FROM RIDGE TO REEF

A Collection of Articles Written by the 2021 DCRM Summer Interns

Issue No. 1 of 8

STREAMING THROUGH SAIPAN

SUBIN CHO DCRM CORAL REEF INITIATIVE WATERSHED MANAGEMENT

Wetlands and streams are important to the CNMI because they provide habitat for juvenile fish, nurseries for marine life, and an abundance of mangroves and native plants. This summer, I had the opportunity to work under the guidance of Zachary Williams, Watershed Coordinator, at the Division of Coastal Resources Management (DCRM) as part of their Summer Internship Program.

My main goal for my summer project was to identify and count fish within the stream areas in Lower Base, Saipan. We conducted this study by deploying an underwater camera, recording at a wide angle shot, and leaving the camera to record for an hour. After the recording, we brought the video back to the office and transferred them onto a computer where we began to study different species of fish that inhabit our streams, how many were present, and observe unique behaviors of fish — such as interspecies and schooling.

My mentor and I journeyed into the thick and tangled mangroves to reach certain points of the stream. There are a total of three segments within the Lower Base estuary: the lower, middle and the upper part of the stream — each approximately 100 meters in length. The equipment that were used for this project were a GoPro Hero 4, a modified tripod, and a dive weight used to hold down the camera in the silty mud.

Throughout our studies, we had identified more than 10 different species of fish living in the stream. To our surprise, species that were locally fished in the CNMI, such as juvenile trevally (locally known as tarakitu), snappers, and thumbprint emperor (mafuti) inhabited mainly the upper and middle regions of Lower Base. Flagtails (*Kuhlia* sp.) were abundant in

all regions of the stream, as well as mullets (*Crenimugil* crenilabis) which usually formed schools. Not only did the streams inhabit native fish but also invasive ones such as the tilapia. The importance of this project is to raise awareness to the public as well as to gain the support of different agencies and organizations who can help further study and conserve our streams in the CNMI.

It is important that we continue to protect and study our streams in order to create a healthier marine ecosystem. At DCRM, the phrase "Ridge-to-Reef" is used to summarize that what happens on our ridges will affect our reefs. Streams and wetlands connect the land to the sea, and serve a crucial role in the terrestrial and marine environment. Therefore, keeping our streams clean means cleaner fish to eat as well as healthier habitats for juvenile fish and nurseries. All in all, this internship was a once in a lifetime opportunity and an experience that will help jumpstart my career in pursuing the field of marine biology.

500 YEARS OF PLASTIC

DHALIAN SALAS DCRM COMMUNICATIONS

Do you know how long single-use plastics have been around? Over the last century and a half, single-use plastics have been marketed as the "material of a thousand uses". Apart from the reputation of these synthetic products, its expansion has manipulated humans with endless possibilities it momentarily spared.

Generally speaking, are you concerned about the time an average consumer utilizes a single-use plastic product, like a plastic bag or a plastic water bottle? Just twelve minutes. Because plastic never fully decomposes, single-use plastic product can last in our environment anywhere from 5 to 500 years.

Growing up in the CNMI, we have always been reminded of the three R's; to reduce, reuse, and recycle. Even so, these practices are not as effective in terms of providing a sustainable solution to the idea of plastic waste. Rather, we should refuse plastic from the start. Notwithstanding, it is estimated that only 9 out of 16% of plastic waste is recycled while the rest end up on our landfill, or oftentimes our ocean. Above all, the CNMI has no adequate recycling infrastructure. So, back to the question of whether we can do anything about all this.

Thankfully, the Division of Coastal Resources Management (DCRM) created a Plastic Free Marianas campaign that aims to address the overarching social, environmental and economic benefits of generating less waste. This summer, I interned with DCRM's Communications Team under the guidance of Colleen Flores, Communications Specialist, alongside another intern. We were tasked to attain Plastic Free Partners, where schools and businesses commit to a zero-waste lifestyle by skipping the straw or switching to biodegradable take out containers, among others.

I am thankful to have been part of a movement that guided me to confront plastic pollution at the beginning rather than at the end. Although you may not contribute to the growing plastic pollution problem, you can be a part of the solution and help create a Plastic Free Marianas. The choice to refuse plastic not only reduces the amount of trash that enters our landfill and ocean, but also lessens the amount of carbon dioxide produced by plastic as it breaks down. With the success of Plastic Free Marianas, we have the opportunity to eliminate another 500 years of plastic.

