

FROM RIDGE TO REEF



Island Ecosystems and Endangered Species

by **GRACE CHOI**

This summer, I had the opportunity to intern with the Division of Coastal Resources Management's Summer Internship Program. As a intern assigned to the Division of Fish and Wildlife - Wildlife Section, I immersed myself in various wildlife conservation projects, which opened by eyes to the diverse ecosystems of our islands.

One of my favorite experiences was monitoring wedge-tailed shearwater birds in Mañagaha. These federally protected migratory birds nest here, and I helped mark occupied burrows across three different plots. It was fascinating to contribute to the protection of these seabirds.

I also participated in Mariana Fruit Bat surveys, venturing to multiple locations to spot and count bat colonies. This work helped me understand the challenges these vulnerable creatures endemic to our islands face.

At the Saipan Upland Mitigation Bank (SUMBA), I assisted in maintaining the habitat for the endangered Nightingale Reed Warbler. I also assisted in re-pinning GPS points and removing trail markers and learned to identify endangered species in the area. It was rewarding to contribute directly to habitat preservation efforts.

Breeding bird surveys sharpened my bird identification skills. I learned to recognize various bird calls and count species at different points, contributing data to critical bird population studies.

I even had the chance to engage in community outreach, teaching kids about our native CNMI birds at the Department of Youth Services

Empowerment Camp. Sharing my newfound knowledge with the younger generation was rewarding.

Perhaps the most intricate task was assisting with the mist netting of the Nightingale Reed Warblers to collect fecal samples for diet analysis. This process showed me the precision required in wildlife research.

Apart from the various projects I participated in, the main project for this internship was

creating an educational posted designed to raise awareness about the Marianas' unique ecosystem. This visual tool showcases the crucial differences between native and non-native species, spotlighting endangered wildlife that call these islands home. The poster also highlights other significant wildlife in the Marianas, offering a comprehensive view of the region's biodiversity.

This project, combined with hands-on conservation work like monitoring wedge-tailed shearwaters, surveying Mariana fruit bats, and assisting with Nightingale Reed Warbler research, has provided a holistic approach to wildlife conservation education and practice in the CNMI.

This internship has not only contributed to vital conservation work but has also ignited my passion for wildlife protection. I'm grateful for this hands-on experience and excited to be a part of conservation in the CNMI.



Diving Deep into Aquatic Education

by **REMEDIO DELA CRUZ**

"Nothing is more expensive than a missed opportunity," stated H. Jackson Brown Jr. I leaped toward a possibility, not knowing what path it would lead me. The 2024 DCRM Summer Internship Program taught me valuable skills, provided me with cherished memories, and gave me a deep dive into the Division of Fish and Wildlife's Aquatic Education Program. This is my second year as an education and outreach intern. I had no idea how profoundly the experience would shape my understanding of sustainable fishing and environmental stewardship. I've been deeply involved in crafting outreach materials that convey the significance of sustainable fishing and promote awareness of aquatic ecosystems through educational initiatives. My work has made a significant impact, from crafting informative brochures and dynamic social media content to creating outreach materials like stickers and compelling PowerPoint presentations on sustainable fishing practices. My internship showcases the many projects I have accomplished to help our community understand the importance



of our aquatic environment.

Education and outreach create an impact on everyone. It is not only our job as residents of the CNMI to take care of our land; it is also the visitors across the world. Overfishing and harmful fishing techniques have long threatened the delicate balance of our marine ecosystems. Our goal is to educate the public on the importance of sustainable fishing and to provide them with the knowledge and tools they need to make responsible choices. Engaging

with the community has been a cornerstone of my internship experience. Outreach events have allowed me to share valuable information and enriched my understanding of the local culture and the challenges we face in the CNMI regarding fishing.

