



National Coral Reef Management Fellows Newsletter

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The Fellow Newsletter is published by the National Oceanic and Atmospheric Administration (NOAA) Coral Reef Conservation Program, the United States Department of the Interior, and Nova Southeastern University to relay information related to the fellowship program.

Meet the Puerto Rico Coral Fellow - Emma Korein!



Emma Korein (Puerto Rico) grew up in Philadelphia and found a love for the ocean while traveling and spending summers at the New Jersey beach. She has a background studying both psychology and environmental conservation, through which she developed a passion for working with diverse groups of people to help preserve our ocean's most vulnerable ecosystems.

As the Puerto Rico fellow, she is working with key informants to build a comprehensive database of coral reef disease distributions that can help inform conservation management decisions and emergency response strategies. Her favorite ocean memory took place while snorkeling in Cornwall, England, when she felt something below her and looked down to find a seal playing with her fins!



Focus on the Fellows - Pacific Edition!

The fellows are well into their first year of work! On August 19th the Pacific fellows presented virtually to the Pacific jurisdictions of the Office for Coastal Management (OCM) and shared their professional and personal backgrounds, and progress on their fellowship work. The Pacific fellows also virtually reconvened in September and heard from Paulo Maurin, Hawaii Management Liaison/NOAA Office for Coastal Management, to learn about Coral Reef Conservation Program updates and ways to connect to OCM and NOAA. In the next section, the Pacific jurisdiction fellows share more about their work and experiences so far in the fellowship program.

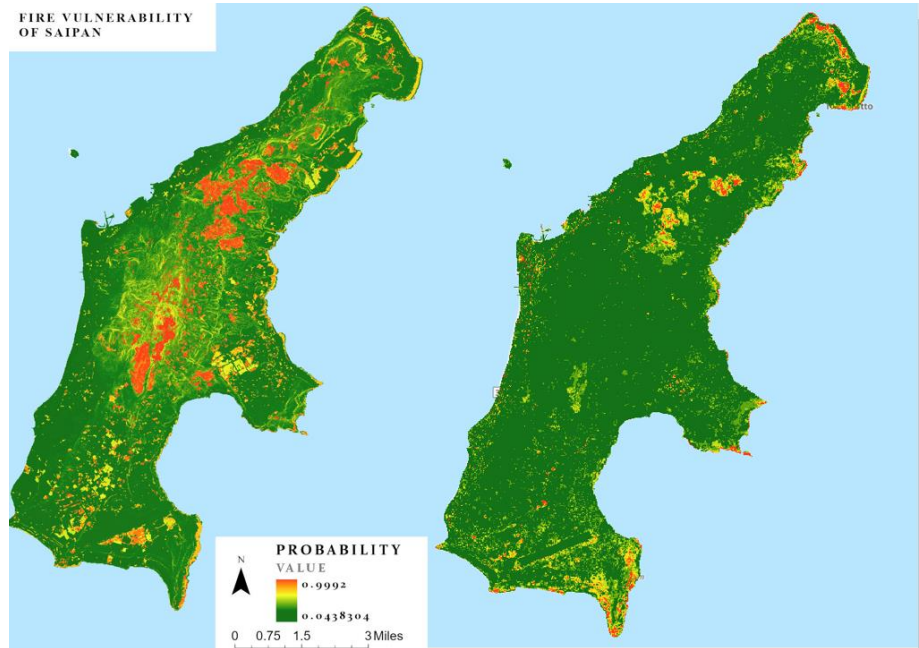


Ilan Bubb (CNMI):

Ilan is working on understanding the connection between upland fires and sedimentation of coral reefs within the island's three priority watersheds in order to inform fire management strategies. Ilan also conducts outreach programming and mentors interns.

What is a major piece of information you have found from your work looking at spatial and temporal patterns of fire on the island that will help reach management goals?

The major take away from our models is that fires are becoming both more common, and spatially larger between the years of 2012-2020. This finding coincides with our weather data suggesting that droughts during the dry season are also becoming more intense. Normally during the dry season there are still sporadic rain events throughout the season that serve to keep vegetation and soil moist. In recent years however these sporadic events are becoming less and less common resulting in drier and more combustible vegetation. This leads us to believe that the small and sporadic rain events during the dry season are integral for controlling the number of wildfires that occur.



(Left map): a predictive model showing in red the areas of Saipan that are most vulnerable to fire. (Right map): actual identified fires with darker regions indicating that more fires have occurred in those areas between 2012-2020. (Maps generated by Ilan Bubb)

How have your experiences and interest in environmental justice and equity guided or affected your approach to work?

