HAWAIʻI CLIMATE WEEK 2024

March 28

PI-CASC Graduate Scholars Symposium

"Emerging Scientists for Climate Adaptation"

PROGRAM GUIDE

Pacific Islands Climate Adaptation Science Center

AGENDA

March 28

PI-CASC Graduate Scholars Symposium

"Emerging Scientists for Climate Adaptation"

Agenda Highlights

9 a.m.

Welcome

By Dr. Mari-Vaughn Johnson, PI-CASC Regional Administrator

9:10 - 9:55 a.m. | Session 1

Ihilani Kamau
TCBES • UH Hilo

Predicting Sea-Level Rise Impacts to Coastal Wastewater Infrastructure & Water Quality

Carla Baizeau
Oceanography • UH Mānoa

The Impact of Vertical Land Motion on Sea-Level Rise Timeline in American Samoa

Jessica Glazner
HIMB • UH Mānoa

From Seabirds to Sewage: Investigating Nutrient Effects on Coral Bleaching

10:05 – 10:55 a.m. | Session 2

Jerolynn Myazoe & Shania Tamagyongfal
Anthropology • UH Hilo

Using Oral Histories of Marshallese & Yapese Voyaging to Support the Development of Community Engagement for Sustainable Sea Transport

Konapiliahi Dancil
TCBES • UH Hilo

What to Plant Where? Using Species Distribution Modeling To Select Restoration Species in Hawai'i's Lowland Wet Forests

Amberly Pigao
TCBES • UH Hilo

Forest Restoration Techniques in a Sub-alpine Forest on Hawai'i Island, Kanakaleonui, Mauna Kea

10:55 a.m.

Closing Remarks

By Dr. Darren T. Lerner, PI-CASC University Consortium Director

ABSTRACT

Predicting Sea-Level Rise Impacts to Coastal Wastewater Infrastructure & Water Quality

ABSTRACT

Sea level is rising, potentially compromising the integrity of coastal onsite sewage disposal systems (OSDS) and other coastal wastewater infrastructure. The purpose of this project is to provide a baseline of the current water quality conditions, determine which coastal OSDS and wastewater infrastructure could be affected by future sea-level rise (SLR), and determine which OSDS should be prioritized for removal or conversion. To address these goals, a multi-indicator approach was used to monitor at twelve stations along the shoreline from Kailua-Kona to Keauhou. This approach included measuring: fecal indicator bacteria (*Enterococcus* spp. and *Clostridium perfringens*), pathogens (*Staphylococcus aureus* and *Methicillin-resistant S. aureus (MRSA)*), nutrient concentrations, Chlorophyll *a*, $\delta^{15}N^{-}$ and $\delta^{18}O\text{-}NO_3^{-}$, and the $\delta^{15}N$ in macroalgae. This multi-indicator approach was used to accurately detect the presence of sewage in Kailua-Kona's nearshore waters. Preliminary results show that: the average *Enterococcus* spp. concentrations exceed the Hawai'i Department of Health geometric mean water quality standard of 35 MPN/100 mL; the average *C. perfringens* was below the water quality standard of 5 CFU/100 mL recommended by Fujioka et al. (2015); and *Staphylococcus aureus* was present along the Kailua-Kona shoreline, with counts ranging from 1.7-810 CFU/100 mL, although no MRSA was detected. The water quality data from this study, along with planned SLR modelling, will be used to create a framework to evaluate the potential impacts of SLR on wastewater infrastructure to help inform adaptive planning in Kailua-Kona.

BIO

Ihilani Kamau was born and raised in Hilo, Hawai'i, and graduated from Kamehameha Schools, Hawai'i. She attended the University of Hawai'i at Hilo and graduated in 2022 with a bachelor's of science in marine science. She is currently pursuing a master's degree in the Tropical Conservation of Biology and Environmental Science (TCBES) Program at UH Hilo. Ihilani's project focuses on the impacts of sea-level rise on wastewater infrastructure and water quality along the shoreline from Kailua-Kona to Keauhou.

