island Conservation Lab

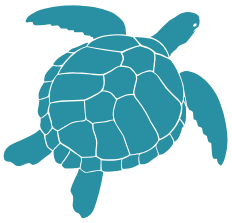
INVASIVE TREES, SEEDLINGS, VINES, SHRUBS REMOVED **2,633**

DIFFERENT NATIVE SPECIES PLANTED **12**

TOTAL AREA OF HABITAT MANAGED FOR INVASIVE FLORA **44,124**

ACRES SURVEYED FOR HABITAT CHANGE ANALYSES **100**

SEA TURTLE SURVEY DATA (2019 to 2024)



1,683 TOTAL SURVEY DAYS

998 NESTING EVENTS

1,306 TOTAL *CHELONIA MYDAS* EMERGENCES

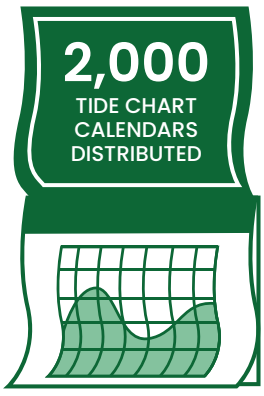
308 NON-NESTING/FALSE CRAWL EVENTS

*A false crawl is when a female sea turtle comes onto the beach but goes back to the ocean without laying eggs.

143 NESTING EVENTS
2nd highest number recorded from 2019 to 2024

66 NON-NESTING/FALSE CRAWL EVENTS

2,000 TIDE CHART CALENDARS DISTRIBUTED



GUIHAN FOR GUÅHAN

1000+ outreach participants

111 fish received and measured

CAPACITY BUILDING PROGRAMS

Students supported by Sea Grant, NSF INCLUDES & GUAM NSF EPSCoR

59 STUDENTS SUPPORTED

2024 UNIVERSITY OF GUAM CONFERENCE ON ISLAND SUSTAINABILITY

90+ SPEAKERS **425** PARTICIPANTS

SACNAS 2024

NATIONAL DIVERSITY IN STEM CONFERENCE

48 ATTENDEES FROM UOG

GUAM GREEN GROWTH CONSERVATION CORPS

2024 **IMPACTS FOR OUR SUSTAINABLE FUTURE**

4,500
SEEDS COLLECTED FOR PLANTING

4,191
VOLUNTEER HOURS

13,483
POUNDS OF TRASH PICKED UP

650
FEET OF INVASIVE SPECIES REMOVED

273
CUBIC YARDS OF GREEN WASTE REMOVED

200
FEET OF EROSION CONTROL DEVICES BUILT

135
POUNDS OF FOOD CROPS HARVESTED

170
GALLONS OF GLASS REMOVED

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UNIBETSEDÅT GUAHAN

188
SAPLINGS PLANTED

90
ALUMINUM CAN BINS BUILT & RECYCLED

63
ITEMS OF BULKY WASTE REMOVED

57
TIRES REMOVED FROM ROADSIDES

3.5
MILES OF FIREBREAK MAINTENANCE

14
ROADSIDE CLEANUPS

5
ISLAND BEAUTIFICATION PAINTING PROJECTS

17
BROWN TREE SNAKES REMOVED

Sustainable Alliances


Inha University
방문을 환영합니다
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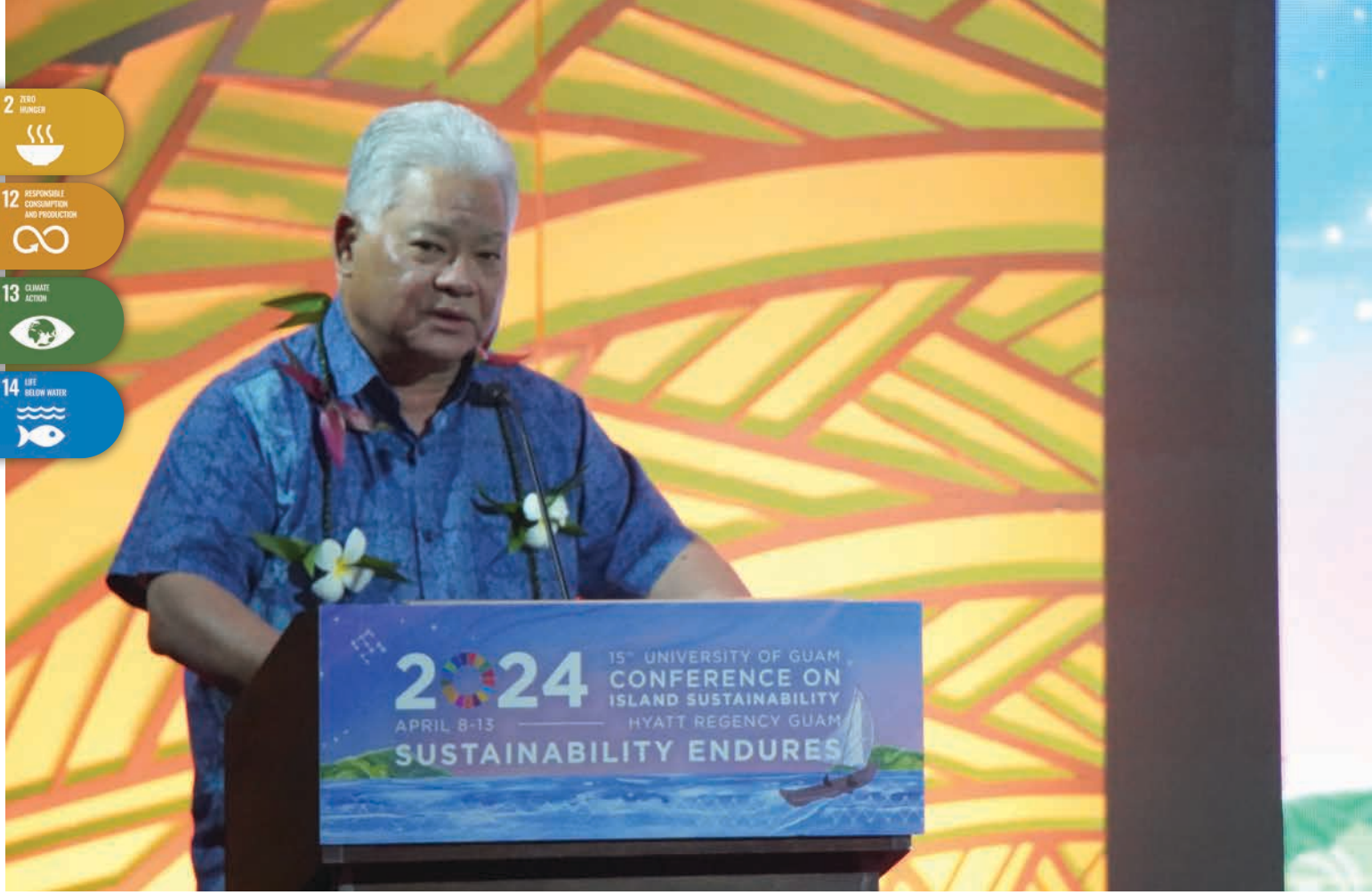


Islands in the spotlight: Insights from the 2024 Sustainability Conference

At the 15th University of Guam (UOG) Conference on Island Sustainability, notable speakers highlighted the critical issues surrounding resource management and climate action, drawing upon cultural narratives and contemporary challenges faced by island communities.

Palau President Surangel Whipps Jr. delivered a powerful keynote address, using a legend from Palauan culture about a giant baby who grew uncontrollably by consuming the island's resources. This cautionary tale illustrated the importance of responsible stewardship and sustainability. "Our goal in Palau is to optimize the use of our resources and balance protection and production to ensure our future generations can continue to fish and farm," Whipps Jr. stated. He emphasized Palau's commitment to promoting island voices in global climate discussions, particularly as chair of the Pacific Small Islands States (PSIDS) during the annual UN Climate Change Conference.

Whipps Jr. expressed concern over the recent Intergovernmental Panel on Climate Change (IPCC) report, noting, "The IPCC report says we just blew past 1.5," referring to the critical temperature limit established in the Paris Agreement. He warned that surpassing this threshold threatens islands like Palau and Guam with rising sea levels that endanger cultural heritage. "Our culture is tied to the land," he said, urging collective action to address these pressing challenges.

In addition to Whipps Jr.'s remarks, Lt. Governor Josh Tenorio of Guam spoke about community resilience, highlighting the CHamoru people's ability to endure natural disasters and the contemporary need to address issues like food security. Austin Shelton, director of the UOG Center for Island Sustainability, reflected on the lessons learned from Typhoon Mawar, noting the island's reliance on outside resources, which stresses the need for sustainability solutions that blend traditional wisdom with innovation.

Robert Underwood, Ph.D., UOG President Emeritus, traced the formation of the Center for Island Sustainability during his tenure as university president. "We had to do something different. We knew it would involve recycling, renewable energy, and fostering an ethic that relied on island resources first," Underwood said.

Emma Perez, co-founder and president of 500 Sails, echoed similar sentiments, emphasizing the importance of cultural heritage in achieving sustainability. "What if our community still had those canoes?" she asked, advocating for a revival of maritime traditions as essential for food security and environmental appreciation.

The conference continued with Governor Arnold Palacios of the Commonwealth of the Northern Mariana Islands (CNMI), who underscored the necessity of integrating indigenous knowledge with modern technology to confront contemporary challenges. He showcased initiatives like the new agroforestry program at Northern Marianas College, which merges traditional practices with scientific approaches in addressing island needs.

Selina Leem, a Marshallese climate change activist and spoken word poet, captivated attendees on the fifth day with her reflections on resilience amid climate change. She recounted her journey, from writing letters advocating for social issues to becoming a voice at international conferences. "With each rising wave is our rising resilience and sense of justice," Leem proclaimed, reminding participants of the urgent need to protect their homes.

In addition to addressing climate issues, the UOG STEM Symposium aimed to support early-career scientists and students through professional development panels. Speakers like Maia Raymundo, Ph.D., and Ann Marie Gawel, Ph.D., shared their personal experiences navigating careers in STEM, encouraging students to embrace their unique journeys.

Throughout the conference, the overarching theme remained clear: the path to sustainability lies in a collective effort that honors the past while innovating for the future. As noted by UOG Senior Vice President and Provost Sharleen Santos-Bamba, Ph.D., "Let us continue to use the knowledge of our people and our ancestors to find answers for the future."

This blend of cultural wisdom, community collaboration, and modern scientific exploration positions island nations to tackle the challenges posed by climate change and resource management effectively.

TOP LEFT AND ABOVE: CNMI Governor Arnold Palacios and Palau President Surangel Whipps Jr. deliver their addresses at the 15th University of Guam Conference on Island Sustainability in April. Conference speakers include Selina Leem, a Marshallese climate change activist and spoken word poet, and Juan Amador, executive director of SACNAS (Society for the Advancement of Chicanos/Hispanics and Native Americans in Science). Sessions focus on research, outreach, and other community initiatives.

CNMI, Palau launch Green Growth hubs expanding regional sustainability

Two new Green Growth hubs were launched in the Micronesia region in 2024, marking a major step forward in regional sustainability efforts.

The CNMI Green Growth initiative officially launched in January in Saipan, followed by the launch of Palau Green Growth in February in Koror. Officials from the Guam Green Growth (G3) initiative and the Local2030 Islands Network praised both efforts as significant progress toward advancing the United Nations Sustainable Development Goals across Micronesia.

The CNMI initiative is co-chaired by Gov. Arnold Palacios and Northern Marianas College (NMC) President Galvin Deleon Guerrero, Ed,D. A working group led by Christina Sablan, CNMI special assistant for climate policy, and Patricia Coleman, NMC dean of Cooperative Research, Extension and Education Services, was created to develop a localized action strategy for CNMI.

Guam Gov. Lou Leon Guerrero, G3 co-chair, said, "It will be exciting to see CNMI's locally driven strategies aligned with the 17 U.N. Sustainable Development Goals."

University of Guam President Anita Borja Enriquez, DBA, who co-chairs G3 with the governor, said the CNMI launch marks the start of a transformative journey.

Enriquez said. "Through the partnership between UOG and the Northern Marianas College community, we can navigate together and shape a resilient, eco-friendly future that will leave a lasting legacy for future generations," she said.

With its launch, CNMI became the newest member of the Local2030 Islands Network, a global alliance of island communities committed to implementing sustainable solutions.

Meanwhile, at the Palau Green Growth initiative launch, officials also unveiled the Palau Sustainability Dashboard, a tool to track progress toward the 17 UN SDGs.

Delivering the partnership remarks, Celeste Connors, Local2030 Islands Network co-lead and Hawai'i Green Growth CEO, said that Palau has long championed good data and local ownership for shared goals and continues to demonstrate

its leadership regionally and globally with its commitment to measuring progress towards the 17 UN SDGs.

"Through our partnership, we hope this launch is just the beginning of many actions," said Palau President Surangel Whipps Jr. "It is through transparency — through our ability to see what we have done and where we are — we can achieve the goals that we are striving for."

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability, presented a painting titled Islands Are Rising to Whipps Jr. and other Palau officials at the event. "Islands are not isolated or scarce — we are abundant, connected and taking action," Shelton said.

In 2023, the UOG Center for Island Sustainability and Sea Grant announced a partnership with the University of Hawai'i Sea Grant College Program for the expansion of Green Growth initiatives across the Western Pacific, supported by a $1.4 million grant from the U.S. Department of State through the NOAA National Sea Grant College Program.

The grant supports the growth of the Local2030 Islands Network and the Green Growth initiative across the Micronesia region.