Decolonizing conservation has been a paradigm that has meant a lot to me in the past few years. Norms held by western environmentalists are not always held in other places. Being able to navigate these differences is one of the most important aspects of the job for anyone who is working in applied conservation. Failure to navigate them well can result in poor conservation outcomes and even worse social outcomes. This idea has come to a head multiple times when dealing with federally endangered species in the CNMI such as haggan tasisea (sea turtles), fanihi (fruit bats) and the Aga (Marianas crows). These three animals have specific, important cultural ties to both the indigenous Chamorro and Carolinian populations whose traditional hunting practices were historically sustainable prior to colonization and, for the most part, stayed that way up until World War II. The listing of the species clashes with traditional use by indigenous folks, resulting in resentment by the local community towards the government, conservationists and the animals themselves. As a result, situations can arise where the very act of trying to conserve a species leads to their imperilment because the social circumstances on the ground were not taken into account by policy makers. As an outsider coming from the mainland United States, my goal is to navigate both my western training and the lived experience of the people in the CNMI to generate the best possible social and environmental outcome for these endangered species.



“Quick! Pretend you’re doing science!” (Photo by Ilan Bubb)

How has your experience mentoring interns added to your fellowship experience?

The BECQ (Bureau of Environmental and Coastal Quality) internship program is a comprehensive internship where students just out of high school or beginning college are offered a paid position to study some aspect of environmental management on Saipan. It is one of the most amazing internships that I have seen, and something that I certainly wish was available to me when I was in college. It was such a great experience to learn about wetlands along with the interns and while I hope they were able to take away a lot from the experience, I know that I learned a lot from them. These are students who have lived on Saipan all their life, so of course they would be able to teach me more about the common flora and fauna that they grew up with.



Valentine (Tine) Vaeoso (AS):

Tine is working with the Coral Reef Advisory Group (CRAG) and other partners to conduct coral restoration trials in the village of Aua. She is also working to identify and reduce land-based sources of pollution (LBSP) and conduct village outreach.

What has been the biggest challenge in the coral restoration planning process? How have you addressed that challenge?

I think the biggest challenge for me in the coral restoration planning process is how little we know about long-term outcomes and conditions that lead to successful coral recovery. Restoration in American Samoa at a village-based level is new and we have a long ways to go in order to restore degraded reefs affected by vessels grounding, hurricanes, and coral predation. However, working with coral managers to initiate pilot studies in Aua village (study site) can provide information needed for success and assist with future restoration projects in other villages on island.



Tine surveying reefs of Aua village to select potential sites for restoration and the coral nursery. (Photo by Valentine Vaeoso)

How did you get involved in underwater photography and how has it affected your work in conservation? Do you have a tip for capturing a great coral reef shot?

I remember becoming more involved with underwater photography when I purchased my first GoPro, which was also my first underwater camera. I was really stoked to take underwater photos and shared them with family and friends. Now with my work in conservation, I believe underwater photography has the ability to show people who have never experienced the marine environment for themselves, the beauty of that amazing world, and helps educate people on the value of conserving it for our future generations. To capture a great coral reef shot takes practice but also getting familiar with your camera is important. Having an expensive camera that isn’t adjusted properly to underwater photography will often times take poorer photos than a very simple camera.



A stream in Fagasa village is a potential site to implement best management practices (BMPs), which include reducing dumping of household waste, reducing removal of riparian vegetation, and instead installing riparian buffers such as vetiver grass. (Photo by Valentine Vaeso)



Cara Lin (GU):

Cara's work focuses on Guam's mangroves and seagrasses. She is working on creating social science surveys and a literature review to gather information that will guide future management efforts. She also leads and assists on various outreach and education projects.

What have you learned so far from your experiences working on diverse outreach projects as part of the fellowship?

Previously most of my outreach work has been within an informal educational setting (eg. STEM nights and activities) or attending events or festivals with an informational or interactive booth. However, a large portion of my outreach efforts here are focused on working with private landowners to conserve mangroves on their property, which is a very different audience. Initially, I was unsure how to begin approaching mangrove preservation with landowners. Thankfully, my more experienced coworkers and mentors were able to offer insight, and we agreed to create a survey to learn from landowners and their experiences. By creating a semi structured survey for landowners, similar to an interview, I hope to learn about the relationships between people, their land, and the vegetation on their land. This experience has demonstrated how essential it is to listen and learn directly from community members.