This internship has been a transformative journey, offering me invaluable insights into the world of conservation and public outreach. I've developed communication, project management, and community engagement skills, all while contributing to a cause I'm passionate about. The experience has solidified my commitment to environmental conservation and inspired me to pursue a career in this field. As Hanna (2011) aptly put it, 'Economics education and outreach can strengthen fishery policy and practice, but they are underutilized as an avenue of influence.' Programs such as DFW's education and outreach continue to promote awareness and encourage individuals to practice sustainable fishing methods. Social media is a vital outlet for people to seek information, news, and methods of capturing sustainable efforts, especially diving deeper into aquatic ecosystems.

Nichols, J. D., & Williams, B. K. (2006). Monitoring for conservation. *Trends in ecology & evolution*, 21(12), 668-673.

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NOAA
CORAL REEF
CONSERVATION PROGRAM

Caring for Corals

by **FRANKLIN PANGELINAN**

Did you know that corals are actually animals? Corals are covered in hundreds to thousands of individual animals called polyps. These polyps have tiny mouths that open at one end and are covered in tentacles that they use to sting their food, just like a jellyfish! (NOAA Ocean Exploration).

Additionally, our coral reefs significantly boost our local economy in various ways, most notably through the tourism and fishing industries. The Northern Mariana Islands' reefs specifically valued between \$208,000 and \$1.4 million in 2006, with fishing adding an additional \$2.12 million to the region's 2014 GDP (NOAA Coral Reef Status Report in the Northern Mariana Islands).

Our coral reefs also offer numerous ecological benefits, including reducing storm and wave energy, protecting coastlines, safeguarding lives and livelihoods, and preserving valuable coast and terrestrial properties, infrastructure, and vegetation. However, our coral reefs are threatened by factors including stormwater and wastewater run-off, coastline construction, marine debris, and more.



In hopes to tackle some of the issues threatening our coral reefs, I decided to join the Department of Coastal Resource Management (DCRM) Summer Internship Program. This year, I interned under DCRM's Coral Reef Initiative (CRI), where I focused on creating educational outreach materials with the goal of raising awareness about coral health and biodiversity in the CNMI.

My projects included: designing an algae outreach poster, creating a coral and marine animals field guide, and promoting best snorkeling practices.

Through these projects, I was able to spread awareness to beachgoers on best management practices and the significance of reef-safe activities.

The updated outreach poster highlights common seagrass and macroalgae in the Mariana Islands. As explained in the poster, excessive algae growth, or "algae blooms," can have a negative impact on corals by blocking sunlight and hindering coral growth. Algae growth is an effect of nutrient rich water that flows into the ocean from our land. The field guide helps snorkelers identify corals and marine animals while providing a scavenger hunt and best management practices for reef-friendly activities. It contains common corals and marine animals in the Marianas and best management practices to follow while swimming.

Thanks to resources like field days with the Marine Monitoring team, JAMS coral outplanting, and interactive presentations with Dr. Douglas Fenner, I hope to see positive impacts from these projects in the coming year. I'm grateful for the support I received and encourage others to apply for the internship next summer.

NOAA Coral Reef Status Report in the Northern Mariana Islands. National Oceanic and Atmospheric Administration (NOAA). 2018.
https://www.coris.noaa.gov/monitoring/status_report/docs/CNMI_status_report_forweb.pdf.

Protect and Preserve the Hidden Treasures of the CNMI

by **JOEL DELEON GUERRERO (KUMOI)**

Buenas! My name is Joel Deleon Guerrero (Kumoi) and I'm excited to share my journey as a first-time intern with the Division of Coastal Resources Management (DCRM), placed at the CNMI Division of Fish and Wildlife. This internship has been a remarkable adventure, providing me with invaluable insights into wildlife conservation and the unique ecosystems of our beautiful islands.

My internship began on Managaha Island, where I assisted Wildlife Biologists and Technicians in monitoring wedge-tailed shearwaters. Each day, the team conducted fieldwork to flag and document the nesting sites of these seabirds. Our primary objective was to revisit these critical locations in the following months to observe nesting activities and ensure the birds' continued presence on the island. This meticulous process helps us track the health of shearwater populations and provides essential data on their breeding patterns. Additionally, we studied various non-native species that have found a new home in the CNMI, enriching our island's biodiversity.