> *"Through our partnership, we hope this launch is just the beginning of many actions...It is through transparency — through our ability to see what we have done and where we are — we can achieve the goals that we are striving for."*
>
> **Surangel Whipps Jr.**
> Palau President

TOP LEFT AND ABOVE: Governor Arnold Palacios and Northern Marianas College President Galvin Deleon Guerrero, Ed.D. sign the agreement launching the CNMI Green Growth initiative in Saipan in January. **TOP RIGHT AND BOTTOM RIGHT:** Palau President Surangel Whipps Jr. poses with representatives from Guam Green Growth, led by UOG Center for Island Sustainability and Sea Grant Director Austin Shelton, Ph.D., along with other guests at the launch of Palau Green Growth in Koror in February.

17 PARTNERSHIPS FOR THE GOALS

At the UN Conference on Small Island Developing States in Antigua and Barbuda, Lt. Gov. Joshua Tenorio, co-chair of the Guam Green Growth Steering Committee, led a roundtable at the Local2030 Islands Network Leaders' Summit.

Guam represented at UN Conference on Small Island Developing States

Guam was prominently featured at the United Nations Conference on Small Island Developing States (SIDS) in Antigua and Barbuda in May.

At the conference, Guam Green Growth (G3) Steering Committee co-chair and Lt. Gov. Joshua Tenorio facilitated a roundtable panel during the 3rd Leaders' Summit of the Local2030 Islands Network.

The summit included U.S. Secretary of the Interior Deb Haaland, Palau President Surangel Whipps Jr., and several other heads of state.

"This was an extraordinary opportunity to reflect on our progress and strategize with partners for future success," Tenorio said.

Tenorio also delivered keynote remarks at the Global Island Partnership (GLISPA) strategic high-level reception, where he highlighted the Micronesia Challenge—a regional conservation initiative launched in 2006—and its recent expansion.

"Eighteen years ago, leaders from Palau, Guam, the Northern Mariana Islands, the Federated States of Micronesia, and the Marshall Islands launched the Micronesia Challenge," Tenorio noted.

"In 2019, we recommitted to effectively manage 50 percent of marine areas and 30 percent of terrestrial resources. The initiative now also addresses climate change, sustainable livelihoods, invasive species, habitat restoration, enforcement and compliance, and fisheries management," he added.

Tenorio was joined by G3 Steering Committee co-chair Austin Shelton, Ph.D., director of the University of Guam Center for Island Sustainability and Sea Grant. The Guam delegation contributed to discussions and strengthened collaborations that benefit both Guam and the broader Micronesia region.

"The collaborative spirit fostered by Guam and Micronesia with partners like the Local2030 Islands Network, GLISPA, and the Blue Planet Alliance provides insight and continued growth as we work toward a more sustainable future," Shelton said.

Guam is a founding member of the Local2030 Islands Network and implements the 17 United Nations Sustainable Development Goals through G3—the largest public-private partnership in Guam's history focused on sustainability.

Guam's participation in SIDS was sponsored by the Micronesia Conservation Trust, the Micronesia Challenge, and Sea Grant.

Guam officials and representatives from Gyeongin Sea Grant announce a partnership to introduce digital twin technology to the island. From left to right: Guam Lt. Gov. Joshua Tenorio; UOG Center for Island Sustainability and Sea Grant Associate Director for Operations and Development Fran Castro; CNMI Gov. Arnold Palacios; Guam Gov. Lourdes Leon Guerrero; Gyeonggi Sea Grant Director Seung-Buhm Woo; UOG Center for Island Sustainability and Sea Grant Director Austin Shelton, Ph.D.; UOG Sea Grant Researcher Brett Taylor, Ph.D.; and UOG Center for Island Sustainability and Sea Grant Associate Director for Communications and Community Engagement Kyle Mandapat, at the Government House.

Guam, South Korea Sea Grant programs partner on digital twin tech for marine science

The University of Guam (UOG) Center for Island Sustainability and Sea Grant partnered with South Korea Gyeonggi Sea Grant (GSG) program in 2024 to introduce advanced digital twin technology to U.S. marine science research.

This first-of-its-kind partnership introduces South Korea's advanced numerical modeling—digital twin technology—to the United States through an international Sea Grant collaboration.

Digital twin technology creates virtual models of physical systems, enabling real-time simulations and predictive analysis. By integrating KSG's sophisticated numerical modeling with UOG Center for Island Sustainability and Sea Grant's extensive marine and fisheries data, the partnership aims to enhance research capabilities, improve data sharing, and strengthen international collaboration.

GSG Director Seung-Buhm Woo emphasized the significance of the collaboration, stating, "The integration of South Korea's numerical modeling capabilities with Guam's marine data is expected to lead to significant advancements in understanding marine environments and promoting the sustainability of marine resources."

Woo added, "This partnership underscores the global nature of marine science research and the importance of international cooperation in addressing the complex challenges facing our oceans."

UOG Sea Grant researcher Brett Taylor, Ph.D., highlighted the potential applications of digital twin technology, noting, "This is going to give us an opportunity at expanding the understanding of near-shore environments. It opens possibilities for infrastructure with theoretical modeling but can be used to build and test hypotheses."

As the first official research cooperation under the Sea Grant program between the United States and South Korea, this project is set to be a landmark in U.S.-Korea Sea Grant collaboration. It highlights the commitment of both programs to fostering scientific exchange and working together toward the preservation and understanding of marine ecosystems.

UOG makes waves at National Sea Grant Week

Representatives from the University of Guam (UOG) Center for Island Sustainability and Sea Grant participated in five panels and presentations on marine science and coastal resource management at the 2024 National Sea Grant Week conference in Savannah, Georgia.

The National Sea Grant Week conference, a biennial gathering of researchers, educators, and leaders from across the United States, provides a platform for sharing knowledge, building partnerships, and addressing pressing coastal and marine issues.

Guam Sea Grant's participation underscored the program's commitment to national collaboration and its contributions to the broader field of marine science.

Guam Sea Grant representatives presented on the following topics:

- **Aquaculture:** Discussed innovative approaches to aquacultural development and science in the context of Guam's CHamoru culture and history.

- **Fisheries management:** Shared insights into sustainable fisheries practices and the challenges facing Guam's fishing communities.

- **Regional collaboration:** Explored the expansion of Guam Green Growth programs across Micronesia through partnerships with the U.S. State Department, Local2030 Islands Network, and the National Sea Grant Program.

- **Community engagement:** Highlighted efforts to involve local communities in marine conservation,

educational outreach, and capacity-building initiatives.

- **Science communication:** Addressed communication strategies to promote equity, inclusion, and culturally respectful representation.

"Sea Grant Week is an invaluable opportunity for Guam Sea Grant to connect with other Sea Grant programs to share knowledge and gain insights into innovative solutions for sustainable development," said Fran Castro, associate director for operations and development at the UOG Center for Island Sustainability and Sea Grant.

"By participating, Guam strengthens its ability to address local challenges and enhance our capacity to protect marine ecosystems, support local economies, and continue advancing toward a sustainable future for all," Castro added.

UOG Center for Island Sustainability and Sea Grant representatives shared insights on marine science and coastal resource management at the 2024 National Sea Grant Week in Savannah, Georgia. National Sea Grant Week is a biennial gathering of researchers, educators, and leaders from across the United States.

Research

UOG Center for Island Sustainability and Sea Grant and other university officials announce the recipients of the 2024–2026 UOG Sea Grant Competitive Research Funding at an event held at the RFK Memorial Library. The grants support research focused on coastal ecosystem health, sustainable fisheries, resilient communities, and more across Micronesia.

From ocean literacy to reef to ridge: UOG announces Sea Grant research

Six researchers were selected as recipients of the 2024–2026 University of Guam (UOG) Sea Grant Competitive Research Funding. The funding supports research projects that address critical challenges facing Micronesia's coastal ecosystems, communities, and economies.

The UOG Center for Island Sustainability and Sea Grant announced the recipients during an event held in August at the UOG RFK Memorial Library.

An estimated $350,000 was allocated to support research over the two-year funding period. Projects focus on one or more of the following areas: healthy coastal ecosystems; environmental literacy and workforce development; sustainable fisheries and aquaculture; and resilient communities and economies.

The following researchers and their proposals were approved for funding:

• **Bastian Bentlage, Ph.D.** (UOG Marine Laboratory): *"Ridge to Reef Microbiome Census and Identification of Reservoirs of Potentially Harmful Bacteria in the La Sa Fua Watershed, Southern Guam."*

• **Peter Houk, Ph.D.** (UOG Marine Laboratory): *"Mitigating Climate Change Impacts on Micronesia Coral Reefs."*

• **Tom Schils, Ph.D.** (UOG Marine Laboratory): *"Crustose Calcifying Red Algae: Climate Change Winners on Guam's Reefs – Their Abundance and Contribution to the Carbonate Budget of Coral Reefs."*

• **Heloise Rouze, Ph.D.** (UOG Marine Laboratory): *"Micro Symbionts to Support Restoration of Acropora virgata in Guam's Reefs."*

• **Christina Karanassos** (Palau International Coral Reef Center): *"Assessing the Status of Commercially Important Reef Fish Populations in Palau to Inform Fisheries Management."*

• **Laurie Peterka** (Friends of the Mariana Trench): *"Seascape of the CNMI: A Study of Intergenerational and Culturally Adaptive Ocean Literacy."*

Bentlage, an associate professor of bioinformatics at UOG, shared details about his proposed research. "We will map the distribution of bacteria throughout the watershed, including plant communities. Understanding how bacteria impact different habitats, including coral reefs, is crucial. This information will support stakeholders like the Guam Green Growth initiative and those involved in restoration efforts."

The researchers will use field and laboratory experiments, modeling, and socioeconomic studies to inform policy decisions and best management practices. Each selected project is required to include a strong outreach component that engages a diverse range of participants, including resource managers, industry stakeholders, citizen scientists, communities, and students.

Austin Shelton, Ph.D., UOG Center for Island Sustainability and Sea Grant director, said, "Their work will provide invaluable insights to help us make informed decisions as island residents to better protect our resources."

"This is just the beginning," Shelton added. "The UOG Sea Grant program has much more in store for our research initiatives."

"The UOG Sea Grant program is vital to our university's mission," said Sharleen Santos-Bamba, Ph.D., UOG senior vice president and provost at the event. "It supports research, education, and outreach that address the critical challenges facing our island and region. From climate change and coastal resilience to sustainable fisheries and marine conservation, this funded work will have a profound impact on our region."

Bastian Bentlage, Ph.D., a UOG associate professor of bioinformatics, provides an overview of his research. Benlage is one of several researchers selected for the 2024-2026 UOG Sea Grant Competitive Research Funding.

New Island Conservation Lab opens with focus on Guam's biocultural diversity

In 2024, the Natural Resources Division of the University of Guam (UOG) Center for Island Sustainability and Sea Grant launched a new interdisciplinary research unit: the Island Conservation Lab (ICL). This transition reflects a renewed focus on protecting Guam's biocultural diversity by integrating terrestrial conservation, ethnobotany, and environmental policy.

Leadership and Vision

Else Demeulenaere, Ph.D., a longtime advocate for traditional knowledge and conservation, and Vince Fabian, a leader in terrestrial ecosystem restoration, founded ICL to bridge science, culture, and community. Vince leads the terrestrial conservation efforts and manages the lab's growing nursery operations and critical infrastructure for native species restoration.

Conservation Achievements

Endangered and Threatened Species (ETS) Research

In 2024, the lab expanded its rare plant nursery's capacity to more than 4,000 plants with a diverse array of 46 native and endemic species, including eight federally listed under the Endangered Species Act. The ICL has successfully salvaged and rehabilitated all three listed epiphytic orchids with plans for transplanting the more than 200 individuals to different restoration sites and even people's yards under the Táiparehu program. This past year, the lab propagated more than 200 individuals of five listed species, and outplanted 60 of them in the rainy season with the rest planned for 2025. The ICL researchers also expanded their ETS survey efforts to cover approximately 16 acres of land, where they documented more than 1,600 individuals, including fadang (*Cycas micronesica*) and listed epiphytic orchids.

Habitat Restoration and Invasive Species Removal

On top of their work with ETS, the lab also tackles habitat restoration through the removal of invasive flora and the promotion of native flora. With the primary target species of the invasive *Vitex parviflora*, the ICL crew removed more than 600 trees, 150 saplings, and 100 seedlings using mechanical and chemical means. Other invasive species like lemon de china (*Triphasia trifolia*) and tangantangan (*Leucaena leucocephala*) were also removed in quantities of more than 1500 trees combined.

In place of these invasive species, approximately 2027 native and endemic trees and shrubs consisting of 46 different species were outplanted in degraded limestone and savanna habitats to encourage more native biodiversity.

Integrating management practices with research, vegetation surveys were conducted in over 100 acres of land with results supporting the development of the Atantåno Vegetation Restoration Plan, several technical reports, and future publications.

Environmental Policy and Partnerships

Led by Caley Jay Chargualaf, the lab plays a vital part in shaping conservation policy in Guam. Caley works closely with other local agencies in conservation policy projects. Alongside the Guam Department of Agriculture, the lab holds a key role in the development of the Guam Habitat Conservation Plan. This plan will be used to provide balance in protecting endangered species and their habitats while promoting sustainable economic development. The lab's policy team is also involved in facilitating the revision of the Guam State Wildlife Action Plan, which aims at identifying conservation needs for the island's species of greatest conservation need.

Ethnobotany, Education, and Outreach

In fanuchånan 2024, Demeulenaere launched Guam's first ethnobotany course, expanding the island's academic and cultural knowledge base. Through this effort, the Island Conservation Lab is expanding local capacity to understand and protect traditional ecological knowledge.