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PREVENTING FIRES, PROTECTING FORESTS

SAMANTHA LISKE-CLARK DCRM CORAL REEF INITIATIVE

Everything on the island is connected in one ecosystem. A fire on Mt. Tapochau can destroy the vegetation that holds the soil in place. That means the next time it rains, the soil will wash down the mountain, and eventually reach the lagoon, where it harms corals and fish. In order to preserve our reefs, we must protect our forests, and that means understanding the wildfires that threaten our island.

Unfortunately, the Division of Coastal Resources Management (DCRM) has limited data on Saipan's wildfires. This makes conservation efforts difficult, because we can't be sure what the 'normal' amount of fires should be. Furthermore, it's possible people's definitions of 'normal' have changed over time. Saipan might be experiencing "shifting baseline syndrome". This is when each generation thinks that the environment was 'normal' when they were younger. However, as time goes by and the environment degrades over time, each generation has lower standards for what the environment should look like (Pauly, 1995). So what does that mean for Saipan? That's what I spent this summer trying to find out!

I had the opportunity to work at DCRM under the guidance of Ilan Bubb, National Coral Management Fellow. We designed a survey to help us figure out the general public's perceptions of wildfires, and whether those perceptions have shifted over time.

Our survey asked respondents to list where they have seen fires occur on Saipan in the last 5 years. It also asked them to rate on a scale of 1-9 whether they think fires today are smaller or larger, less frequent or more frequent, etc. We also developed an online version of the survey using ArcGIS Survey123 software. From that point on, it was just a matter of pounding the pavement.

We went out to places like American Memorial Park, the Man'amko Center, and even the Joeten parking lot to survey as many people as possible. By the end of the summer, we had surveyed over 200 individuals. The next step will be to use R software to perform a statistical analysis of the data we collected. This will allow us to better understand public perceptions of wildfires, as well as the extent of "shifting baseline syndrome" on Saipan.

Because of this internship, I was able to help conduct original research this summer. I am so grateful to DCRM for this incredible opportunity.

FATAL FISHING LINES

ANDREA ROBERTO MICRONESIA ISLANDS NATURE ALLIANCE

The Mariana Islands are home to more than 1,000 species of fish, 1,029 species of plants, and 32% of all discovered coral species on Earth. In an effort to protect these natural resources, the Mariana Islands Nature Alliance (MINA) facilitates various programs and events mainly related to understanding and informing the public about the environment. As an intern working with MINA under the Division of Coastal Resources Management (DCRM) Summer Internship Program, my main task this summer was to measure and observe the effectiveness of the monofilament line recycling bin project implemented in January this year.

Through funding from the National Oceanic and Atmospheric Administration (NOAA), MINA fabricated and installed ten monofilament recycling bins at three popular fishing spots on island: Smiling Cove Marina, Garapan Fishing Base, and Sugar Dock. The monofilament bins serve as receptacles to discard used monofilament fishing lines, which MINA hopes will be recycled. This project was implemented in order to prevent the improper disposal of fishing lines, which may cause harm to our ocean and marine life.

My project this summer was to facilitate the weekly collection of the monofilament bins, record and interpret the data, and report my findings. Every week I visited the sites where they are located, collected the lines (and trash) inside them, and recorded the following information onto a data sheet: content levels, trash quantity, and bin issues, if applicable.

After each collection, I would record the weight of monofilament lines for each bin individually. This data will be used to assess which bins are being used more frequently and the community's response to the project. It would also provide observations on bins where "users" are more likely to adhere to policies and signage regarding bin use, and would ultimately gauge the efficacy of expanding the program. For the duration of my internship, from June 30th up till August 10th, I collected a total of 307.29 grams (10.84 ounces) of monofilament and 213 pieces of trash, 166 being from Smiling Cove.

My second project was assisting with script-writing for an upcoming educational video MINA will be producing. The video focuses on the issues of climate change, specifically to the effects we face in the CNMI.

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EXPLORE THE SHORE

THOMAS BENAVENTE DCRM SHORELINE MONITORING

There is no other experience like relaxing on the beach during a weekend. The shorelines of the CNMI continue to be a public leisure. They provide so much for coastal communities from sports and relaxation to photo shoots and bonding. In order to preserve this treasure, it is important that we observe and document the changes that have occurred to our shorelines and explore ways in which we can better protect them.

The Division of Coastal Resources Management's (DCRM) Shoreline Monitoring Program works to document changes to the shorelines in the CNMI. As a shoreline monitoring intern under the DCRM Summer Internship Program, I participated in a couple projects that led to a better understanding of why shoreline preservation is important. One project focuses on conducting surveys that identify key profile features on the beaches and determine if the beaches are eroding (losing sand) or accreting (gaining sand). These surveys are conducted bi-annually and provide an assessment of shoreline health and progress.