Additionally, creating a survey has been a learning experience. Part of the survey creation process involved requesting several rounds of feedback from many others in the natural resource management field and getting approval from the University of Guam internal review board to ensure ethical considerations for the safety and privacy of our survey participants. Our landowner survey also hopes to use participatory research and will invite landowners to help guide the direction and interpretation of research. By learning and engaging with the community first, we can better understand what management programs or strategies might work best for everyone and achieve any mutual goals. Often times in my university training I read about the importance of engaging with communities from the beginning of a project. The fellowship experience has helped provide a better understanding of what that process actually looks like in practice.

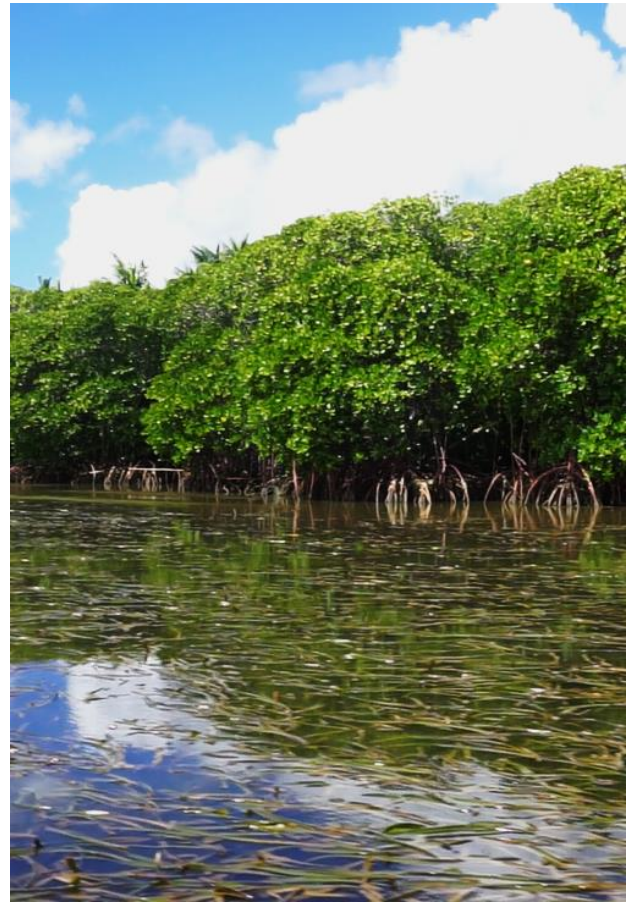
What have you learned about land based sources of pollution so far that could help guide management efforts?

Land-based sources of pollution (LBSP) are one of the main stressors to our marine environment. Pollutants such as sediments, nutrients, and pathogens from land-based activities are several factors threatening the quality of coral reefs in American Samoa. These pollutants are transported in runoff during heavy rainfalls and by groundwater seepage into coastal waters. Some of these pollutants can fuel the growth of macroalgae which can out compete corals for space on the reefs. Understanding the magnitude and extent of pollutants already in the system, and their potential effects on coral reef health is important for management efforts to reduce LBSP.

What are key learnings or findings from your literature review so far?

The research on seagrasses and mangroves, from other areas in Micronesia and the Indo-Pacific, generated over many decades, utilizing various techniques and approaches, has been extremely helpful to piece together a more accurate and nuanced understanding of how ecosystem services are provided, what potential anthropogenic threats might be occurring, and possible management actions for these important ecosystems. This collective wealth of knowledge can be applied to better understand and protect Guam's seagrasses and mangroves.

For instance, a recent report by LaRoche et al (2018) showed Guam's seagrasses have declined by 22% in the last decade. However, the cause of the decline is unclear. Conducting this literature review has helped me better understand potential causes of seagrass loss, such as overfishing (which can lower grazing of epiphytes, causing epiphyte overgrowth and shading of the seagrass), nutrient pollution induced sulfide toxicity, and climate change. We can use this knowledge of the stressors that have caused seagrass loss in other areas of the tropical Pacific to investigate and elucidate the contributing causes of seagrass loss here in Guam.



Mangroves and seagrasses exist in close proximity around the Southern coast of Guam. (Photo by Cara Lin)

Litter-free seas!

Trash that isn't thrown away correctly and ends up in the environment is called **LITTER**. Litter is a big problem. Animals like fish or birds may eat bits of plastic and get sick. Other animals like sea turtles can get tangled in old nets or fishing line and drown.

Litter is also harmful to people. No one wants to swim in a beach full of garbage, step on broken glass, or eat fish and seafood that has been eating plastic garbage!