The lab is actively pursuing new grants to support ethnobotanical and social science research. By integrating scientific inquiry with community engagement, ICL aims to inform conservation practices and policy with culturally grounded insights, ensuring that environmental management reflects the values and knowledge of the island's people.

Our Logo: A Symbol of Island Conservation

The Island Conservation Lab's logo embodies our mission to protect Guam's natural and cultural heritage. The latte house represents our native plant nursery and reflects our foundation in community-based conservation and CHamoru cultural values. The flower and fruit of Tabernaemontana rotensis, a threatened endemic tree, symbolize our focus on the recovery and stewardship of Guam's most threatened plant species. Together, these elements capture the lab's integrated approach to conservation, rooted in both science and tradition.

Looking Ahead

With integrated efforts in science, culture, and policy, the Island Conservation Lab is laying the foundation for a thriving, biodiverse future for Guam. As the lab grows, it will continue building partnerships, expanding restoration work, and uplifting the island's ecological and cultural resilience.

The team from the UOG Center for Island Sustainability and Sea Grant's Island Conservation Lab (ICL) is pictured at top left. Other photos show the team in action as they work to protect Guam's biocultural diversity through interdisciplinary efforts in terrestrial conservation, ethnobotany, and environmental policy.

Dr. Brett Taylor
Assistant Professor of Fisheries Ecology
UOG Sea Grant Researcher

Researcher discovers unusual mortality rates in surgeonfishes

An international team of researchers led by assistant professor Brett Taylor, Ph.D., from the University of Guam (UOG) Sea Grant and Marine Laboratory discovered that while most surgeonfishes mature quickly and die young, some develop slowly and live for several decades.

"This is an extremely rare trait in coastal fishes, and likely contributes to a higher sustainability of surgeonfish fisheries in the Mariana Islands and elsewhere," said Taylor, the lead researcher on the project.

Taylor first noticed discrepancies in the maturity rate and lifespan of surgeonfishes while studying fish in the Western Pacific. Taylor's team sampled surgeonfish species from the Mariana Islands and looked at their basic biology: how long they live, how fast they grow, how big they get, when they start reproducing and when they die.

"Their death rate stood out as bizarre and really went against conventional wisdom, so that motivated the second study," he said.

The second study included surgeonfishes from tropical oceans around the world. The researchers learned that the combination of fast-paced development and long lifespan is found among surgeonfishes everywhere.

"This is certainly the only study of its kind to critically examine the patterns of mortality in a family of reef fishes like this, and the findings are novel in that very few species, if any, have ever shown a similar pattern," he said. "Part of the novelty lies in the fact that over 700 scientific papers have been written that focus on surgeonfishes, yet to date none have identified the patterns that we demonstrate on a global scale."

Scientifically known as Acanthuridae, surgeonfishes comprise up to 30% of coastal fisheries in the Indo-Pacific region. They are important species to local economies, and they are a valuable food source.

The fish studied in the Marianas include ataga, or bluespine unicornfish (*Naso unicornis*); hangon, orangespine unicornfish (*Naso lituratus*); gupau, which include a few species such as yellowfin (*Acanthurus xanthopterus*), ringtail (*Acanthurus blochii*), and epaulette surgeonfish (*Acanthurus nigricauda*); kichu, convict surgeonfish (*Acanthurus triostegus*); hamoktan, whitespotted surgeonfish (*Acanthurus guttatus*); and hiyok, lined surgeonfish (*Acanthurus lineatus*).

Surgeonfishes are a diverse group with life-history patterns that diverge from most other fish families. For instance, some of the smallest species are often the longest lived, reaching ages of more than 20 years. Some species mature at small body sizes while others mature when they are nearly fully grown.

The research will help fisheries officials make informed decisions about how to manage resources.

"The biology of harvested species is a key attribute that needs to be understood in order to design and apply appropriate management practices, especially for fisheries," Taylor said. "Our results demonstrate that surgeonfishes are likely more resilient to fishing pressure, which is generally good news and corroborates prior studies that generally find that surgeonfishes are less impacted by fishing than might be expected."

The studies were funded by a National Fish and Wildlife Foundation grant and NOAA Saltonstall-Kennedy Grant Program.

TOP LEFT AND BELOW: Brett Taylor, Ph.D., a researcher with UOG Sea Grant and the Marine Laboratory, leads a project that sheds light on the lifecycles of surgeonfishes. Acanthurus guttatus, also known as hamoktan or whitespotted surgeonfish, was one of the species studied in the Mariana Islands.
Photos courtesy of Dave Burdick / guamreeflife.com and Dr. Brett Taylor.

13 CLIMATE ACTION

14 LIFE BELOW WATER

Workshop tackles COTS outbreaks

Insights into reproductive trends, predation patterns, and climatic triggers observed prior to a crown-of-thorns (COTS) outbreak are crucial for developing effective mitigation strategies to protect coral reefs, according to Ciemon Caballes, Ph.D., an assistant professor at the University of Guam (UOG) Marine Lab.

Caballes shared his insights during the "Guam Crown-of-Thorns Starfish Outbreak Response Strategy" workshop in December at the UOG Marine Lab.

COTS are marine invertebrates known for their predation on corals. They can cause devastating impacts on coral reefs by depleting coral populations. They are found in reefs across the Indo-Pacific region.

Caballes' research, supported by a grant from the National Fish and Wildlife Foundation, in collaboration with UOG Sea Grant and other local and federal resource management agencies, focuses on understanding and mitigating these outbreaks.

"When we try to catch a serial predator, like the crown-of-thorns starfish, we need to build a profile," Caballes said noting that understanding COTS and the trends leading to an outbreak is crucial for an effective mitigation strategy.

Caballes outlined several hypotheses regarding the formation of COTS outbreaks. The first suggests that outbreaks are a natural biological predisposition, given the species' high fertilization rates. According to Caballes, even a single mating pair can initiate a population surge. He said a female starfish could potentially produce over 100 million eggs in one spawning season while a male can produce around 50 billion sperm.

Surprisingly, he pointed out that, despite a male-skewed sex ratio, crown-of-thorns starfish maintain high fertilization rates, achieving up to 30% success even when separated by significant distances. The second hypothesis links outbreaks to the overfishing of natural predators, leading to the release of COTS from predatory pressure. He also discussed the nutrient hypothesis, which posits that elevated nutrient levels from river runoff result in increased phytoplankton densities.

Since phytoplankton provide a source of food for COTS larvae, the spike improves their survival and development rates. However, he also said recent findings indicate that excessive phytoplankton might lead to overfeeding, affecting larvae survival negatively.

Caballes also recalled several significant outbreaks, particularly one in 2009, and noted the possible influence of temperature and strong El Niño-Southern Oscillation (ENSO) events on COTS populations. He illustrated the correlation between high precipitation and river discharge events, such as those in 2003 and 2004, and subsequent COTS outbreaks in 2006 and 2007.

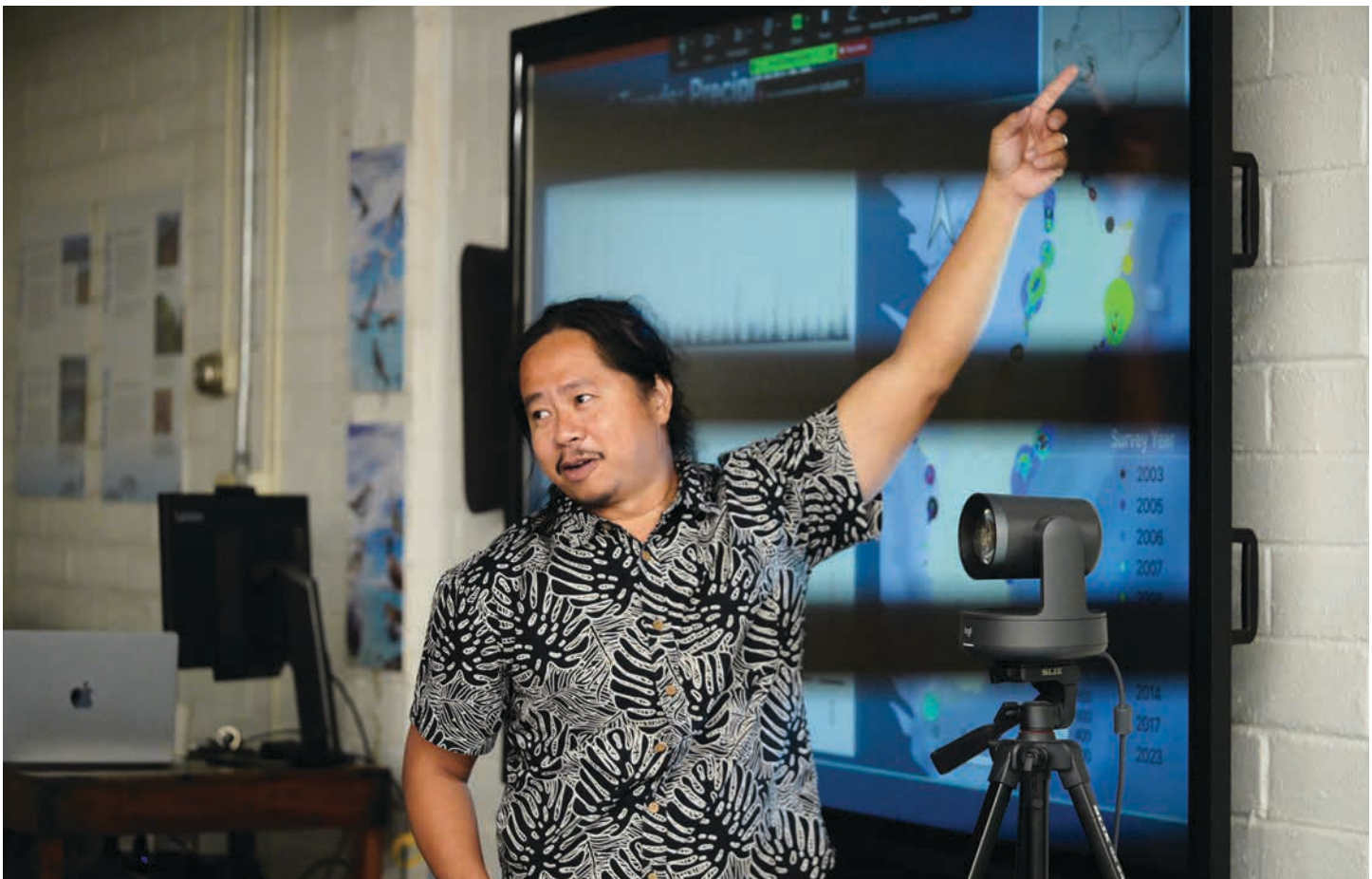
Caballes noted, "With back-to-back coral bleaching events compounded by COTS outbreaks, corals are struggling to recover." He emphasized the need for effective management strategies to address these dual threats.

"This workshop is the culmination of our work since 2022. The project began in March of that year to assess the crown-of-thorns starfish populations around Guam and explore the feasibility of coral rehabilitation in these reef areas," Caballes stated. Caballes described their research efforts, which included testing various plots to determine if culling crown-of-thorns starfish would enhance the survival of transplanted corals.

Input from workshop participants have been integrated into the Guam COTS Outbreak Strategic Management Plan, which will be available to the public and distributed to all local and federal partners.

At the workshop, Fran Castro, associate director for operations and development at the UOG Center for Island Sustainability and Sea Grant, highlighted the significance of the project in addressing COTS. She described multi-agency efforts from the UOG Center for Island Sustainability and Sea Grant and other partners that involved training local agencies and coordinating monitoring efforts.

TOP LEFT AND BELOW: Ciemon Caballes, Ph.D., a senior research associate at the UOG NSF EPSCoR and assistant professor at the UOG Marine Lab, presented findings from a study during the "Guam Crown-of-Thorns Starfish Outbreak Response Strategy" workshop in December at the UOG Marine Lab. Caballes' research received support from the National Wildlife Foundation, UOG Sea Grant and other agencies.



UOG students present, win awards at SACNAS STEM Conference

A total of 22 University of Guam (UOG) students presented their research at the 2024 Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Diversity in STEM (NDiSTEM) Conference, held in October in Phoenix, Arizona.

Two students—Anna Lhyn Mallari and Nadley Yow—received awards for their presentations and were recognized during an end-of-week awards ceremony.

The student presentations covered topics ranging from marine biology to environmental science and engineering. Their work was featured through poster presentations, giving them a platform to engage with leading professionals and potential collaborators.

"It is a privilege to present my research and be recognized at a national conference like SACNAS. This award reflects the dedication and support of my mentors and colleagues, and I am proud to bring it back to the University of Guam and to the School of Engineering," said Mallari.

UOG SACNAS presenters included:

1. Daissy Demei (SEAS)
2. Deniena Fred (SEAS)
3. Ale'a Duenas (SEAS)
4. Lucey Mea (SEAS)
5. Nadley Yow (SEAS)
6. Thuy Nguyen (PIPCHE)
7. Yoonji Seo (EPSCoR)
8. Sean McManus (EPSCoR)
9. Tristan Pajela
10. Cassandra Paule (PNNL)
11. Ava-Rene Suba (SEAS)
12. Ave Medina (EPSCoR)
13. Mya Ngemae (EPSCoR)
14. Daniel Urbano (EPSCoR)
15. Makayla Dela Cruz (SEAS)
16. Anna Mallari (SEAS)
17. Cyril Concepcion (SEAS)
18. Nicolas Nadeau
19. Joanna Rose Lauana (EPSCoR)
20. Carlo Tapia (EPSCoR)
21. Reina Evangelista
22. Gian Paras (PIPCHE)

Forty-eight UOG participants attended the 2024 SACNAS National Diversity in STEM (NDiSTEM) Conference, connecting with experts, recruiters, and peers while strengthening Guam's presence on a national STEM stage.