Another project I was tasked with was to create informational outreach material on the process of shoreline monitoring and combating erosion in the CNMI. This outreach material will be used at numerous outreach events and are meant for a variety of audiences including elementary students, high school students, and local developers.

Over the years, our shorelines continue to erode due to human activity, climate change, and storm surge. According to a study done by the IETR, "climate change has devastating effects on coastal areas..the physcial interface of land and water," (Toure et al., 2019). The sea level rise from climate change can lead to erosion and warmer temperatures, thus resulting in changes in coastal ecosystems and resources. Without protective action, sidewalks and picnic tables at local beaches and parks could possibly be submerged into the ocean. To prevent this, shoreline monitoring will continue to be done to assess future actions.

This summer, I have helped conduct surveys, created outreach materials, and gained extensive knowledge into different projects done by DCRM. Thus, I have become aware of how important our shorelines are to the community and how it is essential to spread this knowledge to the youth. I plan to use this experience to work in the local community after the internship. Overall, it was an honor to be part of the 2021 DCRM Internship cohort.

Toure, Seynabou, et al. "Shoreline Detection Using Optical REMOTE Sensing: A Review." *ISPRS International Journal of Geo-Information*, vol. 8, no. 2, 2019, p. 75., doi:10.3390/ijgi8020075.

OCEAN ENTHUSIAST

RICHELLE RAMON DCRM MARINE MONITORING

If there's one place you'd always catch me at, it's the beach. I am an ocean lover who grew a passion to preserve, conserve, and protect our ocean in any way that I can, whether it's through education and outreach, combating marine debris, or interning with marine conservation organizations.

Since my first internship at the Division of Coastal Resources Management (DCRM) in 2020, I've gained extensive knowledge and hands-on experience in marine biology. Because of that, I was able to secure other internships with non-government organizations such as Johnston Applied Marine Sciences (JAMS) as a coral reef restoration intern and Friends of the Marianas Trench's (FOMT) Project HOPE (Healthy Oceans and People Empowerment) as an education and outreach volunteer.

As a second-year intern, I am thankful to have been given the opportunity to work with DCRM's Marine Monitoring program once again. Marine monitoring is essential to determine the health and negative impacts imposed on our reefs, lagoons, and seagrass beds. Generally, there are 14 sites in the CNMI that our Marine Monitoring Team surveys yearly. Data collection is kept on a long term database as it helps indicate changes over time.

This summer, my colleague and I were tasked to survey the lagoon at Kanoa Resort to help identify possible impacts of a proposed project. Throughout conducting our surveys, we collected numbers based on what was present in the area, in terms of seagrass, sand and macroalgae. These numbers will allow us to determine the health of the lagoon in contribution to this proposed project.

Seagrasses play an important role in our oceans. They provide homes to our sea creatures, are a food source, filter pollutants and sediments that come from runoffs which balances our water quality.

As for the sand, there is not much coverage which is an important factor for some marine animals, like stingrays, as they usually bury themselves beneath the sand for protection from predators as well as to rest. As for their diet, stingrays are carnivores and are nocturnal as they hunt at night. There are small fish present, although not much of crustaceans or invertebrates. Overall, this project is still in progression.

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PESTICIDE EXPOSURE

JONATHAN SALAS DEQ PESTICIDE PROGRAM

As part of the 2021 Division of Coastal Resources Management (DCRM) Summer Internship Program, I had the opportunity to work at the Division of Environmental Quality (DEQ) Pesticide Program under the guidance of Darion Jones, Environmental Specialist.

It was an eye-opening experience to learn and understand how much work goes into regulating the sale and use of pesticide products in the CNMI. Without the regulatory duties of the Pesticide Program there would be a higher risk of harm to public health and the surrounding ecosystems and wildlife. During this internship I was able to experience firsthand what it takes to keep our people and environment safe from unnecessary pesticide exposure.

A pesticide is considered to be any product that claims to kill, repel, or mitigate a type of plant or animal. This could be any common insect spray found at a hardware store or commercial pesticide sprays used by businesses. Regulation pesticides requires annual routing inspections of many different businesses and farms all across the island.

During my time with the Pesticide Program, I was able to participate in three routine inspections. The first was a store inspection in which we checked if the store was following the correct procedures as far as displaying the pesticide and ensuring all EPA regulation numbers are still valid. The second was a site inspection at a local golf course where we reviewed their pesticide storage practices and recordkeeping. We also documented any issues that were found and recommended solutions.