As my internship progressed, I delved into the study of fruit bats, locally known as fanihi. Each morning, our team met at the break of dawn, around 5:00 AM, to observe these fascinating creatures. We explored fruit bat habitats across Saipan, many new to me. One of the most memorable moments was feeding a fruit bat a carabao mango. This close interaction allowed me to observe the bat's behavior up close, offering a rare and intimate glimpse into its daily life.

Another critical aspect of my internship involved learning about the Saipan Upland Mitigation Bank Area (SUMBA). SUMBA is a mitigation process where individuals seeking to clear land must consult with DFW to ensure their projects do not disturb endangered species' habitats. This process is crucial for maintaining the ecological balance and protecting the diverse wildlife that calls our islands home. Understanding SUMBA has deepened my appreciation for the regulatory measures safeguarding our natural resources.

Additionally, I participated in Bird Breeding Surveys (BBS), which involved visiting various



locations to monitor bird species. During these surveys, we listened to bird calls and observed their behavior, documenting any sightings. Hearing birds that had not been recorded in some time was a rewarding aspect of BBS, suggesting that our conservation efforts might have a positive impact.

This internship has been an incredible learning experience, blending hands-on fieldwork with critical conservation efforts. I'm grateful for the opportunity to contribute to preserving the CNMI's wildlife and look forward to continuing this meaningful work.

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NOAA
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Eliminate Pollution & Save Our Ocean!

by **MAXIMUS GABIONZA**

Marine pollution, a pressing issue, is a blend of chemical and plastic waste, predominantly originating from land sources. This escalating problem requires our immediate attention and concerted action. As a 2024 Intern at the CNMI's Division of Environmental Quality (DEQ), under the Water Quality Surveillance and Nonpoint Source branch, it is essential to share crucial information on the factors contributing to ocean pollution and how we can prevent its further spread into our waters.

Nonpoint Source Pollution is a type of water contamination that comes from multiple diffuse sources rather than a single point. According to the United States Environmental Protection Agency (EPA, 2023), heavy rainfall exacerbates this problem by transporting various wastes into natural bodies of water.

The Water Quality Surveillance (WQS) and Nonpoint Source (NPS) program monitor and evaluate the health of our marine waters and freshwater streams, lakes, and wetlands. Waters that fail to meet the CNMI microbial standards are considered a "Red Flag," a status that is advised to the public and can be found on our website under **Public Beach Advisories**. Marine and freshwater samples are collected weekly by WQS



and NPS staff. They are then tested in the DEQ Environmental Surveillance Laboratory to monitor the chemical, physical, and microbial quality of our nearshore waters surrounding our most frequent and popular beaches.

My main project has focused on stream assessments in priority watersheds,

particularly in the Kagman streams. During this assessment, I navigate through thick brush to find the stream's source. The assessment involves Habitat Assessments: measuring stream width, depth, flow rates and observing physical features such as bank stability and vegetation; **Biological Surveys**: identifying and counting aquatic species, including fish, insects and plants, to assess biodiversity and ecological conditions; and **Identifying Pollution Sources**: detecting potential non-point source pollution and assessing its impact on stream health.

Through this internship, I have gained a profound understanding of Non-Point Source Pollution, which has made me more mindful of my actions in public spaces. I now realize the significant impact our community can have on the health of our surrounding waters and the crucial role we play in preserving them for future generations. By increasing our outreach efforts and raising awareness, we can all contribute to the preservation of our natural water sources.