"We are incredibly proud of our students and their dedication to research," said UOG President Anita Borja Enriquez, DBA. "Their participation in SACNAS NDiSTEM demonstrates UOG's commitment to fostering scientific inquiry and preparing the next generation of STEM leaders to take to the national stage."

Student attendance was supported by capacity-building grants from the NSF SEAS Islands Alliance, NSF Navigating Home, the Sloan Foundation, Guam NSF EPSCoR, and travel scholarships from SACNAS and the Research Corporation of the University of Guam.

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, emphasized the value of national exposure for Guam students, noting that despite geographic challenges, UOG secured funding to ensure their participation at the SACNAS conference, where students earned awards, networked with top universities, and gained immediate research and scholarship opportunities.

"We're excited for the future of our island as our students go on to receive advanced training and return home to solve our most pressing challenges," Shelton said.

The 2024 SACNAS NDiSTEM brought together thousands of scientists, engineers and students from across the country.

The conference is a leading event for Hispanic, Native American, and Asian Pacific Islander students and professionals, offering opportunities to share research and promote diversity in science, technology, engineering, and math.

"It is a privilege to present my research and be recognized at a national conference like SACNAS. This award reflects the dedication and support of my mentors and colleagues, and I am proud to bring it back to the University of Guam and to the School of Engineering."

Anna Lhyn Mallari
UOG Student/SACNAS Awardee

TOP LEFT: The UOG delegation at the 2024 SACNAS National Diversity in STEM (NDiSTEM) Conference includes 48 students who connected with experts, recruiters, and peers while strengthening Guam's presence on the national STEM stage. RIGHT: UOG students Anna Lhyn Mallari and Nadley Yow receive recognition during the end-of-week awards ceremony.

UOG Island Conservation Lab rescues native orchids

One of the initiatives undertaken by the University of Guam Center for Island Sustainability and Sea Grant's Island Conservation Lab is the rescue of threatened native orchid species.

Decaying old trees play a vital role in a forest's life cycle. As trees age and become more fragile, they eventually fall, creating open spaces in the forest that allow new seedlings to thrive. In some cases, these fallen trees serve as hosts for rare and threatened orchids.

In one rescue effort, the natural resources team trekked into the jungles of Guam and retrieved more than 12 clusters of native orchids that an old yoga tree displaced during its fall.

The clusters include *Dendrobium guamense*, *Bulbophyllum guamense*, and *Coelogyne guamensis*, which are epiphytic orchids that grow on other plants for support.

Dendrobium guamense and *Bulbophyllum guamense* are only found on Guam and the Commonwealth of the Northern Mariana Islands, while *Coelogyne guamensis* is also found in Palau.

"It is important to preserve the genetic diversity of each orchid population, especially because they are threatened with extinction," said Else Demeulenaere, Ph.D., associate director for natural resources at UOG Center for Island Sustainability and Sea Grant.

The team will care for the rescued orchids at the natural resources rare plant nursery, where they will provide the necessary treatment to help the orchids thrive before reintroducing them to a suitable habitat.

"After the orchids recover in the nursery, we will return them to the forest on new host trees," said Vince Fabian, program manager at the natural resources division. "We will tag them to track their origins and monitor their health in the future. These reintroductions will also allow us to observe reproductive activity and determine if these salvaged orchids increase in numbers after transplanting."

Once the orchids recover, the community will have opportunities to assist with the care of these orchids through the Táiparehu Program, which the group will launch soon.

This rescue represents just one part of the team's ongoing efforts to protect, preserve, and conserve Guam's natural resources.

"Our team engages in forest restoration projects, removes invasive species, and plants native trees. We also run several endangered species recovery programs, develop policy and natural resource planning initiatives, and conduct ethnobotanical projects," Demeulenaere said.

"It is important to preserve the genetic diversity of each orchid population, especially because they are threatened with extinction."

Else Demeulenaere, Ph.D.,
Associate Director, Natural Resources
UOG Center for Island Sustainability and Sea Grant

UOG Center for Island Sustainability and Sea Grant Natural Resources Division rescues clusters of threatened native orchids—including *Dendrobium guamense, Bulbophyllum guamense,* and *Coelogyne guamensis*—as part of its conservation program.

Partnership with fishers to monitor Guam's reef fish population

The Guihan for Guåhån project continues its efforts to monitor the health of Guam's reef fish population by engaging with local fishers for outreach and data collection.

Launched in February 2023, Guihan for Guåhån collects data on fish catches by working closely with fishers. Through this community-based process, researchers gather information on fish size, species and abundance.

The project, part of University of Guam (UOG) Center for Island Sustainability and Sea Grant, utilizes the data for long-term reef fisheries monitoring and determining diversity and overall reef health.

In 2024, the Guihan for Guåhån team engaged with more than 1,000 community members through various outreach activities for the project. Through their data collection efforts, they measured over 100 fish catches submitted by fishers from across the island.

In the long run, the data collected would inform the island's fisheries management plan, help shape future policies to protect Guam's marine resources and also translate the science of sustainable fishing to the community.

"By working directly with fishers, we can better understand their needs and concerns while also collecting crucial data," said Leilani Sablan, a marine biologist leading the project.

As part of this effort, Guihan for Guåhån hosted a Community Science Workshop in December at the Guam Green Growth Circular Economy Makerspace & Innovation Hub's Green Store in Hagåtña.

During the sessions, Sablan explained the importance of fisheries-dependent data and how it helps assess the health of Guam's reefs and marine species. Participants learned how to properly use specially designed fishing mats to measure and record their catches.

Participants received catch mats and hands-on training on their use. Giveaways such as posters, stickers and bags were also distributed.

Fran Castro, the associate director for operations and development at UOG Center for Island

Sustainability and Sea Grant said, "The research our team is doing will benefit the entire community, and we welcome the community to get involved."

The Guihan for Guåhån project is funded through the Sea Grant Omnibus.

"The research our team is doing will benefit the entire community, and we welcome the community to get involved."

Fran Castro
Associate Director, Operations and Development
UOG Center for Island Sustainability and Sea Grant

RIGHT: UOG Sea Grant marine biologist Leilani Sablan leads the Guihan for Guåhån project, which monitors the health of Guam's reef fish populations through outreach and data collection with local fishers. BELOW: Local fishers display their catches, which were measured as part of the data collection process for Guihan for Guåhån.

Dr. Else Demeulenaere
Associate Director for Natural Resources,
UOG Center for Island Sustainability

Plant classification study published in PhytoKeys includes håyun lagu

Else Demeulenaere, Ph.D., associate director for natural resources at the University of Guam (UOG) Center for Island Sustainability and Sea Grant's Island Conservation Lab, has contributed to research that reclassified Caesalpinioidea, a group of plants that includes the critically endangered *Serianthes*.

Published in PhytoKeys, the study provides a new understanding of the relationships between various plant species within this diverse group.

Demeulenaere led the chapter dedicated to the Archidendron clade, building upon her Ph.D. research on the *Serianthes* genus and closely related species. The research was also published in PhytoKeys in 2022, under the guidance of dissertation chair, Stefanie Ickert-Bond, Ph.D.

The *Serianthes*, known as håyun lågu in Guam and tronkon guåfi in Rota, belongs to the Archidendron clade under Caesalpinioidea. A clade refers to a group of plants with related characteristics and a common ancestor with all its descendants.

Demeulenaere's contribution particularly highlights the traditional uses of *Serianthes*, an ecologically and culturally significant species for Guam and region.

"I took the opportunity to list the traditional uses related to the *Serianthes* genus important to Micronesia and clarified that, although the same species occurs on Guam and Rota and another on Palau and Yap, each has its own indigenous plant name," she explained.

Demeulenaere added that this aspect underscores these plant species' cultural significance and practical applications within local communities.

Demeulenaere collaborated with 48 authors from 41 institutions around the globe on the monograph, which was published earlier this year. Along with Demeulenaere, Ickert-Bond also contributed to the monograph.

"It's an honor to have collaborated with an incredible group of researchers on this monograph," Demeulenaere said.

Caesalpinioidea is a diverse subfamily of legumes consisting of approximately 4,680 species. Members of this subfamily often have unique floral structures and are found in a wide range of habitats worldwide.

The Caesalpinioidea subfamily includes a variety of trees, shrubs, and herbs known for their economic and ecological importance. Other species belonging to the Caesalpinioidea are the tamarind tree, the flame tree, and the acacia tree.

The recent monograph not only establishes a new classification for the Caesalpinioidea but also includes distribution maps, an identification key, and detailed morphological descriptions covering the species' various growth forms, foliage, flowers, and fruits.

According to Demeulenaere, reclassification is important because it helps botanists understand the relationships between plants, in this case based on genomic data, which is essential for conservation and recovery efforts.

PhytoKeys serve as an essential resource for researchers, conservationists, and anyone interested in the biodiversity of the Archidendron clade and Caesalpinioidea.

Else Demeulenaere, Ph.D., associate director for natural resources at the UOG Center for Island Sustainability and Sea Grant collects leaf samples for her research. Her work has helped re-classify Caesalpinioidea, which includes the ecologically and culturally significant Serianthes species. Recently published in Phytokeys, this study provides valuable insights into the relationships among various plant species within this diverse group. Photo courtesy of Dr. Else Demeulenaere.

Addie Ferguson
Sea turtle biologist,
UOG Center for Island Sustainability

UOG Sea Grant: Increased sea turtle nesting in 2024

The University of Guam (UOG) Sea Grant program reported an active year for sea turtle nesting in 2024.

According to sea turtle biologist Addie Ferguson, the 2024 nesting season was non-stop, in contrast to previous years. "The nesting season started earlier than normal" Ferguson said. "We had more year-round nesting, which was great!"

From March 2014 through December 2024, the team conducted beach surveys on a combined total of 1,683 days. Over the course of the project, they recorded 1,306 *Chelonia mydas* (green turtle) emergences, which resulted in 998 nests and 308 non-nesting events, also known as false crawls—instances when a female sea turtle comes onto the beach but returns to the ocean without laying eggs.

In 2024 alone, they documented 143 nests and 66 false crawls. Among all seasons, 2021 recorded the highest number of total emergences, with 2024 following as the second-highest year on record.

Since 2018, UOG Sea Grant has been in a cooperative agreement with NAVFAC Marianas to monitor nesting beaches at Andersen Air Force Base. This collaboration has contributed years of meaningful research and conservation efforts, while remaining dedicated to preserving the native species of the Marianas: the green and hawksbill sea turtles.

A key focus of the Sea Grant program is monitoring sea turtle nesting activity.

In addition, the program is actively involved in regular outreach and educational presentations to students throughout the community. Recently, the group extended its sea turtle outreach efforts to the Commonwealth of the Northern Mariana Islands through a partnership with the Naval Facilities Engineering Systems Command (NAVFAC) Marianas.

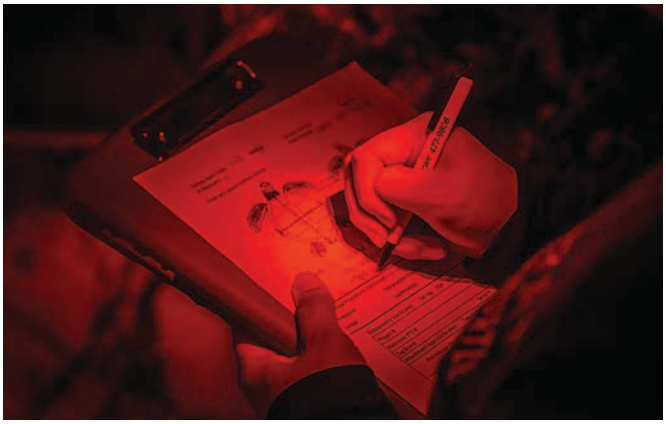
By engaging the community, UOG Sea Grant aims to foster a deeper appreciation for sea turtles and

inspire stewardship of the marine environment. Researchers in the program are also collaborating with local and federal partners on various research projects and recently participated in turtle tagging training with the NOAA Pacific Islands Fisheries Science Center Marine Turtle Biology and Assessment Program team.

In the face of habitat loss, pollution, climate change, and other stressors, the UOG Sea Grant Sea Turtle program remains committed to its mission of protecting and conserving these cultural icons.

"Sea turtles are a culturally significant species and necessary for the health of coral reefs and seagrass beds," Ferguson added. "The program's goals are to monitor and protect the nests of these endangered species and spread awareness to the local community about the threats affecting our sea turtles in Guam." This project is part of a cooperative agreement between UOG and Andersen Air Force Base, funded by the Department of the Navy on behalf of Joint Region Marianas. Biologists are authorized to conduct research under ESA Recovery Permit ES2195A.

> *"The program's goals are to monitor and protect the nests of these endangered species and spread awareness to the local community about the threats affecting our sea turtles in Guam."*
>
> **Addie Ferguson**
> Sea Turtle Biologist, UOG Sea Grant



RIGHT: UOG Sea Grant biologist Addie Ferguson monitors the nesting areas of the green and hawksbill sea turtles as part of conservation efforts in Guam. Ferguson and other UOG Sea Grant biologists are authorized to conduct research under ESA Recovery Permit ES2195A.

Island Conservation Lab shares research at Mariana Islands Conference

The University of Guam (UOG) Center for Island Sustainability and Sea Grant's Island Conservation Lab (ICL), led by Associate Director for Natural Resources Else Demeulenaere, Ph.D., and Program Manager Vince Fabian, presented forest conservation and restoration research at the sixth annual Mariana Islands Conservation Conference (MICC) in February in Saipan.