I was also able to assist with an inspection regarding the importation of pesticides by a business. The main objective of this inspection was to ensure that the imported products matched the order placed and that all products abide by EPA regulations.

Besides conducting inspections, I was also tasked with creating outreach material that focuses on pesticide labels and the importance of reading them before use. I used the information that was shared by my mentor as well as previous outreach materials to create an educational pamphlet.

Overall this internship was such as great experience to have and I am grateful for the team that I was able to work with. I have learned so many new things and have come to have a deeper understanding of the dangers common pesticides pose.

RESTORING NATURE NATURALLY

KIANA CAMACHO DCRM SHORELINE MONITORING

Growing up on Saipan, the beach was my playground. It was not a traditional playground with monkey bars, swings and slides but instead, was an endless pool with an abundance of fish, sea creatures, and our renowned sea cucumbers (*balåti*). Our beaches were bountiful; soft white sand filled with beach morning glory, seashells, and tiny crabs. It was the best playground growing up and I hope it'll remain that way for generations to come.

During my internship under the Shoreline Monitoring Program at the Division of Coastal Resources Management (DCRM), I was able to get a better understanding of the importance of our beaches and why we monitor/study them. As part of our work, we went to 54 specific locations to lay down transects for surveying. Equipment we used to gather shoreline information were a berger level, rod level, transect line, notebook and pen. For every transect, we measured the height along the beach and made observations about the shore. Afterward, we updated the beach profiles. We compare the shoreline over the years and determine whether or not a beach is eroding (losing sand), accreting (againing sand), or stable. This is crucial for planning and developing in the CNMI, as well as combating ongoing erosion.

One approach to combat erosion is through the use of living shorelines and nature-based solutions. Mangroves, seagrass, and coral reefs are some nature-based solutions that reduce wave energy and protect our shorelines. According to a G-STIC article written by Dietrich Van der Weken, nature-based solutions "have higher resilience to climate change compared to grey infrastructure, and this increased resilience comes at reduced investment, maintenance, and operational costs."

I was specifically tasked during this internship to create infographics and a layout for the Living Shorelines and Nature-Based Solutions guidebook. The guidebook will bring attention to the Marianas regional shoreline erosion issue whilst giving solutions that will beautify and promote healthy shorelines. With the help of mentors and peers, the layout of this guidebook should be completed by the end of my internship and the general public will be able to access the guidebook by next year.

I am grateful for this experience because it increased my knowledge on environmental issues, skills and abilities in shoreline monitoring, and my personal interest about nature and the impacts of human activity. With this experience, I am able to continue my education in this field and do something bigger for my home in the future.

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SEAGRASS FOR THE SOUL

DOMINIC TORRES DCRM MARINE MONITORING TEAM

"With every drop of water you drink, every breath you take, you're connected to the sea. No matter where on Earth you live. Most of the oxygen in the atmosphere is generated by the sea." - Sylvia Earle, Oceanographer. This summer, I had the opportunity to participate in the Division of Coastal Resources Management (DCRM) Summer Internship Program with their Marine Monitoring Team. Marine monitoring is necessary to identify and understand coastal and ocean fluctuations and vulnerabilities to measure the impact of human activities and local conditions. The Marine Monitoring Team is responsible for monitoring the health of marine ecosystems across the Northern Mariana Islands. We look at all the different things within a reef ecosystem, the fish around it, algae and the coral itself.

My colleague and I conducted benthic surveys behind Kanoa Resort to determine whether or not it would be a viable site for a proposed project. Benthic surveys were conducted to estimate the benthic coverage of the area. The required tools to conduct a survey are transect lines, a GPS, and quadrats. The first step is to use GPS to locate the site and mark the area to be surveyed. Five, ten meter transect lines are then set down within the area. Quadrats are then placed every meter to identify present species. They key factor to consider is seagrass (*Halodule uninervis* and *Halophila minor*) coverage. Seagrass is important because it: has roots that hold down sediment and stabilizes shoreline, releases oxygen into the atmosphere, helps absorb nutrient runoff, and is a habitat for many fish (Houk and Camacho, 2020). Based on our findings, we concluded that the proposed site has a healthy amount of seagrass coverage to be a concern for the proposed site. IT is our recommendation that the site be located elsewhere that contains lesser seagrass coverage.

I am thankful for the opportunity to be part of the 2021 Summer Internship cohort and I am looking forward to pursuing a higher education in the environmental conservation field. The internship was a memorable experience and I highly recommend other ocean lovers to take advantage of this program.