You can help by reducing how much trash you make, keeping trash in the trash can, and recycling in the recycling bin! You can also pick up litter you see and join clean up events!

On the side are some of the most common types of litter that ends up on our oceans. Can you find them in the mangrove and seagrass habitat below?

- Bottle cap
- Plastic bottles
- Plastic bag
- Glass bottle
- Plastic straws
- Candy wrapper
- Plastic fork
- Cigarette
- Plastic spoon
- Aluminum drink can
- Fishing line and hook

BONUS CHALLENGE: put a STAR next to items you CAN recycle, and CROSS OUT items you CANNOT recycle

Draft of page for activity book challenging kids to find marine debris in the seagrass and mangroves. (Illustrated and written by Cara Lin)

What has the process of creating an educational activity book been like so far?

The activity book has been constantly evolving these past months. Originally the book was going to focus on mangroves and seagrasses, since there is relatively lower awareness of these ecosystems. However, since connectivity between ecosystems is so important, and stewardship involves protecting multiple natural resources, I changed the overall focus to provide a very holistic view that also includes coral reefs and terrestrial ecosystems. The book seeks to provide information on the basic biology of these coastal ecosystems, highlight ecosystem services, demonstrate connections between the ecosystems, and emphasize stewardship.

As I worked on the literature review I gained a better understanding of the local area and coral reef stressors. With this knowledge, I added relevant pages on the local marine preserves and citizen science monitoring program, and emphasized ridge to reef conservation since sedimentation is such a big issue on the coral reefs in Guam. I also often changed activities and layouts while testing clear and appealing ways to visually present the information in the most fun and interactive way possible.

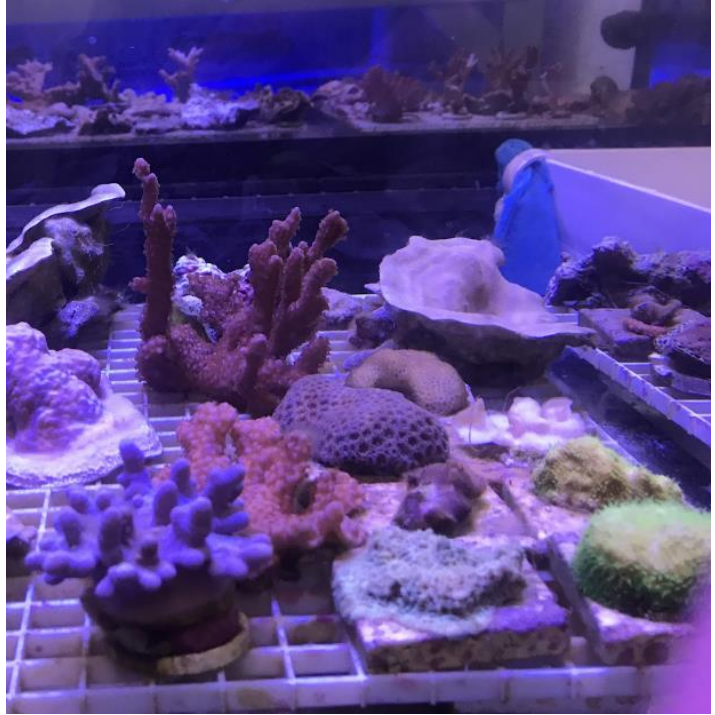


Bert Weeks (HI):

Bert is coordinating the multi-agency partnerships for coral reef management and creating a coral restoration permitting framework. He is also working on furthering the Marine 30x30 Initiative, a state-led program to effectively manage 30 percent of Hawaii's nearshore waters by 2030.

What is the greatest challenge you have faced creating the coral restoration permitting framework? How have you addressed that challenge?

A big challenge in creating a coral restoration permitting framework has been addressing the amount of unknowns involving coral restoration in Hawaii. There has been amazing research on restoration that has come out of Hawaii but compared to some other places in the world, our restoration implementation practices are still in its infancy. So far, our reefs haven't needed as much restoration compared to other more degraded reefs, but that might not be the case in the future. Taking those lessons and methods from around the world and seeing which would benefit Hawaii's reefs is a delicate balancing act between minimizing risk yet still allowing growth in the field. It has been necessary to consult with the many coral experts that are in Hawaii who have generously given their time and knowledge.