The MICC provides a platform to showcase and connect conservation research across the Mariana Islands. Topics ranged from forest restoration and insect ecology to coral reefs, bird rehabilitation and more.

Demeulenaere presented interdisciplinary findings from her doctoral thesis on the endangered håyun lågu/tronkon guåfi (*Serianthes nelsonii*). She highlighted the species' rich ethnobotanical history and traditional uses in Micronesia, as well as clarified its phylogenetic relationships. Her research emphasized the importance of recovery efforts and the need for conservation policy and enforcement.

Fabian summarized the ICL's work on invasive flora management and native species recovery, offering insights into forest restoration strategies that can be adapted across the Marianas. His presentation sparked important discussions on the use of herbicides in invasive plant removal and the viability of above-ground outplantings to promote native species regeneration.

Conferences such as the MICC are important venues for researchers such as those in the ICL to share and connect with fellow managers, scientists, and community members to move toward the common goal of conservation.

Top photo shows participants and speakers at the 6th Annual Mariana Islands Conservation Conference in Saipan, including UOG Island Conservation Lab's Else Demeulenaere, Ph.D., and Vince Fabian, who presented on forest conservation. Photo courtesy of Tåno, Tåsi, yan Todu"

UOG introduced the first ethnobotany course in 2024. As part of the course, students learned traditional ecological knowledge and modern challenges.

Island wisdom in practice: First ethnobotany course at UOG

In Fanuchånan 2024, the University of Guam (UOG) offered its first-ever course in ethnobotany.

Ethnobotany of Micronesia is designed and taught by Else Demeulenaere, Ph.D., associate director for natural resources at the UOG Center for Island Sustainability and Sea Grant. The course brought together students, plants, and cultural knowledge systems in a unique academic setting that embodied UOG's "Island Wisdom" mission.

This mission calls on the university community to navigate and integrate both Indigenous and Western frameworks in decision-making and action, with the goal of strengthening our communities and island life.

Ethnobotany is the study of the relationships between people and plants within specific cultural and ecological contexts. This course introduced students to the basics of ethnobotanical research, including ethical principles, and emphasized plant use in Micronesia for food, medicine, fishing, construction, and ceremony.

Students also explored how traditional ecological knowledge intersects with modern challenges such as climate change, sustainability, and public health. Student-led projects became the heart of the course, illustrating the richness of local knowledge and creativity. One student cooked soup in class using ingredients harvested from his own yard.

Another led a workshop on coconut leaf weaving. Presentations covered traditional remedies for urinary tract infections, root crops, the gåogao tree, ferns found in savanna environments, and the culturally significant tassel fern.

By combining academic learning with hands-on cultural experiences, the class cultivated not just knowledge, but pride and stewardship. Students connected with their heritage, learned to value local resources, and began to see themselves as contributors to ongoing conversations about sustainability and Indigenous knowledge.

This pioneering course represents a vital step in strengthening place-based education at UOG and highlights the transformative power of integrating traditional wisdom into higher education.

STEM symposium features presentations from UOG high school interns

Three high school students won the top prizes at a science symposium that marked the culmination of the 2024 STEM High School Summer Internship program of the University of Guam (UOG) Center for Island Sustainability and Sea Grant and the National Science Foundation INCLUDES SEAS Islands Alliance.

The symposium took place on Friday, June 28, at the UOG School of Business and Public Administration.

Addressing the interns at the start of the symposium, UOG Center for Island Sustainability and Sea Grant Director Austin Shelton, Ph.D., said, "We hope that your experience here at the University of Guam in the last few weeks has sparked a continuing interest in Science Technology Engineering and Mathematics."

According to Shelton, participating in the NSF-supported summer internship gives the high school students a valuable head start in STEM careers, as the NSF is a leading force in scientific research funding.

Below are the projects which bagged the top prizes at the symposium. Two students tied for the 3rd prize:

- **1st Prize:** Cecelia Rose Borja from Simon Sanchez High School (Mentor: Bastian Bentlage, Ph.D.), *"The Production of Siderophores with Associated Bacteria in Pavona decussata"*

- **2nd Prize:** Sophia Leon Guerrero from Academy of Our Lady of Guam (Mentor: Ciemon Caballes, Ph.D.), *"Crystal Clear: How Water Quality Affects Coral-Zooxanthellae Symbiosis"*

- **3rd Prize:** Ghislaine Desacula from George Washington High School (Mentor: Ernesto Guades, Ph.D.) *"Repurposing Plastic Bottles in Concrete Mixtures: Study on the Strength and Displacement Performance"* and Manny Marcus from GWHS (Mentor: Else Demeulenaere, Ph.D.) *"Watershed"*

"Coral reefs are significant for ecosystems as they provide habitats for numerous organisms," Borja said, adding those anthropogenic stressors (caused by human activities) impact coral reef health.

Borja's winning poster presentation proposes probiotic treatment with siderophore-producing bacteria to increase coral health and reef resilience.

Eight students from local high schools participated in the month-long internship program at the start of June. Throughout the program, the high school students participate in science-based research with their undergraduate, graduate, and faculty mentors.

At the end of their internship, the students present their research in a poster format at the science symposium. The presentations focus on engineering, botany, marine biology, and other fields of science.

Also, part of the program is the Near-Peer mentorship which aims to help students recognize how their research experiences influence their self-identity and shape their education and career path in STEM.

Cheryl Sangueza, Ph.D., co-principal investigator of NSF SEAS Island Alliance, takes the lead in the Near Peer seminars. She mentioned that students are collaborating on their presentations, sharing reflections, and building connections. "It is really nice seeing these gatherings of students both socially and in the realm of science," she said.

Three high school students earn top honors at a science symposium held at the UOG School of Business and Public Administration. The event is part of the 2024 STEM High School Summer Internship Program, hosted by the UOG Center for Island Sustainability and Sea Grant in collaboration with the NSF INCLUDES SEAS Islands Alliance.

Else Demeulenaere, Ph.D., associate director for natural resources at the UOG Center for Island Sustainability and Sea Grant, highlights Guam's native plants and biocultural challenges at the XX International Botanical Congress.

UOG's Demeulenaere brings håyun lågu research to international botanical congress

Bringing a unique perspective to a major international forum, Else Demeulenaere, Ph.D., associate director for natural resources at the University of Guam (UOG) Center for Island Sustainability and Sea Grant shared insights into Guam's unique flora and pressing biocultural issues at the XX International Botanical Congress in Madrid, Spain.

The congress, a global gathering of over 3000 botanists, plant scientists, and conservationists, provided a platform for researchers to exchange ideas, collaborate on projects, and advance botanical knowledge.

Demeulenaere organized one of the 350 concurrent symposiums hosted during the congress, highlighting biogeographic research in the Indo-Pacific region.

As the lone presenter from Micronesia, Demeulenaere shared her latest findings in her work with the flora of the islands, specifically highlighting the findings of her work with the håyun lågu tree (*Serianthes nelsonii*) on Guam.

According to Demeulenaere, the large-scale congress only occurs every six years and gave her a chance to talk with other botanists and make connections about our region and the plants we have.

"It was great to hear other botanists from the Indo-Pacific region talk about species distribution patterns and their seed dispersal routes throughout the Pacific. Using molecular data, we were able to compare Micronesian floristic patterns and affinities with other biogeographic regions" added Demeulenaere.

In addition to the håyun lågu presentation, Demeulenaere co presented with Maria Hernandez May from Hita Litekyan (using voice recording) during a symposium on science decolonization where they shared how science can be an advocate for bioculture preservation.

Their presentation entitled, "Biocultural Heritage of Litekyan in Guam: Connecting Stories of Spirituality and Resistance" highlighted the importance of preserving biodiversity and understanding their cultural importance in the face of the military buildup on Guam.

Vince Fabian, program manager at the UOG Center for Island Sustainability and Sea Grant's Island Conservation Lab, outlines the goals, accomplishments, and future plans of the lab at the first UOG Research Forum.

Advancing sustainability: Insights from the inaugural University of Guam Research Forum

The inaugural University of Guam (UOG) Research Forum, held at the UOG Leon Guerrero School of Business and Public Administration, convened experts to discuss innovative research and sustainability practices relevant to the future of Guam and the Pacific region.

Presenters included researcher Vince Fabian, program manager at the UOG Center for Island Sustainability and Sea Grant's Island Conservation Lab, who outlined the goals, accomplishments, future plans, and challenges faced by the lab.

Fabian presented findings on sustainable practices in island ecosystems. His research, based on extensive fieldwork, investigates strategies for natural resource management, biodiversity conservation, and sustainable development.

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, also provided insights into sustainability strategies for island communities.

Shelton addressed ongoing efforts to drive community-based sustainability initiatives through Guam Green Growth. His work emphasizes empowering local communities through education, research, and outreach programs that promote environmental stewardship.

He provided details on successful projects that have involved youth and local leaders in sustainability efforts, including those that are aimed at restoring Guam's coral reefs and enhancing food security through sustainable agriculture.

The forum, featuring presentations from various UOG departments, offered a platform for interdisciplinary collaboration. The range of topics presented—from environmental science to social and cultural sustainability—underscored the university's commitment to addressing the complex challenges faced by Guam and the Pacific region.

Students from Micronesia share insights at the Science Café

Students from the Bridge to Bachelor's program showcased their research findings at a Science Café held in July at the Guam Green Growth (G3) Circular Economy Makerspace and Innovation Hub.

The Bridge to Bachelor's program is supported by the National Science Foundation INCLUDES SEAS Islands Alliance.

The program is designed to support students transitioning from community college to a four-year degree in STEM fields. As part of the program, students undertake research projects under the mentorship of faculty and industry professionals.

The Science Café gave students the opportunity to share their work with the community and engage in dialogue about the importance of STEM education and research.

Cheryl Sangueza, Ph.D., co-principal investigator for the program, said the café experience was beneficial for both presenters and audience members.

"For these amazing students, being able to share their experiences showcased their increase in confidence and knowledge in research. Many of them said they had never engaged in science research or presented like in our program," Sangueza said.

"For the audience, hearing the perspectives of those living in our neighboring islands was a highlight — they opened up new ways of seeing things for all of us."

The Science Café featured presentations on a variety of topics researched with the assistance of faculty mentors from the University of Guam. Attendees had the chance to interact with students and ask questions about their work.

Here are the student presentations at the Science Café:

"The Effect of Coconut Fibers in Fine Recycled Concrete Aggregate Mortar Specimen Mixtures"
Presenter: Azer L. Bilimon, College of the Marshall Islands **Mentors:** Ernesto J. Guades, Ph.D., Alvin Page

"The Evolution of Traditional Plant Uses in Guam and Palau" **Presenter:** Daissy Demei, Palau Community College
Mentors: Else Demeulenaere, Ph.D., Vernice Yuzi

"New Species Microtabella udotensis from Chuuk Coral Reef" **Presenter:** Deniena Fred, College of Micronesia
Mentors: Christopher S. Lobban, Ph.D., Jeniel C. Mian, MaryJolleen Perez, Margarita Cholymay

"What Role Do Plants Play in Our Culture?"
Presenter: Leann Gabriel, College of Micronesia
Mentors: Else Demeulenaere, Ph.D., Peltin Olter-Pelep

"A New Diatom from Marshall Islands Coral Reefs"
Presenter: Lucey Mea, College of the Marshall Islands.
Mentors: Christopher S. Lobban, Ph.D., Jeniel C. Mian, Alvin Page, MaryJolleen Perez

"My Experience in Dr. Lobban's and Dr. Guades' Laboratory"
Presenter: Paul Elanzo
Mentors: Christopher S. Lobban, Ph.D., Jeniel C. Mian, Alvin Page, MaryJolleen Perez

"The Science Café demonstrated the talent and potential of young scientists in Guam and the rest of Micronesia," said Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant and principal investigator of the program.

"The event highlighted the importance of supporting STEM education and research initiatives to foster innovation and economic growth throughout our region."

The UOG Center for Island Sustainability and Sea Grant's capacity-building portfolio also includes NSF Navigating Home, a program that brings college graduates who may have relocated off island for jobs back home with a year- or summer-long assignment in local agencies, with the intention of securing full-time employment. Other initiatives include several STEM-related fellowships for high school and college students currently enrolled on Guam.

Students from the Bridge to Bachelor's program present their research at the July Science Café hosted at the G3 Circular Economy Makerspace and Innovation Hub. The event gives students the opportunity to share their work with the community and engage in dialogue about the importance of STEM education and research. The Bridge to Bachelor's program is part of the National Science Foundation INCLUDES SEAS Islands Alliance.

Workforce Development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Community education series launched at Sustainable September finale

2024 Sustainable September concluded with the launch of the Guam Green Growth (G3) Community Education Workshop Series.

The initiative highlights partner-led workshops across the island on topics such as food security, marine conservation, sustainable design, and science communication.

The launch event followed G3's biennial meeting, co-chaired by Gov. Lou Leon Guerrero and University of Guam (UOG) President Anita Borja Enriquez, DBA. "The University of Guam is dedicated to working closely with partners who are doing their part to further sustainability on our island and throughout the region," said Enriquez.

As part of the series, Juanita Blaz of Island Girl Power presented on service learning and its benefits for both communities and nonprofit organizations. Aquaculture Specialist David Crisostomo discussed the principles of aquaculture and aquaponics, providing attendees with insights into growing their own food sustainably.

Andrea Sant, Ph.D., from the UOG Center for Online Learning, presented on the process of creating sustainability courses and encouraged participants to pitch their own course ideas in an interactive session.

Another session delved into sustainable fishing practices with Kevin Rivera of Reef Pursuit International, who emphasized the importance of preserving marine resources for future generations.