Camacho, Rodney, and Peter Houk. "Decoupling seasonal and temporal dynamics of macroalgal canopy cover in seagrass beds." *Journal of Experimental Marine Biology and Ecology* 525 (2020): 151310.

CREATING A PLASTIC FREE MARIANAS

LAURINA SEBAKLIM DCRM COMMUNICATIONS

Did you know that plastic is one of the main sources of pollution and is perhaps on of the most harmful pollutants on Earth? About 8 million tons of plastic enter our ocean every year. Plastic has been present in our environment for over 100 years and will continue to be if we don't make a change today.

About 1 million seabirds and 100,000 marine animals die from plastic pollution every year. According to NOAA, plastics never fully decompose. They can take up to 450 years to break down into smaller and small pieces until they eventually become microplastic — plastic pieces that are 2.5 cm or smaller. Marine wildlife are not able to differentiate microplastic and often mistake it for food. When animals consume plastic, they suffer from indigestion and other harmful side effects.

Marine animals are not the only ones affected by plastic pollution. We, as a coastal community, depend on our ocean for food sources. Because of the abundant presence of plastic in our ocean, humans are also ingesting microplastic from the seafood we eat. It is said to be possible that humans may be consuming between 39,000 to 52,000 microplastic particles a year, according to National Geographic.

In 2020, the Division of Coastal Resources Management (DCRM) launched a behavior-change campaign called Plastic Free Marianas (PFM) which aims to lessen plastic consumption and the amount of plastic waste that enters our ocean and landfill every year. This summer, I had the opportunity to help expand the PFM campaign under the guidance of Colleen Flores, DCRM Communications Specialist.

My partner, Dhalian Salas, and I created a plastic free commitment infographic that helps businesses understand the overarching social, environmental, and economic benefits of generating less waste. When a business signs up to become a plastic Free Partner (PFP), they commit to reduce the amount of single-use plastic consumed in their establishment. Additionally, we distributed a number of plastic-free commitment cards which encouraged local community members to commit to reducing the use of single-use plastic. Plastic-free commitments include skipping the straw, packing waste-free lunches, and joining a beach cleanup, among others.

The commitment to leading a zero-waste lifestyle will be challenging but by doing do, we are saving ourselves, our wildlife, and our environment from the effects of plastic pollution. Let's take responsibility for our actions by creating a Plastic Free Marianas.

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STRIVING TOWARDS SUSTAINABILITY

ROSS ARRIOLA DCRM SHORELINE MONITORING

As an islander who was born and raised on Saipan, I have grown to appreciate the island's beauty and the environment that surrounds us. The simple experience of being able to grow our own crops and the nearby beaches has made me recognize my passion to preserve the nature of our island. With that said, I was given the opportunity to be part of the Division of Coastal Resources management (DCRM) Summer Internship Program where I was able to gain exposure towards implementing better building practices in the CNMI.

DCRM encourages developers to implement sustainable practices that help mitigate coastal hazards such as flooding and coastal erosion intensified by climate change. Climate change has been predicted to bring high volume rainfall, powerful typhoons and drier seasons. Since our islands have been affected by and are prone to super typhoons, DCRM continues to drive improvements in stormwater management, energy efficiency and climate change. DCRM provides guidance and consultation to help developers include effective ways to alleviate coastal hazards in their projects.

Having green infrastructure can capture runoff and can help recharge groundwater. Identifying ways to reduce nonrenewable energy, such as solar panels, can lessen greenhouse gases and allow energy efficiency. In addition, as climate change continues to happen, developers need to consider best management practices such as integrating plans that are Leadership in Energy and Environmental Design (LEED)-certified.

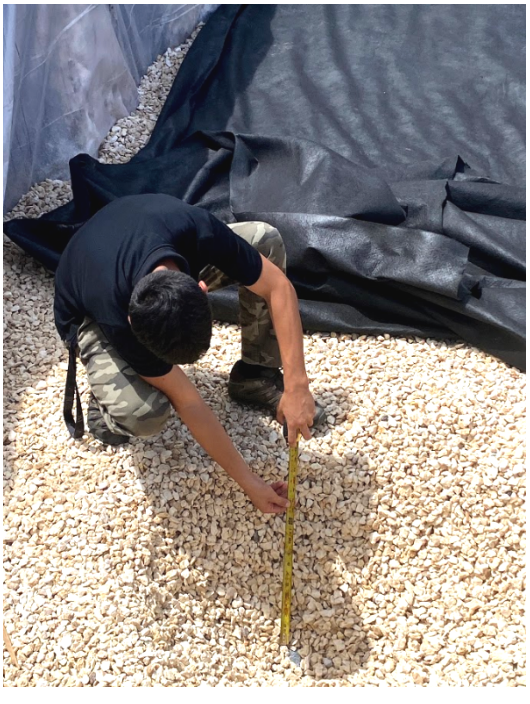
DCRM is dedicated to educating our community and its stakeholders of the importance of practicing sustainable efficiency and its effects on our coastal waters while offering incentives. For this project, I used Canva (an online software) to create the alyout for the "Better Building Practices in the CNMI" guidebook. The tentative release date for the guidebook is scheduled for the later part of 2021. For more information on the Better Buildings guidebook, contact DCRM.