United States Environmental Protection Agency. (2023). Nonpoint source pollution. Retrieved from <https://www.epa.gov/nps>

Behind the Scenes of Conservation

by **RAJA SEVUGAN**



It is widely acknowledged that the waters surrounding the CNMI are among the most beautiful in the Pacific. They not only provide us with gorgeous beaches, pristine water, and habitats for diverse marine ecosystems but also a source of drinking water for some. However, despite all the benefits our ocean provides us, we tend to overlook the endless work that goes into maintaining its vitality, sometimes even contributing to its harm. This highlights the need for awareness of the work that goes into keeping our waters clean and safe for everyone.

When you think of conservation, you would probably imagine being out in the field and surveying the lands, beach clean-ups, or measuring the sand. However, there is way more to conservation that goes on behind the scenes. As an intern at the Division of

Environmental Quality's (DEQ) Surveillance Lab, I've had the privilege of assisting in water testing away from the field. This has allowed me to gain insight into our analysts' meticulous evaluation processes, where one wrong move could result in massively incorrect data. The lab is divided into two key sections: Microbiology and Chemistry. In the Microbiology section, we run daily tests for contaminants such as E. coli, Enterococci, and total coliforms. Meanwhile, the Chemistry section focuses on measuring parameters like total suspended solids and chemical levels of nutrients such as nitrite, nitrate, and phosphates. Analyzing the levels of these contaminants is essential for identifying potential environmental hazards and ensuring that our water meets the quality standards. In short, Microbiology aims to assess bacteria content, while Chemistry aims to assess chemical levels.

Even after explaining what our lab does, I know it might still sound confusing. However, that is precisely what I aim to address through my project. Through my project, I want to create an easier way to show and describe the procedures we undertake in the DEQ's Lab while also emphasizing the importance of this profession and inspiring others to develop an interest in this area of conservation. To achieve this, I wanted to create comprehensive videos documenting these procedures and post the videos with descriptions. While the impact of my project may not be easily quantifiable, I hope to create a greater appreciation for the fields of Microbiology and Chemistry in the CNMI, ultimately promoting a deeper understanding of how we can protect and conserve our precious marine ecosystems.

Raising awareness about our work and its significance is crucial because the DEQ Lab's efforts play a vital role in safeguarding public health and the environment. As Arthur Hounslow puts it, "The objective here is to use water analysis to interpret the history of the water," as well as its components, to ensure safe and clear water for all of us to enjoy (Hounslow 6). Through daily testing of water samples, whether it be drinking water or marine water, we help ensure that the CNMI's water meets the quality standards, protecting both our ecosystems and the communities that depend on these vital resources. Without our work, the quality of our water would not be kept in check, leaving us unaware of whether the water is safe for consumption swimming, or if our marine ecosystems are being damaged. Without our work, the health and well-being of everyone who relies on our island's water would face significant risks.

FROM RIDGE TO REEF



Guardians of the Reef

by JENISHA DUBRALL



Whether you're visiting the CNMI's stunning beaches or are a resident, the Marianas' coral ecosystem will likely affect you in ways you might not fully be aware of. Beyond attracting visitors and stimulating economic activity, our reefs provide numerous benefits to the island. They are home to a diverse array of marine species that are essential for local nutrition and safeguard our coastlines from floods/wave action and erosion. Globally, 500 million people rely on coral reefs for nourishment, income, and protection (NOAA, 2019).

Despite their importance, our reefs are threatened by climate change impacts and anthropogenic activities such as pollution, overfishing, and mining/harvesting coral. Recognizing these challenges, this summer, I had the privilege of contributing to the restoration of our island's coral ecosystems by assisting the Division of Coastal Resource Management's (DCRM) Marine Monitoring Team (MMT) in various capacities.

During my internship, I shadowed CRI Communications Coordinator, Joseph Nekaifes and NOAA Coral Management Fellow Bailey Warren at outreach events and planning meetings. With appropriate training, I was able to present to the 4-H Camp Magalåhi participants the importance of native vegetation in our watersheds and their significance towards our coastal ecosystems. Under the guidance of DCRM's Coral Technician, Jordan Suel, we worked on coral identification research and updated outreach materials relating to common corals found in the Mariana Islands. Our study provided insights into coral species' appearance, habitat, and ecological importance to assist MMT with future monitoring needs and educate the public.