Rivera said, "My favorite part was having an audience to express my views on what sustainable fishing means to me. It was nice to engage with people and share my ideas."

Michelle Crisostomo and the Guåhan Sustainable Culture team conducted a composting workshop, demonstrating the benefits of composting for both individuals and the environment. The CHalan Deskubre team also showcased their place-based educational products and discussed how they can be implemented in local schools.

The final session of the day featured a traditional CHamoru medicinal plants workshop led by Yo'åmte "Mama Lou" Mangloña.

UOG Sea Grant Sea turtle biologist Addie Ferguson also provided insights into sea turtle conservation efforts and their historical significance in Guam. Abby Crain from the G3 Makerspace and Innovation Hub facilitated a hands-on workshop on circular economy creation, encouraging participants to explore sustainable design and production methods.

Minerva Hermosilla attended the workshops and was pleased to see the community's involvement. "I think, on Guam, getting involved is what we do," said Hermosilla. "We all have this mission to better our island. Just being engaged is so important for our development."

"Today's event gave people a taste of the sustainability education we're expanding islandwide," said Austin Shelton, Ph.D., UOG Center for Island Sustainability and Sea Grant director. "We're proud to work with our partners to make learning accessible and impactful."

Sustainable September 2024 wraps up with the launch of the G3 Community Education Workshop Series, featuring partner-led sessions on food security, marine conservation, sustainable design, and science communication across Guam.

Fourth cohort graduates from G3 Conservation Corps

Twelve members of the fourth cohort of the Guam Green Growth Conservation Corps (G3CC) graduated from the program in July.

The ceremony, held at the Governor's Complex in Adelup, recognized the accomplishments of the corps members, who spent five months engaged in hands-on conservation and sustainability projects across the island.

The conservation corps graduates undertook a range of projects in key focus areas, including invasive species removal with the Guam Department of Agriculture, aquaculture with University of Guam (UOG) Sea Grant, agriculture with UOG Triton Farms, watershed restoration with the Guam Restoration of Watersheds (GROW) initiative, and limestone forest work and plant identification with Tåno, Tåsi, Todu.

Other accomplishments of the cohort included:

- Collected 13,483 pounds of trash
- Collected and recycled more than 31,000 aluminum cans
- Prepared 200 feet of erosion control devices
- Planted more than 340 seeds and seedlings
- Harvested 135 pounds of locally grown produce
- Conducted 19 village roadside cleanups or beautification projects
- Maintained nearly four miles of firebreaks

"This is the start of this group's legacy for the green economy in Guam," said Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant.

For G3CC graduate Thomås Benavente, the program affirmed their purpose. "The Conservation Corps has mentally, physically and emotionally prepared us for what's to come within our green economy," he said.

Meanwhile, Marlena Pangelinan, UOG vice provost for institutional effectiveness, academic and student affairs urged the corps members to pursue their work in conservation and sustainability.

"As you graduate today, I encourage you to continue to be ambassadors for our island," Pangelinan said. "Share your knowledge, inspire others and work together to create a sustainable future for Guam."

Participants in the G3CC program received a stipend and comprehensive training in environmental science, conservation practices and leadership development. They also earned continuing education credits from UOG.

"This is the start of this group's legacy for the green economy in Guam."

Austin Shelton, Ph.D.
Director, UOG Center for Island Sustainability and Sea Grant.

Twelve members of the fourth Guam Green Growth Conservation Corps cohort celebrate their graduation in July at the Governor's Complex in Adelup after five months of hands-on conservation work across the island.

G3 Kupu Corps strengthened conservation partnerships and workforce in 2024

The Guam Green Growth (G3) Kupu Corps welcomed four new members in 2024, continuing a steady increase in participation since the program launched in January 2023.

New members include Joan Tomokane, hosted by the American Memorial Park (U.S. National Park Service) in Saipan; Lawrence Lizama, hosted by the University of Guam (UOG) Center for Island Sustainability and Sea Grant; and Joshua Artuz and Tatiana Ananich, both hosted by the U.S. Fish and Wildlife Service's Guam National Wildlife Refuge.

The G3 Kupu Corps is a collaboration between G3 and the Kupu Conservation Leadership Development Program. The initiative aims to empower young professionals through education and hands-on training for careers in the emerging green economy.

Kupu is Hawai'i's largest nonprofit organization focused on providing entry-level, real-world experience to youth pursuing conservation careers.

Now in its second year, the G3 Kupu Corps has welcomed a total of nine members, since the program launched in 2023.

Annania Kemp, project coordinator for the G3 Conservation Corps and Kupu Corps, noted significant growth in 2024 alone.

"We've expanded our host sites by two this year—adding UOG Center for Island Sustainability and Sea Grant's aquaculture team and the U.S. Fish and Wildlife Service's Guam National Wildlife Refuge," Kemp said. "As a result, we've also grown the number of members."

Each G3 Kupu Corps member works directly with their assigned host site, gaining valuable experience and skills to support a future in conservation.

"The goal of the program is to prepare individuals for the growing green economy," Kemp said. "We want members to either use their AmeriCorps

education award to pursue higher education or transition directly into conservation careers after completing the program."

Over a six to eleven month term, members train alongside professionals at their host sites, developing practical skills to help them enter the workforce or advance their education.

Kemp expressed optimism about the future of the program's participants. "We hope our members use their education award to attend school and build a conservation career, or step directly into the workforce with the skills and confidence they've gained," she said.

According to Kemp, the G3 Kupu Corps offers a wide range of benefits to participants interested in conservation work.

"There are so many advantages to this program—education awards, professional training, potential certifications, a competitive living allowance, health insurance, childcare and student loan forbearance for those eligible," she said. "Best of all, it provides hands-on learning without requiring a prior background in conservation."

The Guam Green Growth (G3) Kupu Corps welcomes four new members in 2024, continuing to grow since its launch the prior year. The program empowers young professionals with hands-on training for careers in Guam's emerging green economy.

Entrepreneurs, artists upcycle used clothes through screen printing

A group of aspiring entrepreneurs and artists on Guam learned the art of screen printing and upcycling used clothes at the Guam Green Growth (G3) Circular Economy Makerspace and Innovation Hub.

The workshop, held in August, provided participants with hands-on experience creating custom designs. Screen printing expert Roldy Aguerro Ablao taught key techniques as participants experimented with various inks, fabrics, and materials.

G3 Circular Economy coordinator Abby Crain organized the workshop and said she was excited to work with Ablao to show attendees how to extend the life of items they already own.

"People got to bring in their own garments that they didn't like anymore or were going to discard and personalize them to breathe new life into them," Crain said. "They were able to make the old new again by adding designs via screen printing to refresh and upcycle clothes."

Crain said the workshop was well received. "It was a great workshop and was well attended. The feedback was great. Some of the same participants came back to do the second class because they enjoyed it so much," she said.

"This is actually my first time doing screen printing! I'm not an artist whatsoever, so that's why these workshops are so much fun to me," said participant Laura Gumbar. "I had so much fun and a lot of the pieces came out better than I was expecting.

I was a little worried about the mistakes I made, but everyone has been so encouraging about accepting the mistakes we make and making the most of it."

"Everything is about self-expression, and everyone here at the G3 Makerspace is so welcoming, so I hope more people come out! Don't be shy! If you don't have anyone to go with, you will definitely end up making friends here," she added.

The G3 Circular Economy Makerspace and Innovation Hub holds monthly workshops for the community. Their workshops include creating new products from discarded trash and post-consumer waste such as plastic and glass.

By offering these workshops, the hub provides valuable resources and opportunities for individuals to develop skills and start their own businesses.

Participants explore screen printing and upcycling at the G3 Circular Economy Makerspace and Innovation Hub in August, learning custom design techniques from expert Roldy Aguerro Ablao. The G3 Makerspace hosts monthly workshops where community members learn new skills and create new products from waste materials.

Workshop transforms post-consumer glass to art

A glass mosaic workshop at the Guam Green Growth (G3) Circular Economy Makerspace & Innovation Hub taught participants the art of recycling glass and wooden pallets into one-of-a-kind pieces.

At the workshop in February, at least a dozen participants worked under the guidance of local artists Mark and Andrea Murer, a father-daughter duo and business partners behind Mark Murer Mosaics.

Although most attendees had little to no experience with mosaic art, everyone completed their pieces by the end of the night with help from the Murers.

G3 Circular Economy Coordinator Abby Crain said she was excited to welcome the Murers to the G3 Makerspace.

"I think what made it really successful was that it was the first time a class taught by Mark was being offered," Crain said. "A lot of people have always loved and admired his work, and this was a chance for them to finally get to participate in that."

Participants received step-by-step instructions from the Murers, who encouraged and empowered them throughout the process.

Morgan Leon Guerrero, one of the workshop participants, shared her thoughts on the experience.

"The workshop was a lot of fun! I had never done something like it before, so I was a little nervous, but Mark and Andrea guided us every step of the way," she said. "It was a great way to spend time with my friends doing something creative. I am excited to participate in more workshops like this one."

The G3 Circular Economy Makerspace and Innovation Hub holds monthly workshops for the community. Their workshops include creating new products from discarded trash and post-consumer waste such as plastic and glass.

Crain said, "We are here to inspire ways to use what we have on island and to also teach the community new skills so that they can take their artistry, their business, and their interests a little bit further."

Participants learn to transform glass and wooden pallets into unique art pieces during a February mosaic workshop at the G3 Circular Economy Makerspace and Innovation Hub. Local artists Mark and Andrea Murer of Mark Murer Mosaics facilitated the workshop. The G3 Makerspace hosts monthly workshops where community members learn to turn plastic, glass, and other waste into new, useful products.

G3 Makerspace mentors young entrepreneurs

The Guam Green Growth (G3) Circular Economy Makerspace and Innovation Hub opened its doors to Junior Achievement Guam teams in January as they prepared for a youth entrepreneurship competition.

Junior Achievement, or JA, is a nonprofit organization dedicated to educating students about work readiness, entrepreneurship and financial literacy through experiential, hands-on programs.

The organization hosted the 2023–2024 JA Company of the Year Competition at the Guam Community College in Mangilao to recognize student entrepreneurs and their innovative products.

Each year, the G3 Makerspace plays an active role in assisting JA teams. In 2024, they mentored Prikura Guahan — a group of students from Harvest Christian Academy and St. John's School. The name "Prikura" means "preserve" in CHamoru.

Prikura Guahan attended mentorship sessions and workshops at the G3 Makerspace, where they learned to use cutting-edge equipment. By the end of the sessions, the team had created latte-stone-shaped stamps and inkpads using locally sourced wood and invasive bamboo.

"The reason we chose the stamp is because we wanted to show how invasive bamboo is to Guam," said Yang Wang, a Harvest Christian Academy student and president of Prikura Guahan. "So, for our inkpads, we used invasive species bamboo to make the ink itself."

The team engraved positive messages such as "Good work" and "Håfa Adai" into the stamps.

Wang credited G3 Makerspace coordinator Abby Crain for helping guide the production process. Crain suggested using charcoalized and crushed invasive bamboo to create the inkpads.

"We assist the teams however we can — whether mentoring, counseling, consulting on materials to use, packaging or even during conceptualization," Crain said. "We also help them develop and find the most cost-effective methods for production."

Crain described the ongoing partnership between G3 Makerspace and JA. "Our mission is to promote circular economy and sustainability," she said. "We also aim to encourage local production and help business owners and aspiring entrepreneurs make use of the resources available on Guam."

According to JA, a total of 146 high school students participated in the 2024 competition, representing nine student-led companies. Corporate and private sector ponsors included Graphic Center, Title Guaranty of Guam, GTA, Dusit Thani Resort Guam, Bank of Hawaii and Community First Guam Federal Credit Union.

Each year, the G3 Circular Economy Makerspace and Innovation Hub assists Junior Achievement teams as they bring their business ideas to life for the annual JA Company of the Year competition.

Students from Micronesia complete G3 sustainability program

Ten members of the inaugural cohort of the Guam Green Growth Local2030 Islands Network Conservation Corps (G3LINCC) celebrated the completion of their service term this May, marking a milestone in Guam's efforts to cultivate environmental leadership across Micronesia.

The G3LINCC program, part of the Guam Green Growth (G3) Initiative, empowers young islanders to lead sustainability and conservation efforts across the region. All participants are University of Guam (UOG) students from neighboring Micronesian islands who reside in the UOG Residence Halls.

Don David, a 2024 UOG graduate, is returning to his home island of Pohnpei to begin work with the Micronesia Conservation Trust. He credits the program with preparing him to make a meaningful impact.

"I will bring all of these lessons home with me when I move back to Pohnpei," David said. "I am grateful for these experiences. I've learned a lot from this program, and I look forward to working with my government to implement these ideas."

Four members of the G3LINCC cohort also celebrated another achievement this May—earning their degrees and turning their tassels at the UOG commencement ceremony held at the Calvo Field House.

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, said the program was developed in partnership with the Local2030 Islands Network and University of Hawai'i Sea Grant to build environmental capacity across the region.

"Along with our partners, we wanted to create workforce development opportunities that directly benefit our island communities," Shelton said. "We are proud of this cohort of motivated and inspired islanders who are advancing Green Growth in Micronesia."

Ten members of the Guam Green Growth Local2030 Islands Network Conservation Corps (G3LINCC) cohort complete their service in May. G3LINCC allows UOG students from neighboring islands who reside in the UOG dorms to participate in local sustainability projects. BELOW: G3LINCC members showcase their garden at the UOG residence dorms.

UOG student Garret O'Donnell was selected for the prestigious 2025 Knauss Marine Policy Fellowship, where he worked in Washington, D.C., helping shape national coastal and water resource policy.