During this internship, I was able to learn new information and be exposed to a deeper understanding of the coastal environment. Because of my involvement in the Better Buildings guidebook, I can now make the connection between development and impacts to our environment. As community members, we focus on the monetary value of new developmens that we oftentimes forget the negative impacts it can cause on our environment. Therefore, it is important that investors comply with DCRM's regulations to ensure that their plans do not cause adverse impacts to our island. I am grateful for the opportunity to be part of the 2021 Internship cohort.

Scientific reports. (2021, February 16). Citizen science for monitoring seasonal-scale beach erosion and behaviour with aerial drones. https://www.nature.com/articles/s41598-021-83477-6.

CONTROLLING EROSION

MATEO GUERRERO DEQ WEEC



Saipan prides itself on its pristine beaches and vibrant wildlife that entices tourists to come experience its beauty and culture. With new developments happening daily, it is important to understand the impacts they bring onto our environment and what we need to do to safeguard these natural treasures.

The Division of Environmental Quality's (DEQ) Wastewater, Earthmoving, and Erosion Control (WEEC) branch is one government office that promotes the Clean Water Act (CWA) which "establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters" (Environmental Protection Agency).

As a summer intern under WEEC, I had the chance to conduct educational and experiential field work which includes inspections of new construction activities, assess uncleared properties, and enforce stop-work orders to unpermitted sites. WEEC deals with several on-going construction and consultation projects on a daily basis. Without WEEC's regulations, Saipan could succumb to negative impacts caused by pollution discharge and erosion.

When a construction site is in violation of WEEC regulations, DEQ inspectors are able to issue a stop-work order to help mitigate any negative impacts imposed by a construction site.

Furthermore, if they refuse to comply with the stop-work order, said company could be faced with a severe fine of up to $25,000 per violation per day.

According to Ross, Phillippe, & DeLorenzo, Marie E., in 2009 Barbados needed to clear more forest for their sugar can production, which led to uncontrolled erosion and increased sedimentation into nearby rivers. The eroding soils became contaminated with water-soluble toxicants. These sedimentations were dispersed into the coastal reef which buried a part of it, thus beginning the process of rapid coastal erosion. Although this is jsut on instance of improper erosion control, this country is still feeling the negative effects of deforestation.

At WEEC, it is our job to inspect and enforce large and small scale development to ensure implementation of best management practices and erosion sediment control methods such as silt fences, earth berms, or ponding basins in order to avoid uncontrolled erosion. By doing so, we help to preserve and conserve our pristine natural resources.

Ross, Phillippe., & DeLorenzo, Marie. E. (1997). "Sediment contamination problems in the Caribbean Islands: Research and regulation." Environmental Toxicology and Chemistry, 16.1(1), 52–58 (1997). Web. 26 October 2009. https://doi.org/10.1002/etc.5620160105.

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TOGETHER WE WILL

KYLE BAUTISTA OFFICE OF PLANNING & DEVELOPMENT

"Together we will build and maintain a more sustainable CNMI." This quote will resonate with me for the next ten years as that's what it means to work at the Office of Planning and Development (OPD). This summer, the Division of Coastal Resources Management (DCRM) gave me the opportunity to become OPD's first intern under the DCRM Summer Internship Program.

OPD's main project is creating the Comprehensive Sustainable Development Plan (CSDP), which promotes a sustainable and resilient CNMI in a ten-year span. The CSDP follows the United Nations' seventeen Sustainable Development Goals (SDGs) to assist government agencies int he CNMI in promoting and implementing these goals in the coming years.

OPD really opened my eyes as to what is going on in the CNMI for the next 10 years. The staff taught me a lot of things regarding planning for not just the CSDP, but overall life in general. Whether it would be at work, school, or even buying a car, strategic planning is a part of everyone's everyday life, and that's what I learned from working here.