When we weren't in the office, we were actively working in the ocean. We assisted Johnston Applied Marine Sciences (JAMS) with coral planting outside of Paupau's reef, helped maintain DCRM's coral nursery, and traveled to Tinian to learn about the Crown of Thorns seastar's detrimental effects and methods for controlling them. These field days were the highlight of my internship, providing hands-on experience in coral restoration by actively participating in challenging yet rewarding tasks while coral harvesting and outplanting.

With all the valuable knowledge, experiences, and memories I've gained, this internship helped me conclude my choice of pursuing a career in marine conservation. Despite the wealth of information about our reefs, there's always more to discover. I encourage anyone passionate about our environment to apply for this internship, which offers endless opportunities to help restore and beautify our island's coastal ecosystems.

Coral Reef Ecosystems. National Oceanic and Atmospheric Administration. (n.d.). <https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems>

Reefscaping

by DEANNA KAPILEO

This summer, I had the incredible opportunity to intern with the Marine Monitoring Team (MMT) under the supervision of Rodney Camacho. During my internship, I completed three projects. These projects included creating a photomosaic, recreating an educational poster on marine macroinvertebrates, and learning the process of sexual coral propagation. Each of these tasks provided unique insights and hands-on experience, enhancing both my technical skills and my appreciation for the complexity and beauty of marine life.

One of the highlights was learning the process of creating a photomosaic. My initial target was a large single colony of *Heliopora coerulea* (blue coral) located just off the shore of Tanapag Beach, Saipan. The location had all the right conditions, including good visibility, depth, slight overcast, and current. However, during our field visit, we encountered a few challenges with the camera. As such, instead of using the perfect colony for my project, I was required to improvise and create a land-based mosaic. Using 3D printed corals, my phone camera, and a table in the office I created an artificial reef to practice. After collecting my photos, I was able to create the mosaic using Agisoft.



The second project involved recreating an educational poster on marine macroinvertebrates. Macroinvertebrates are defined as any animal lacking a backbone and large enough to see without the aid of a microscope. Under this project, I conducted thorough research online. Using canva and procreate, I then combined illustrations, photographs, and concise descriptions to create a visually appealing and informative poster highlighting the diversity and significance of these organisms.

The most hands-on project I was involved in was the process of sexual coral propagation. Why sexual propagation? Because sexual propagation is crucial for the genetic diversity and adaptability of species (Barrett & Charlesworth, 2001).

For collection, we decided on two Acroporid coral species, *A. surculosa* and *A. digitifera*. That night we collected the gametes using net collectors that concentrated the gametes into falcon tubes. The next step was cleaning the spawn, which involved waiting for the eggs to fertilize and rinsing out the excess sperm. We then transported the fertilized eggs to the CRIB (Coral Rearing In-Situ Basin) where the coral babies could settle on pre-prepared substrates. Finally, I participated in outplanting the settled corals onto natural reefs.

Reflecting on this summer, I am grateful for the opportunity to work on such meaningful projects and excited for the future of marine conservation. Each project offered unique challenges and learning opportunities, from honing technical skills to gaining hands-on experience in the field. There is still much work to be done, but with continued effort and dedication, we can ensure the preservation of our precious marine environments for generations to come.

"Genetic Diversity and the Importance of Sexual Reproduction in Plant Species"
Author: Barrett, S. C. H., & Charlesworth, D.
Journal: Nature Reviews Genetics, 2001
Volume 2, Pages 241-250
DOI: 10.1038/35066096

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Connecting Conservation to the Next Generation

by **TAMISHA SABLAN**

Hafa adai yan iakwe! My name is Tamisha Sablan, and this year I had the privilege of returning to the Division of Coastal Resources Management's (DCRM) Summer Internship Program. Previously, I completed my internship under DCRM's Shoreline Monitoring Program. This year, I interned for DCRM as the new Education & Outreach intern, under the guidance of Colleen Flores and Joseph Nekafes, DCRM's Communications Coordinators. I am truly grateful for the guidance and support my mentors have given me.