UOG student O'Donnell selected for Knauss fellowship

University of Guam (UOG) student Garret O'Donnell was selected for the highly competitive Knauss Marine Policy Fellowship from the National Oceanic and Atmospheric Administration (NOAA) and the National Sea Grant College Program.

The announcement was made in October 2024.

O'Donnell joined the 2025 cohort of fellows in Washington, D.C., where he worked with federal and legislative offices and had the opportunity to shape policies that impact the nation's coasts and water resources.

"Being selected for this fellowship represents a chance for me to tangibly apply the skills I've learned as a tropical reef biologist to the field of marine policy creation and implementation. I feel lucky to be moving from a position of scientific observation and hands-on field work to one of conservation and management," said O'Donnell.

According to a statement from the program, the 2025 cohort marked the first time in history that all eligible Sea Grant programs were represented by a diverse group of 88 early-career professionals who spent the year working alongside federal agencies or legislative offices in Washington D.C., applying their academic expertise to critical marine, coastal, and Great Lakes policy issues.

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, said O'Donnell's selection was an example of the growing capacity of UOG in marine science on the national stage. "Garret was only the third Knauss fellow selected from Guam since the program began," Shelton said.

"We were not stopping there. Our students at UOG showed the dedication and passion to compete with students from all over the country. UOG CIS and Sea Grant were there to support them every step of the way."

The Knauss Fellowship is a one-year, paid opportunity for current and recent graduates from advanced degree programs to apply their scientific knowledge and experiences to issues in science, policy, and public administration.

Participants in the Mental Health First Aid Training, organized by the NSF Navigating Home program, learn skills to recognize anxiety and other conditions and offer support to their peers. Navigating Home, a capacity-building program with the UOG Center for Island Sustainability and Sea Grant, aims to bring postgraduate students who have relocated off Guam back to the island.

Workshop trains students, partners in mental health support

The National Science Foundation (NSF) Navigating Home program hosted a Mental Health First Aid training on island in 2024.

The Navigating Home program is a capacity-building initiative, in collaboration with the University of Guam (UOG) Center for Island Sustainability and Sea Grant, aimed at bringing postgraduate students who have relocated away from Guam back to the island.

The training covered a range of topics, including the signs and symptoms of common mental health conditions such as anxiety, depression, and PTSD. Participants also learned practical skills for offering support, encouraging help-seeking, and reducing immediate risks of harm.

"More than ever before, it is so important to highlight the need for mental health training and to be aware of the different situations that may arise, and need be addressed," said Kyle Mandapat UOG Center for Island Sustainability and Sea Grant associate director for communications and community engagement.

"Being able to assist your classmates, your co-workers, your community with the lessons of this training will help you continue your growth and professional development," he added.

Participants came from a variety of sectors, including UOG students and staff, the Guam Department of Agriculture, and other community partners.

According to Navigating Home coordinator Jessica Fernandez, the training supported the goals of the program and helped develop the leadership qualities needed in today's workforce.

Outreach and Education


4 QUALITY EDUCATION
7 AFFORDABLE AND CLEAN ENERGY
6 CLEAN WATER AND SANITATION
8 DECENT WORK AND ECONOMIC GROWTH
2 ZERO HUNGER
GUAM GREEN GROWTH

Participants gather at a multi-agency meeting for the Guam Habitat Conservation Plan (HCP). The Guam HCP is a plan of action designed to provide a structured approach to offsetting impacts from land use on listed endangered and threatened species such as the fanihi and Denrobium guamense on the right.

Photo courtesy: Scott Vogt

Stakeholders shape conservation plans for Guam

Several multiagency meetings were held in 2024 for the Guam Habitat Conservation Plan (Guam HCP) by UOG Center for Island Sustainability and Sea Grant, the Guam Department of Agriculture (DoAg), and the consulting firm ICF.

The Guam HCP is a plan of action designed to provide a structured approach to offsetting impacts from land use on listed endangered species.

Under the Endangered Species Act, landowners, developers, government agencies, and other nonfederal entities engaged in lawful activities—such as constructing a home or hotel or maintaining roadsides—can apply for an incidental take permit from the U.S. Fish and Wildlife Service under Section 10 of the act. An incidental take permit allows the holder to impact endangered species and their habitats, provided those impacts are offset by conservation actions described in a habitat conservation plan.

Members of the HCP Steering Committee met in early November to discuss the administrative draft of the Guam HCP, which addresses concerns and comments compiled throughout the year at stakeholder and steering committee meetings and through public engagement. These discussions help ensure that the plan meets the needs and expectations of the community.

Else Demeulenaere, Ph.D., associate director for natural resources at the UOG Center for Island Sustainability and Sea Grant, said, "The key focus of the discussions revolved around how we can build the HCP reserve network for the Guam HCP, as it is the central component of the plan's conservation strategy."

The HCP reserve network will be composed of lands set aside for the conservation of endangered species to offset the impacts of development. This applies to all of Guam except lands under federal jurisdiction. Because development impacts to endangered species are permanent, the reserve network lands must be protected in perpetuity.

"The challenge is securing government and conservation easements that can be protected in perpetuity, enabling effective habitat management and ensuring endangered species continue to thrive in Guam," Demeulenaere said. "This protection will help offset impacts to listed species as part of the agreement with the U.S. Fish and Wildlife Service."

Guam DoAg Director Chelsa Muña also shared her insights at the meetings. "The HCP provides a framework that allows landowners to use their property while meeting conservation requirements," Muña said. "A common misconception about the Endangered Species Act is that it restricts private property rights due to the presence of a listed species, but it offers a permitting process that enables development."

Community volunteers of all ages come together to plant trees with the GROW initiative, restoring Guam's watersheds and protecting vital marine ecosystems.

Watershed effort draws community support; More than 6,000 trees planted

Before the end of 2024, a series of community tree-planting events organized by the Guam Restoration of Watersheds (GROW) initiative brought together hundreds of volunteers who planted more than 6,000 trees, including native species.

These events, which welcomed participants of all ages, aim to restore degraded watersheds and protect Guam's fragile marine ecosystems.

Recent plantings have taken place in key locations such as the Ugum Watershed, which supplies water to much of southern Guam.

"My first time planting was so much fun, I had to come back out and bring friends," said healthcare worker and volunteer Ryan Shayne. "Being out here and helping is something that we can all do—it's easy but has a big impact on our island."

Volunteers from schools, community groups, and the general public have worked diligently to plant thousands of saplings. These trees help prevent soil erosion, improve water quality, and protect coral reefs from sedimentation.

"These tree-planting events are more than just a way to beautify our island," said GROW team lead Daniel Stone Jr. "They are a crucial step in ensuring the long-term health of our environment. By restoring our watersheds, we're protecting our coral reefs, our fisheries, and our overall quality of life."

The GROW initiative is facilitated by the University of Guam Center for Island Sustainability and Sea Grant, in collaboration with local landowners, federal agencies, and the Guam Department of Agriculture's Forestry Division.

"Seeing people of all ages and backgrounds take part in the restoration of our environment is really inspiring," said UOG Center for Island Sustainability and Sea Grant Program Leader Phillip Cruz. "We welcome everyone to join us for these community planting events. It's a great family activity."

Outreach team promotes turtle conservation in Tinian

The University of Guam (UOG) Center for Island Sustainability and Sea Grant outreach team engaged over 400 students in Tinian in June 2024 through a series of educational initiatives focused on sea turtle conservation.

Activities included school presentations, an art contest, and the installation of sea turtle safety signs on two nesting beaches.

The outreach program is part of a collaboration with the Naval Facilities Engineering Systems Command (NAVFAC) Marianas, aimed at enhancing awareness and understanding of sea turtle conservation.

Tinian is home to both green and hawksbill sea turtles, with green sea turtles nesting on several beaches across the island. However, these populations face significant threats, including poaching, predation, and habitat loss.

Due to its relatively small demographic of approximately 51,000 residents, Tinian lacks extensive educational resources pertaining to these endangered species.

The outreach initiative, established through a cooperative agreement with NAVFAC Marianas, included comprehensive presentations delivered to all grade levels at Tinian's public schools.

In addition to presentations, the program featured a student art contest and the creation of safety signs that highlight the importance of protecting sea turtle nesting areas.

During the outreach, the team conducted four presentations that reached 268 students in grades K-12, along with 22 teachers from Tinian Elementary and Junior/Senior High School.

Pre and post-assessment surveys were administered to measure the effectiveness of the outreach activities, revealing a notable increase in knowledge—averaging a 30% improvement—in students from grades 3 to 12.

The art contest attracted 83 entries, with 13 students recognized as winners. The winning artwork was printed on the back of the sea turtle safety signs installed on two nesting beaches, serving as a lasting reminder of the importance of conservation efforts in the region.

Through these educational initiatives, the University of Guam and its partners are not only raising awareness about the vital role sea turtles play in the marine ecosystem but are also empowering the local community to participate in conservation efforts.

The UOG Center for Island Sustainability and Sea Grant outreach team, in collaboration with NAVFAC Marianas, engaged over 400 students in Tinian through sea turtle conservation activities—including school presentations, an art contest, and the installation of safety signs on nesting beaches.

Sustainable September 2024 starts with proclamation signing

Sustainable September 2024 began with a proclamation signing in August at the Ricardo J. Bordallo Governor's Complex to mark the month-long commemoration promoting awareness of the 17 United Nations Sustainable Development Goals.

Aside from the proclamation signing, Sustainable September activities included watershed restoration, tree-planting events, and the unveiling of sustainability-themed murals around the island.

At the event, the University of Guam (UOG) Center for Island Sustainability and Sea Grant, along with Guam Green Growth (G3) and other multisectoral partners, emphasized the importance of sustainability, raised awareness about environmental issues, and strengthened collective actions to protect Guam's biodiversity.

"As a higher education institution, the university plays a crucial role in not only promoting the 17 U.N. Sustainable Development Goals but also in developing programs, conducting research, implementing sustainable practices, and fostering discussions to find sustainable solutions to our island-wide challenges," said UOG President Anita Borja Enriquez, DBA.

"UOG also has a significant role in integrating sustainability principles across all disciplines and in inspiring and empowering new sustainability leaders to carry on this important work," she added.

During the proclamation signing, Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, said Guam was one of the first island communities to join the Local2030 Islands Network, a partnership promoting the U.N. SDGs.

"Guam is a founding member of the Local2030 Islands Network, which signifies our commitment and leadership in advancing the 17 U.N. Sustainable Development Goals in locally and culturally effective ways," Shelton said.

For Lt. Gov. Joshua Tenorio, who co-chairs the G3 steering committee with Shelton, becoming part of the network expanded Guam's role in the global sustainability movement.

"Embracing sustainability and sustainable development has helped us engage the region and the world," he said. "The opportunity to become a charter member of the Local2030 Islands Network meant that we could establish great partnerships with island leaders, island governments, and academic institutions around the world."

Top photo: UOG Center for Island Sustainability and Sea Grant team members, along with government and university officials, gather for a group photo at the proclamation signing for Sustainable September. The event kicks off a monthlong series of activities highlighting community efforts toward achieving the 17 UN Sustainable Development Goals by 2030.

The Guam Green Growth Conservation Corps (G3CC) collects trash, including aluminum cans, during the 80th Guam Liberation Day celebration in July, diverting waste from the landfill and promoting sustainable waste management at large public events.

Conservation Corps leads recycling efforts at Liberation Day parade

The Guam Green Growth Conservation Corps (G3CC) collected an estimated 7,500 cans during the 80th Guam Liberation Day celebration in July, successfully diverting them from the landfill.

The initiative addressed a major challenge for Guam: managing waste generated during large public events. To tackle this, the corps focused on collecting aluminum cans—a readily recyclable material.

G3CC members were stationed along the parade route, collecting recyclables from the crowd.

But G3CC's efforts went beyond collection. To boost recycling and offer an added incentive, the corps distributed free can cages to all registered parade participants. These cages not only made collection easier but also served as a visual reminder of the importance of recycling.

"Our goal this Liberation Day was to significantly increase recycling and divert cans from landfills," said Phillip Cruz, coordinator for the G3 Conservation Corps.

The collected cans were donated to local schools in partnership with iRecycle, a program that helps schools raise funds by redeeming recycled aluminum.

The project's impact extended beyond immediate environmental benefits, according to Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant.

"This initiative combined environmental responsibility with community outreach and education," Shelton said. "By incorporating recycling into the festivities, we weren't only cleaning up after the parade—we were also promoting a culture of sustainability on our island."

‘Guam in Bloom’ exhibit promotes conservation through art and design

The “Guam in Bloom” sustainable art exhibit was launched in September, highlighting local efforts to promote the conservation of native and endemic plants, environmental stewardship, and cultural awareness through art and design.

Organized by the University of Guam (UOG) Center for Island Sustainability and Sea Grant and the Guam Green Growth (G3) Circular Economy Makerspace and Innovation Hub, the exhibit featured artwork, fashion pieces, and educational components, including an outreach booth with QR codes linking to information about Guam’s native plant species.

Artists featured in the exhibit included Abby Crain, April Colitoy-Gaerlan, and Franceska de Oro.

Among the species highlighted were the *Bulbophyllum guamense*, a rare mustard-colored orchid with a distinctive triangular shape, as well as the nanåsu and gaosåli flowers. Native orchids were featured through contributions from the Island Conservation Lab at the UOG Center for Island Sustainability and Sea Grant.

Fashion pieces—including headpieces and outfits—crafted from upcycled materials and inspired by these flowers were also displayed, showcasing the connection between sustainability, creativity, and design.

At the event, UOG President Anita Borja Enriquez, DBA., commended the UOG Center for Island Sustainabiity and Sea Grant team and emphasized the university’s commitment to fostering the next generation of conservation professionals.