The Hawaii DAR nursery serves a coral ark, growing rare Hawai'ian corals in aquariums and potentially saving them from extinction. (Photo by Bert Weeks)

We have learned many lessons from the history of forest restoration in Hawaii leading us to be much more cautious of long term impacts when restoring coral reefs. Over 100 years ago when many of Hawaii's forests were decimated by logging, arborists introduced quick growing trees to stabilize hillsides and were wildly successful. They found a tree with one of the fastest growth rates in the world, called *Albizia*, which repopulated many of the barren forests. However, in the present, *Albizia* and other highly invasive plants have taken over, causing many issues for both the forest and people. There are many parallels we can draw when restoring the ocean, and we don't want to create more headaches for the reef managers 100 years from now who will have to deal with the consequences of decisions we make today.

Personally, a big challenge of this process has been getting good feedback from our panel of expert scientists without the ability to host in-person meetings. In the times of COVID-19, most of my meetings are over Zoom which has really tested my virtual facilitation skills to get done virtually a task that would be much easier to accomplish in person.

I've found that, just like a traditional workshop, preparation is key. There are many online tools that are helpful, but it's nearly a form of punishment to have to sit through three straight hours of a single online Zoom call. Asking the right questions, getting helpful feedback, and anticipating and guiding the discussion all require not only a good understanding of the topic, but also of the dynamics of the people in the room. As a coral fellow, it has been a great opportunity to interact with many of the top coral reef scientists in Hawaii. I strive to make the zoom call discussions a worthwhile experience for all parties.

As a dive enthusiast that grew up in HI, what has been the most unique or inspiring thing you have experienced underwater?

I get the most excited when I get to see some of the rare and unique sea creatures that are found in Hawaii. Due to its isolation, Hawaii has one of the highest rates of endemic species in the world, animals that are found in Hawaii, and nowhere else. Unfortunately, that also means that there are many endangered species that have a possibility of disappearing within our lifetime like the Hawaiian monk seal. I've had a handful of memorable in-water experiences with monk seals who like to hang around coral reefs looking for food. Monk seals are not commonly seen around the main Hawaiian Islands so it's always a treat to see one in the water.

Recently when I was diving off the West side of Oahu, I happened to catch a photo of a monk seal as it stole some fish off the float of some spearfisherman above me. Although it's generally best to try to avoid these interactions as it is harmful to monk seals to associate people with food, the fisherman was having a hard time keeping the seal away as it maneuvered with speed and agility through the water. It ended up stealing most of the fish off the stringer. Encounters like this remind me that I'm always the guest in the ocean and that we need to respect its residents like this seal. It also keeps me motivated to keep Hawaii's waters healthy so that we'll still be able to see monk seals generations from now



A rare Hawaiian monk seal seen off the Western side of Oahu, stealing fish from a spearfisherman. (Photo by Bert Weeks)

From looking at ocean user fees from other countries or areas, what are some elements you think makes these fee structures successful and what do you hope to incorporate into how a fee would be applied in HI?

Our ocean provides for us in many ways, like putting food on our plates, places to swim and play, and even ways to make money and support businesses. The ocean does all this for us for free, not charging us to enjoy all these benefits. However, as more and more people use the ocean, it also takes more resources, people, and money, to take care of it so that we all can keep using the ocean in a healthy way. If we create a way that users can help contribute to taking care of the ocean, managers can be more successful and everyone who uses the ocean will benefit. One way that users can contribute is through the creation of a small fee that will be added whenever people pay to use the ocean, such as in tours or snorkel trips.

One of the key elements that make these fees successful is the fact that the funds generated by the users are spent on services that directly benefit the people who are paying. Many of the actions taken by a management agency, like the Division of Aquatic Resources (DAR), aren't highly visible projects that the public can see, and it can take a long time to see the benefits of stewardship of the resource, which ultimately benefits the user. A user fee can be highly successful in generating additional funds to raise capacity for the agency. If those funds can be spent in a way that users can see the benefits, it makes it easier to understand how their money is contributing to taking care of the ocean. For example, the fee can fund restoration projects on coral reefs that a snorkel tour can then visit. Projects that have direct benefits to both the ecosystem as well as tourism would be more likely to be supported by many of the businesses that will be paying the fee.

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The National Coral Reef Management Fellowship was established in 2003 to respond to the need for additional coral reef management capacity in the U.S. coral reef jurisdictions in the Pacific and Atlantic/Caribbean. The fellowship is a partnership between the National Oceanic and Atmospheric Administration's Coral Reef Conservation Program, the U.S. Department of Interior's Office of Insular Affairs, the U.S. All Islands Coral Reef Committee and the Nova Southeastern University's Halmos College of Natural Sciences and Oceanography. The program's vision is a thriving collaborative fellowship program that builds excellent next generation leaders and capacity for effective local coral reef ecosystem management.