"Education and outreach play a crucial role in addressing the tap issue and raising awareness about its hidden costs. By providing communities with knowledge and resources, we empower them to take action and make informed decisions." Public relations and outreach.

I firmly believe that knowledge is power and that the youth is our future. By educating them, we have the chance to inspire future marine biologists, environmental lawyers, environmental activists, etc. That is why I chose to focus on education and outreach for this summer program.

During the internship, I participated in a variety of outreach events. My first outreach effort was Camp Maga'lahi, where we took students on a nature hike to Jeffrey's Beach while educating them about invasive and native plants, endemic birds, and more. After the hike, we hike a scavenger hunt and cleared up a small area with the students. We then proceeded to PauPau Beach, where we gave snorkeling lessons to teach the students



about the different habitats and local species.

I later had the opportunity to attend the Tinian and Saipan Ocean Fair, where I presented our outreach material and captured special moments with our community and ocean partners.

My creativity was tested this summer while working on various flyers, stickers, infographics, and social media posts for the

DCRM outreach programs. My goal was to create eye-catching material that also highlighted and emphasized the message I wanted to spread.

Overall, coming back to this internship highlighted the importance of outreach and the work that BECQ does. Not everyone understands the effort BECQ puts into ensuring a bright future for our land and sea. We the public can learn and help with the ongoing battle they are fighting for us. Saipan is all of our homes and the sea is our way of life. We have to protect and conserve what we have before it's too late. For the sake of our future generations and our living quality.

Public relations and outreach. FasterCapital. (n.d.-a). <https://fastercapital.com/topics/public-relations-and-outreach.html>

Protect and Restore, With Wetlands and More

by **CHAREENA LAYUGAN**

Where the past meets the present, land use planning is crucial in guiding growth and preserving our rich and natural resources. There is more to land use planning than you may think. As noted by Anna Palom, "Land use planning is one of the fundamental options in flood management. It offers many advantages in terms of economic, social, and environmental criteria (Anna)." Effective land use planning can help ensure land is sustainable for future generations, especially with wetlands and watersheds in our islands.

This summer I was given the opportunity to become an intern for the 2024 Division of Coastal Resources Management (DCRM) Internship. Through the DCRM internship, I interned for DCRM's Land-Use Planning Program under my mentor, David Cabrera. My summer project was to design and create informational flyers and surveys on wetland conservation for the community on the islands of Saipan, Tinian, and Rota. For this task, I focused on three different wetlands and watersheds: Lake Susupe (Saipan), Makpo Wetland (Tinian), and the Talakhaya Watershed (Rota). Through the development of these flyers and surveys, I played a role in raising awareness regarding the DCRM land acquisition project with Areas of Particular Concern (APCs). While creating these flyers and surveys, I not only learned the importance of land use planning for our environment, but also the significance of using land resources efficiently.

For example, wetlands provide habitats for wildlife and plant species, improve water quality for our people, and control flooding. With land use planning, our wetlands also offer the opportunity for recreation (fishing, kayaking, etc.), conservation in Areas of Particular Concern (APC), and contribution to our local economy. Providing our communities with these informational flyers and surveys can help educate the



people of CNMI about our wetlands and highlight the importance of staying informed about the conditions and changes affecting them.

Although the land-use planning program was a new addition to the DCRM Summer Internship, I am so blessed to be a part of this opportunity. This internship opened my eyes to the complex balance between development and environmental conservation, showing me how important it is to plan for sustainable growth on our beautiful islands. I also learned about the difficulties involved in managing land resources, the importance of preserving natural habitats and our heritage, and the impact of responsible development on our community. This internship has not only widened my understanding of land use planning, but also deepened my passion for sustainable planning, conservation, and preservation for our future.