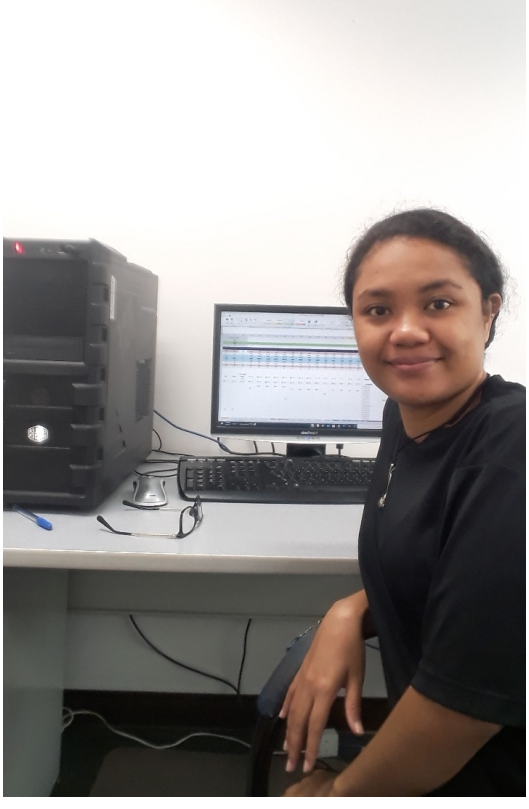
I was tasked to find and understand the connection between OPD's CSDP and DCRM's mission. In the CSDP, three out of the seventeen SDG's align with DCRM's management policy. These goals include #13 Climate Action, #14 Life on Water, and #15 Life on Land. OPD partners with multiple government agencies, including DCRM, to work towards the goals of the CSDP.

This can be seen on SDG #13, Climate Action, with alignments from DCRM, OPD and the Public School System (PSS) collaborating towards developing a climate action curriculum within the education system as part of the ten-year plan. For #14, Life on Water, the Natural Resource Taskforce, in collaboration with OPD, DCRM and other government agencies, is developing a plan to construct a Marine Center for jobs, education, and tourism which is also part of the ten-year plan. And finally, #15, Life on Land, with OPD collaborating with DCRM and other agencies, they will progress towards reducing man-made wildfires by 50% in the next ten years.

"What happens on land will eventually make its way down to the ocean," these examples from the three goals will eventually affect both the land and the ocean in a sustainable way. Learn more about OPD and its CSDP at www.opd.gov.mp and together we will build and maintain a more sustainable CNMI.

CONTAINING CONTAMINANTS

WILEEN MONGAMI DEQ SAFE DRINKING WATER PROGRAM



Salty, fresh, treated, chlorinated, or raw water. Collecting, surveying and conducting inspections can provide valuable information to help protect public health and the environment. Water is important because it is a part of our everyday life activities.

Whether its for drinking, domestic use, food production or recreational purposes, having available drinking and ground water is important to public health. Sanitation and better water management can promote economic growth and can help reduce poverty.

Waterborne illnesses are contaminated water sources that are caused by microbes or pathogens in recreational or drinking water (mn department of health). Waterborne illnesses including cholera, diarrhea, dysentery, hepatitis A, typhoid, and polio have been linked to contaminated water and inadequate sanitation. Individuals are exposed to preventable health hazards due to the lack of, insufficient, or improperly managed water and sanitation facilities. This is especially ture in healthcare institutions, where both patients and employees are at increased risk of infection (World Health Organization, 2019).

This summer, I interned under the Division of Environmental Quality's (DEQ) Safe Drinking Water Program (SDWP) under the guidance of Travis Spaeth, SDWP Manager. I was tasked to combine data from 2005 to present and input them into a spreadsheet to create a historical trend line in a graph to provide valuable insight to the contaminants; such as chloride, nitrate, total dissolved solids, specific conductivity and total hardness. Creating this graph will show a trend of these contaminants and can help with regulation sanitation systems and manage areas that need improvement for public health and safety. The data that is provided is collected into a system that keeps track of all the underground water wells that are being tested and is entered into an excel sheet, where it is broken down into a quarterly basis.

SDWP works closely with private and government businesses to ensure that the source water they are receiving is safe for consumption. The results of this project could become a new set of data used to create a digital map of physical locations in the CNMI that are known to have high concentrations of contaminants.

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ENSURING OVERALL HEALTH & SAFETY

MARIA CRUZ DEQ ENVIRONMENTAL SURVEILLANCE LABORATORY

Despite the ocean's profusion of resources and recreational involvement, it is pivotal to know what is really in our waters. As an intern at the Division of Environmental Quality (DEQ) Environmental Surveillance Laboratory as part of the Division of Coastal Resources Management (DCRM) Summer Internship Program, I saw the utmost importance of conducting the analysis of water resources for contamination and bacteria.