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, said the exhibit demonstrates the potential of sustainable development to support Guam’s creative industries.

“Sustainability is not about sacrifice anymore—it’s about opportunity,” Shelton said. “We can build a green economy, diversify beyond military spending and tourism, and celebrate the beautiful work that local artists are bringing to the community.”

Lt. Gov. Joshua Tenorio, who co-chairs the G3 steering committee with Shelton, said the exhibit

highlights the island's growing talent and the university's role in supporting both the arts and environmental awareness.

The exhibit was held at T Galleria by DFS in Tumon and reflected an ongoing partnership with retailer DFS Guam.

DFS Vice President of Operations Billy Chung said the company values opportunities to support local sustainability initiatives.

"We are extremely excited to be able to host the 'Guam in Bloom' exhibit here in our Galleria. For us here at DFS T Galleria, sustainability is something that we hold closely in our hearts," said Chung.

The exhibit was part of Sustainable September, an initiative that included a tree-planting event, beach cleanup, and educational workshops. It marked the second collaboration between UOG and DFS.

The "Guam in Bloom" sustainable art exhibit showcases local efforts to conserve native plants, promote environmental stewardship, and celebrate culture through art and design. Organized by the UOG Center for Island Sustainability and Sea Grant and the G3 Makerspace, the exhibit features artwork, fashion, and interactive educational displays.

Students dive into ocean discovery with latest CHålan Deskubre magazine

Students got a chance to see the view from under the sea as the University of Guam (UOG) Guam Green Growth initiative unveiled the cover of the latest issue of CHålan Deskubre, a place-based science magazine for children.

The unveiling took place as more than 100 students, including members of the Guam WAVE Club, received the first copies of the issue during a special event at the Aquarium of Guam.

The theme of the issue is Sustainable Development Goal 14: Life Below Water.

Topics covered in the issue include crabs, parrotfish, sea turtles, diatoms and more. The magazine was produced with support from the research teams at the UOG Center for Island Sustainability and Sea Grant and the NSF Guam Established Program to Stimulate Competitive Research (EPSCoR).

Lt. Gov. Joshua Tenorio attended the event to celebrate the launch. The magazine was funded through the Education Assistance and Youth Empowerment Grant Program from the Office of the Governor.

"This magazine that we have funded with the University of Guam is meant to give you, your teachers, and your parents so many ideas to discover our island," Tenorio told the students. "We hope that you see this magazine and take some time to look at it, do the activities, and have some fun and excitement."

Austin Shelton, director of UOG Center for Island Sustainability and Sea Grant, said the issue is a great way for students to learn about the ocean surrounding Guam and the life within it—making it a powerful tool for conservation and education. He led students through a brief lesson highlighting the diversity of the island's marine ecosystem.

"Guam has over 1,000 species of reef fish and 375 species of coral—that's more than Hawaii, Puerto Rico or the Virgin Islands," Shelton said. "We have so much on our island to be proud of, and you have so much to discover."

He encouraged students to pursue careers in marine science.

"I want you to explore, and when you fall in love with the ocean, I want you to become marine biologists too—so you can take care of our very special environment and make a difference on our island," Shelton said.

Pamela Peralta, Ed.D., interim vice provost of research and sponsored programs at UOG, emphasized the university's commitment to outreach and encouraged parents to support their children's scientific curiosity.

"Curiosity leads to discovery. There is much to learn not only in the skies and on land but also below water," Peralta said. "We hope today marks further exploration of the myriad species yet to be discovered and preserved. Let us do our part to empower our children and inspire them to ask questions and get involved."

Students explore the wonders beneath the sea as Guam Green Growth unveils the latest CHålan Deskubre issue at the Aquarium of Guam, spotlighting SDG 14: Life Below Water.

Art Corps unveils new murals in Malesso and Yoña

The Guam Green Growth Art Corps (G3AC) recently unveiled two new murals in the villages of Malesso and Yoña, marking continued progress in its mission to inspire sustainable change through the arts.

In Malesso, artist Ha'ani Bettis completed a mural focused on United Nations Sustainable Development Goal (UN SDG) 14: Life Below Water. Located next to the Merizo Supermarket, the artwork reflects themes of environmental stewardship and cultural identity, two pillars of the G3AC program.

"We are thrilled to unveil Ha'ani Bettis's mural and celebrate the achievements of the Guam Green Growth Art Corps," said Gov. Lou Leon Guerrero, whose education stabilization funds supported the project. "This program has empowered artists to use their creativity to raise awareness about environmental issues and promote a more sustainable future for Guam."

The G3AC initiative, part of the broader Guam Green Growth (G3) movement, equips local artists with knowledge about the 17 UN SDGs. Participants create public art pieces that foster awareness and action around key environmental and social issues and the UN SDGs addressing them.

Bettis said she drew inspiration from the island's natural landscape and CHamoru heritage. As a committed environmental advocate, she uses her artwork to raise awareness about marine conservation and climate action

Meanwhile, in Yoña, fellow Art Corps member Corina Benavente unveiled a deeply personal mural reflecting SDG 3: Good Health and Well-Being. Painted on the walls of Peredo's General Merchandise, the piece traces an emotional journey from struggle to healing.

"I was going through a rough ending of my marriage," Benavente said. "I started falling deep into depression and I didn't have anyone to talk to. That's when I started to pick up sketching, and after a few weeks, I picked up a paint brush. I wanted to do more to keep my mind busy."

What began as a way to cope soon evolved into a powerful form of connection and compassion.

"I started [painting more] because it helped me get through my healing process."

Her mural, which unfolds from left to right, begins with a figure facing a turbulent sea, symbolizing a troubled past. A weeping willow at the center represents inner and outer struggles, while its deep roots encourage viewers to release their burdens.

A carabao emerges as a symbol of resilience, followed by a female figure who serves as an anchor—both emotionally and visually. The mural's backdrop is Tagachang Beach, a place of peace and healing for Benavente.

Despite painting during a difficult time, Benavente credits the experience with helping her grow stronger.

"It is like planting a seed: you water it, nurture it, give it sunlight, and watch it grow into something beautiful! That's art to me!"

G3AC aims to install murals in every village across Guam, using public art to educate communities on sustainability, conservation, and well-being. The program continues to empower local artists to tell their stories, build awareness, and spark meaningful change.

TOP LEFT: UOG and government officials pose in front of one of the murals completed by the Guam Green Growth Art Corps. ABOVE and RIGHT: Corina Benavente speaks at her mural launch in Yoña. Her mural reflects her personal story of healing.

CBAS project installs first four aquaponics household systems

The Community-Based Aquaponics Systems (CBAS) project reached its first major milestone in 2024 with the successful setup of four backyard aquaponics systems at local households.

Installed by the aquaculture team at the University of Guam (UOG) Center for Island Sustainability and Sea Grant, each system—valued between $7,000 and $10,000—allows residents to raise fish and grow vegetables in a single, sustainable system.

"We're excited to bring aquaponics directly into people's homes and help our communities become more self-sufficient," said David Crisostomo, aquaculture specialist at the UOG Center for Island Sustainability and Sea Grant. "Aquaponics offers a sustainable and environmentally friendly way to grow fresh, nutritious food."

Joshua Muña, a research assistant with the aquaculture program, explained how the CBAS system works.

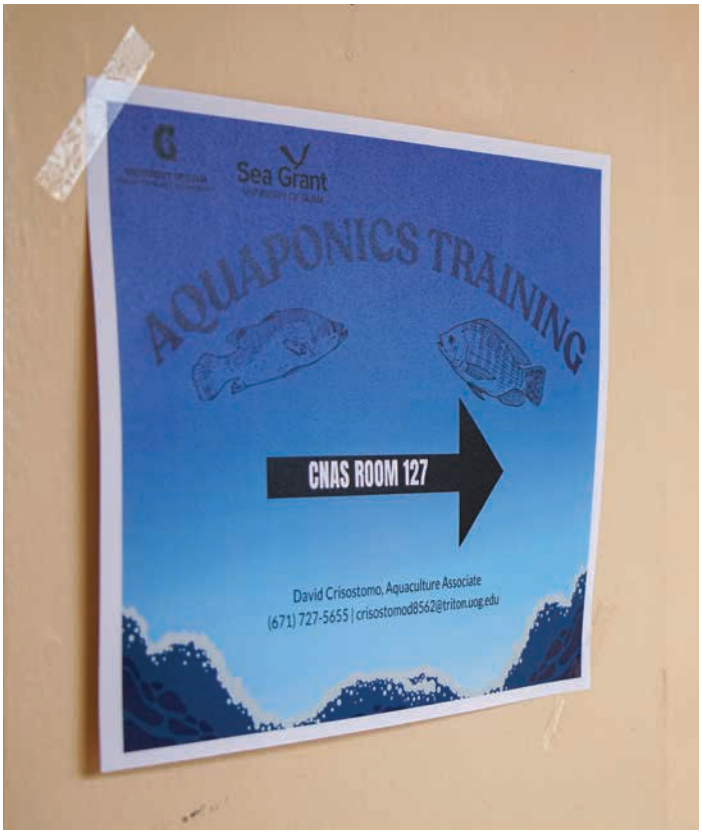
"Aquaponics is a symbiotic system that combines aquaculture with hydroponics," he said. "Fish waste provides nutrients for the plants, while the plants filter the water for the fish. This closed-loop system is highly efficient and adaptable to different climates and spaces."

The project also includes an educational component. As part of CBAS, the team will continue providing training and support to system recipients to ensure the long-term success of each system. The curriculum covers aquaponics principles, system maintenance, and harvesting techniques.

The CBAS project received funding from the Office of the Governor to expand from its original plan of 20 systems to 120. The additional systems are expected to be installed across the island over the next two years.

With plans of scaling up in the future, Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, said the first systems represent only the beginning of a long-term vision for food sustainability.

"This is the first of dozens of systems that will be installed as part of our sustainable aquaculture and aquaponics program," Shelton said, adding, "The goal is to teach people how to sustain themselves and reduce reliance on imports."



The Community-Based Aquaponics Systems (CBAS) project celebrates a milestone as the UOG Sea Grant aquaculture team installs four backyard aquaponics systems, helping local families grow fish and vegetables sustainably at home.

Through classroom visits and professional presentations, the UOG Center for Island Sustainability and Sea Grant's Island Conservation Lab helped spark a deeper understanding of sustainability across the island in 2024—planting seeds for a greener, more resilient future.

Island Conservation Lab conducts student and community outreaches

Jacob Concepcion and Wade Kitalong, both research assistants for the University of Guam (UOG) Center for Island Sustainability and Sea Grant's Island Conservation Lab (ICL), present the role their jobs play in conservation and the reforestation of Guam's natural habitats.

They have spoken with children of different ages from Carbullido elementary school and, most recently, kids from Benavente Middle School.

These events allow the ICL to spread awareness and explain what the job consists of doing in an easily digestible format based on the demographic.

The ICL is a program that encompasses a large variety of concepts in conservation and sustainability. It is specific, but also continues to grow with a holistic view of all things terrestrial.

"It is extremely great to be able to show kids and the community what we do and to be able to expose them to a career path they might not have been aware of. Showing them that it is important to care for our Island and that we can all take part in making a difference," said the research assistants.

Meanwhile, Vince Fabian, program manager at the Island Conservation Lab also presented at the 2024 Guam Soil & Water Conservation Educators' Summit. Fabian discussed how ICL is integrating conservation into the Guam Department of Education's curricula.

The UOG Center for Island Sustainability and Sea Grant unveiled three calendars for 2025, offering information about resource conservation, as well as fishing, farming, and sustainability tips to support island food security.

2025 calendars promote land and ocean sustainability

Toward the end of 2024, the University of Guam (UOG) Center for Island Sustainability and Sea Grant released the 2025 Guam Tide Chart Calendar and the Guam Grower's Calendar, which provide information on fishing, agriculture, and environmental stewardship to support food security across the island.

The Tide Chart Calendar features daily tide predictions for Guam, including high and low tides, sunrise and sunset times, and moon phases. It also showcases local fishers and their catches. This resource is especially useful for fishers, boaters, and beachgoers planning coastal activities.

The Guam Grower's Calendar offers guidance for local farmers and home gardeners. It includes planting and harvesting tips based on the lunar cycle and traditional CHamoru agricultural knowledge, along with best practices for pest and disease management, soil health, and water conservation.

Austin Shelton, Ph.D., director of the UOG Center for Island Sustainability and Sea Grant, acknowledged the local fishers who contributed photos to the tide chart calendar.

"Thank you to all the fishers who submitted pictures of your wonderful catches," Shelton said. "They inspire all of us to go out there and understand what it is we are protecting and conserving, so we can continue to feed our families."

Shelton also recognized Guahan Sustainable Culture (GSC), a partner in the development of the Grower's Calendar, for its work in the community through the G3 Community Gardens and public workshops.

Michelle Crisostomo, co-founder and president of GSC, said, "I'm proud that this calendar continues to serve as a valuable resource for the community to be more self-sufficient and to help them grow their own food."

The calendars are produced through a collaboration between UOG Center for Island Sustainability and Sea Grant, Guam NSF EPSCoR, Guahan Sustainable Culture, the Office of the Governor, and Guam Green Growth.

In 2024, the UOG Center for Island Sustainability and Sea Grant also partnered with the Joint Region Marianas Natural Resources Stewardship Outreach and Public Engagement Program to release the 2025 Natural Resource Calendar. The calendar highlights the environmental management and conservation efforts that are being made across the Joint Region Marianas Area of Responsibility.

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Scarification of seeds helps to expedite germination
Any seeds not immediately sown are sealed and stored for the future
Seeds and cuttings are
ways to propagate
Aim to grow native
are in need of


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