Anna Ribas Palom, and David Saurí Pujol, and Jorge Olcina Cantos. Floods. "Sustainable Land Use Planning in Areas Exposed to Flooding: Some International Experiences." Floods. Elsevier. 24 Nov. 2017.

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See You at the Shoreline!

by **GUILLERMA CHONG**

The phenomenon of erosion proves one thing: change is constant. Along with change comes trying something new, so in life I took that leap. This summer, I was lucky enough to pursue one of my passions as an intern in the Division of Coastal Resources Management's (DCRM) Shoreline Monitoring Program. Essentially, for the summer, I got to play coastal scientist!

Using survey-grade equipment under the guidance of my mentor, Mary Fem Urena, and my fellow partner, Kyla Cabrera, we collectively conducted field surveys of our beaches throughout the island, collecting data to update beach profiles. These graphs depict whether the shoreline has accreted or eroded and informs on water lines, vegetation and the many other natural aspects that make up our shorelines. Through data collection, I became well-acquainted with the Berger Level method, a commonly used survey-grade equipment encompassed by a tripod adorned with a telescope working together in tandem with a transect line and measuring rod. We would survey in pairs: One person must go

down the transect line every 10 feet. At the same time, the other peers through the Berger level to read the measurement on the rod. The field data will be calculated and graphed into a shoreline profile at the time of the survey. Through this work, I have learned how pertinent this data is to our lives as CNMI residents.

We are all ocean stewards in our own ways and collectively seeing firsthand the rapid loss of shoreline at beaches like Micro Beach. Still, over this summer, I have learned that coastal erosion is natural and not only inevitable though not exactly welcomed as it is a sensitive process that affects our beach side activities and structure. We, as humans, just have to decide whether the erosion rate is alarming and if it serves our purposes. And some beaches are getting lost while others grow!

Another fact and awareness I have gained through this internship is that beaches grow as well; because of strong waves along with weather and many other variables. Sand shifts and moves around the island causing loss and growth along our shorelines. Though coastal erosion and accretion can also be anthropogenic in causation like dredging and coastal buildings, the fight seems futile but with proper assessments and understanding we can make it work. My belief is that an ecosystem-like approach might serve us well, "recognition that we must consider, and ultimately function, within both ecological and human-defined boundaries is an important tenet" to be



able to work with nature instead of bending it to our will (Griffis, 1996).

Through the longevity of this internship, I have also encountered my fair share of trash along our beloved beaches and even having to pick up bags worth of trash before surveying. I have been instilled with a reinforced sense of ocean stewardship and compassion, which I have realized is an aspect of this job and related fields. If you care for our beaches and our home, don't trash a place that makes you happy.

Griffis Roger B. and Kimball Katharine W. *Ecosystems Approaches to Coastal and Ocean Stewardship*. Ecological Applications. 6(3). 1996. pp. 708-712 1996 <https://www.jstor.org/stable/2269467>

Filament Extrusion

by **LEILANI ATTAO**

"For every person on the planet, there are 21,000 pieces of plastic floating in the ocean." (Tamara Davison). Statistics state that about 14 million tons of trash can be found in the ocean annually which leads to the discussion "what can we do?". I am an intern at the Marianas Islands Nature Alliance (MINA). MINA is a non-profit organization created to conserve, protect, and educate the natural resources of the Northern Marianas. One valuable lesson I learned from MINA was that almost every object can have a solution even after it is used. Specifically for plastics, when recycled, can be repurposed and made into another product to be used again. My summer internship project was trying to create recycled PLA filament out of recycled plastics.