In the microbiology laboratory, I focused on analyzing marine beach waters from Saipan, Mañagaha, Tinian and Rota for enterococcus bacteria which indicates that decal waste is present. I also had the opportunity to work alongside DEQ's Water Quality branch to collect water samples at Mañagaha and various west beaches for analysis.

According to N. Bruce Hanes and Robert Fragala, it is precise that "disease can spread by either swimming in, or eating shellfish harvested in, areas that are contaminated by the decal material of man [and other warm-blooded animals]" (Hanes et al., 1967). Furthermore, it is crucial to do the analysis for the "presence and amount" of fecal material because this determines what beaches are green flag and red flag, meaning which beaches are safe and unsafe to swim in. If left unaware of these circumstances, the public can be negatively impacted in contaminated waters as they catch illnesses, such as headaches, fevers, and infections from open wounds.

For accurate and valid results to prevent such diseases, I practiced using aseptic techniques and wore protective gears, such as a lab coat and gloves, as I carried out the process of analyzing samples with my mentors. Upon collecting and

receiving samples, I would prepare 90 mL of sterile dilution water, adding 10 mL of sample water in the vessels using a pipette. Then, I would add the Enterolert media, shaking it thoroughly until fully dissolved. Afterwards, I would properly label the Quanti-Trays with the sample location, pouring the sample mixture in and inserting through the Quanity-Tray Sealer with sealed trays put in the incubator for 24 hours at 41 degress Celsius. Lastly, I would conduct the readouts the next day by putting the samples under a UV light where results determine which sites are safe for recreational usage. To conclude, this phenomenal experience gave me valuable information this summer regarding the analysis procedures from start to finish and its impact in ensuring our environment's and community's overall health and safety. I look forward to applying what I've learned from all my mentors as an aspiring environmental health scientist!

Hanes, N. Bruce, and Robert Fragala. "Effect of Seawater Concentration on Survival of Indicator Bacteria." Journal (Water Pollution Control Federation), vol. 39, no. 1, 1967, pp. 97. JSTOR, www.jstor.org/stable/25035720. Accessed 12 August 2021.

THANK YOU! SI YU'US MA'ASE! OLOMWAY!

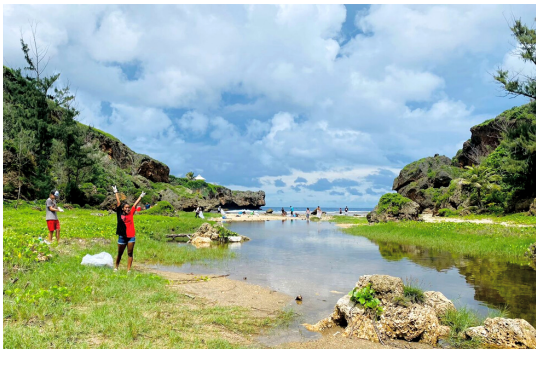
The Division of Coastal Resources Management would like to thank our partnering agencies for mentoring interns and contributing to the 2021 DCRM Summer Internship Program.

DIVISION OF COASTAL RESOURCES MANAGEMENT
COMMUNICATIONS
SHORELINE MONITORING
MARINE MONITORING TEAM
WATERSHED MANAGEMENT
WILDFIRE MANAGEMENT

DIVISION OF ENVIRONMENTAL QUALITY
WASTEWATER, EARTHMOVING, & EROSION CONTROL
ENVIRONMENTAL SURVEILLANCE LABORATORY
PESTICIDE PROGRAM
SAFE DRINKING WATER PROGRAM

MARIANA ISLANDS NATURE ALLIANCE

OFFICE OF PLANNING & DEVELOPMENT



Thank you to the following agencies that offered educational field trips for this years cohort:

DIVISION OF COASTAL RESOURCES MANAGEMENT
WATERSHED MANAGEMENT
MARINE MONITORING TEAM
PLANNING SECTION

NMI MUSEUM

DIVISION OF ENVIRONMENTAL QUALITY
WATER QUALITY

NATIONAL PARK SERVICE
AMERICAN MEMORIAL PARK

PACIFIC COASTAL RESEARCH & PLANNING

The DCRM Summer Internship Program is offered to fifteen (15) CNMI-based college or college-bound students with an interest in learning about coral reef and coastal zone management. To be a part of the 2022 cohort, contact DCRM!