The Impact of Vertical Land Motion on Sea-Level Rise Timeline in American Samoa

ABSTRACT

An earthquake struck American Samoa (AS) on September 29th, 2009. Since then, AS has been experiencing rapid sea-level rise (SLR) rates, attributed to land subsidence resulting from the earthquake. Indeed, from September 2009 to January 2023, sea level has risen by 23.91 ± 4.12 cm, of which 19.56 ± 1.19 cm are attributed to land subsidence. The Interagency Task Force (ITF) provides a set of SLR projections for AS, according to five greenhouse gases scenarios, designed for planning purposes. However, this global framework is not able to resolve the unique land subsidence behavior in AS. Recently, Han et al (2019) modeled vertical land motion specifically for AS and provided projections until the end of the century. We compared SLR projections from the ITF and SLR projections with Han-modeled land subsidence. At the intermediate scenario, ITF underestimates SLR by 42% in 2050 compared to SLR projections that include Han's model, and this gap decreases to 13% by 2100. It also corresponds to an underestimation of 25% of the area flooded in 2050, but only 13% in 2100. These comparisons highlight the importance of short-term accurate projections in AS. Since land in AS is managed by land tenure, we developed an SLR viewer, enabling inhabitants to decide independently how they will adapt to SLR.

BIO

Carla Baizeau is a third-year master's student at the University of Hawai'i at Mānoa. She did her undergraduate degree in natural sciences, specializing in oceanography. Her research focuses on sea-level rise and its seasonal drivers in American Samoa. She wants to make science accessible and derive useful tools from her research for the public.

From Seabirds to Sewage: Investigating Nutrient Effects on Coral Bleaching

ABSTRACT

Local environmental conditions contribute to either the resilience or susceptibility of corals to the global stress of climate change. One such factor is the local nutrient input from terrestrial sources. Prior studies have indicated that corals around islands with abundant seabird populations may be more resilient to bleaching events, and it has been hypothesized that this is due to nutrient enrichment from seabird guano. In contrast, near human-populated islands with high levels of anthropogenic nutrients entering the coastal environment via wastewater effluent, corals often display negative effects on reef health and survivorship from those nutrients. This experiment investigated corals' response to natural vs anthropogenic nutrient sources to disentangle their contrasting effects. Corals were exposed to one of four nutrient treatments: seabird guano, wastewater effluent, inorganic nutrients, or an ambient control. Half of the fragments were subjected to a simulated bleaching event after nutrient exposure. Coral condition and physiological response measurements were taken to compare how each nutrient treatment affects the coral's response to increased water temperatures. Local managers can use these findings to implement targeted nutrient management strategies, bolstering reef resilience in the face of climate change.

BIO

Jessica Glazner is a Ph.D. student in the Donahue Lab at the Hawai'i Institute of Marine Biology. Her research is focused on the interaction between local nutrient enrichment and global climate change and how this influences coral reef resilience. Her overarching research goal is to support local management on both remote and populated islands across the Pacific.

Using Oral Histories of Marshallese & Yapese Voyaging to Support the Development of Community Engagement for Sustainable Sea Transport

ABSTRACT

The aim of this project is to collect oral histories of the forms of community engagement that traditionally and historically supported Marshallese and Yapese seafaring. Data collected from the oral histories will be used as a method for climate change adaptation, using the concept of voyaging for sustainable sea transport. With the core of the project primarily focused on documenting oral histories, the key methods utilized are oral histories, participant observation, and Indigenous methodologies rooted in Marshallese and Yapese values. Based on the interviews conducted, results show that there is a need for documentation of the traditional knowledge passed down through oral histories. Documentation is crucial for deepening our understanding of the knowledge available today and ensuring its preservation for future generations and applications. Examples of the traditional knowledge being shared include sail weaving by women, women's roles in community engagement, environmental circumstances that influenced the development of voyaging networks, and the sociocultural dynamics of the relationships in voyaging. From this project, our community stakeholders aim to use this knowledge to re-activate systems of sustainable sea transport as an Indigenous means of climate change adaptation.