PLA Filament is the scientific term for a type of plastic used in 3D printing. The goal in having PLA Filament as a main focus is to develop a sustainable method for recycling plastics, transforming them into usable items for 3D printers. By doing so, we hope to establish a reliable supply of recycled filament within the CNMI, benefiting 3D printing companies, hobbyists, and educational institutions alike. Our target audience includes these sectors, all of which can significantly reduce their environmental impact by utilizing recycled materials. The project at hand can only be accomplished with the right environment and resources. This being said



my research has led to the result in using heavy duty gloves, a Filament Extrusion System Machine, 100% recycled plastics, and unpredictable weather has created a trial and error phase for MINA. The types of plastics I experimented with to create recycled filament were PETE 1, HDPE 2, LDPE 3, and PP5. I collected data on the type of plastic, temperature and speed of the machine, outside weather conditions (since I was working outdoors), and the results of the finished filament. The project goal was to produce usable filament, with a diameter of 1.7mm, that could be used in 3D printers. After many trial and errors, I was able to successfully produce over 10 feet of filament. However, partnering with agencies who had a 3D printer, we found that the filament was not consistently 1.7mm and could not be used. After other trials, reaching a consistent diameter throughout the whole process proved difficult and required much patience. In the end, I was not able to successfully produce filament that could be used with a 3D printer. But what I did find, was the best plastics to work with were 2s, 3s, and 5s, at X weather conditions, X temperature, and X speed. While there is no fixed date for when the results of this project will be fully realized, finding the right conditions of temperature, speed, weather conditions, and plastic type is the key objective. As we continue to gather and analyze data, we remain committed to delivering a viable solution. Hopefully in due time, the project location can be moved to a controlled site aside from the MINA office.

The significance of this work extends beyond the CNMI. By educating individuals on the versatility of plastics and the importance of recycling, we aim to protect our oceans and natural resources. Our hope is to not only be beneficial to our local community but may also inspire others worldwide to adopt sustainable practices.

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Care for Our Coasts

by **KYLA CABRERA**

At 8 years old, I did not realize that the same sandy shores where I built sandcastles would be the focus of my work with the Shoreline Monitoring Team at 18. This summer, I had the opportunity to observe and document shoreline changes on the island of Saipan through an internship with the Division of Coastal Resources Management (DCRM) under the mentorship of Mary Fem Urena from the department's planning section. This experience was incredibly educational as it taught me the importance of caring for our shorelines.

Healthy shorelines are essential to ecosystem health, which is a complex concept involving the interaction of physical, chemical, and biological components, all influenced by human activity (Cooper et al., 2019). These factors drive sediment movement along our shorelines, making the task of monitoring them both intricate and essential. My role this

summer focused on capturing the state of the shoreline by updating the beach profile data, which highlights any changes in shoreline length, elevation, and key characteristics.

During fieldwork, our team documented key shoreline features such as vegetation, waterlines, berms, and wracklines, all contributing to the overall beach profile. Beach vegetation, in particular, plays a vital role in stabilizing shorelines and maintaining ecosystem health. The beach profile data is essential for understanding shoreline trends, which informs coastal zone management on areas that need restoration and those that remain stable. By observing shoreline trends, our team can determine whether shorelines are experiencing erosion, accretion, or stability on our Shoreline Trends map.

Our findings are shared with the public through the DCRM website at dcrm.gov.mp, where the Shoreline Monitoring Program's Beach Profile Reports and Shoreline Trends maps can be viewed. This transparency is crucial for community awareness and involvement. As part of our outreach efforts, I also designed a sticker to remind our island community to care for our coasts, reinforcing the message that our actions impact our beautiful shorelines daily.



This internship has definitely informed me more about the importance of data collection for conservation and highlighted the importance of advocating for and caring for our coasts. I encourage our community to engage with the information available at dcrm.gov.mp and to take an active role in protecting our shorelines.

Cooper, N. J., McKenna, J., & Jackson, D. W. T. (2019). Ecosystem health and coastal management: An evolving perspective. *Journal of Coastal Research*, 35(6), 1233-1246.