BIOS

Jerolynn Neikeke Myazoe is from the Marshall Islands, and her family is from the village of Lorkom on Wotje islet located within Wotje atoll. After graduating from University of Hawai'i at Hilo with a BA in anthropology and completing the Pacific Islands Studies Certificate, she decided to return to UH Hilo to pursue a master's degree in heritage management. Her project focuses on gathering oral histories of Marshallese voyaging experiences.

Shania Gootineg Tamagyongfal was born and raised in Hilo, Hawai'i, and is of Yapese descent. Her family is from the village of Toruw in the municipality of Maap, located on the northeast side of the island of Yap. She graduated from the University of Hawai'i at Hilo in Spring 2020 with her BA in anthropology and completed the Pacific Islands Studies Certificate. In fall 2021, she returned to UH Hilo to pursue her master's degree in the Heritage Management Program, where she is currently working on her project focusing on the oral histories and traditional knowledge of Yapese voyaging. She hopes that her project will not only contribute to the future of adapting to climate change, but will also empower younger generations of Yapese youth to work within their community and cultural heritage.

What to Plant Where? Using Species Distribution Modeling to Select Restoration Species in Hawai‘i’s Lowland Wet Forests

ABSTRACT

Ecological restoration in Hawai‘i faces various challenges, such as invasive species, habitat fragmentation, and climate change, highlighting the complex interplay between environmental preservation, human activity, and ecosystem resilience in the region. These challenges are exacerbated in Hawai‘i’s lowland wet forests, which have seen drastic changes since Western contact began. Managers of lowland wet forests today are focusing on identifying what restoration species are suitable for a changing climate. Species restoration becomes much more complicated when considering that species present historically may no longer be fit to persist naturally in their historical ranges. One technique we can use to help choose non-endemic species for restoration is applying species distribution models, which offer insights into ecological dynamics and evolutionary processes by using occurrence data to estimate where a species will persist and thrive. This project aims to use this technique to identify species that will persist on their own successfully across Hawai‘i’s lowland wet forests. For example, we have identified one particular indigenous species, *Psydrax odorata* (Alahe‘e), that may be capable of surviving in lowland wet forests under future climate change scenarios. Identifying suitable replacement species or alternatives like Alahe‘e can assist land managers in selecting suitable restoration species for lowland wet forests, which are seeing an accelerated loss of historically present species. Using this approach, we can more accurately identify species that will persist here in Hawai‘i and better develop climate resilient forests for the future.

BIO

Konapiliahi Dancil is a graduate student at the University of Hawai‘i at Hilo pursuing a career in conservation in Hawai‘i. Born and raised in Hawai‘i with a love and appreciation for the outdoors, Kona’s entire academic and professional career has been geared towards better understanding our ecosystems and learning how best to protect them.

Forest Restoration Techniques in a Sub-Alpine Forest on Hawai‘i Island, *Kanakaleonui, Mauna Kea*

ABSTRACT

Climate change in Hawai‘i stands to alter forest succession where re-forested corridors may create a path to higher elevation habitats. Most of these areas are now degraded grasslands, where water capture by trees and subsequent regeneration is not occurring. Kanakaleonui Bird Corridor (KBC), located on Mauna Kea, is a unique transition zone from a tropical montane cloud forest to a colder, drier subalpine forest. We conducted two separate experiments in different elevation zones to understand how fog water capture may facilitate seedling growth in forest restoration efforts: nurse trees to capture fog; and synthetic fog structures to capture moisture as fog passes through. Sensor data instruments were used for daily readings. The results indicate that both shade cloth and nurse trees facilitate fog water capture at KBC where fog is frequent. Future restoration efforts can benefit from fog capture strategies to restore native Hawaiian forests successfully.

BIO

Amberly Pigao was born and raised on Kaua‘i and currently resides on O‘ahu. She specializes in native forest ecosystems and natural resource management. She earned her master’s of science degree in tropical conservation biology and environmental science, and holds a bachelor’s degree in geography from the University of Hawai‘i at Hilo. She also has certifications in natural resource conservation management and planning. Amberly has a passion for bridging the gap between local communities and western science. Her goal is to continue her work to re-establish native forests and connect her community back to upland forests.