

Centering Indigenous Knowledge in Undergraduate Student Research: Strengthening Cultural Resilience in Resilience Hub Planning on O‘ahu

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Cultural resilience in disaster management is crucial for Indigenous communities. Despite its importance, discussions considering Indigenous Knowledge and culture are often limited. The Action 15 Resilience Hub Network Project on the Hawaiian Island of O‘ahu addresses resilience planning gaps through community-based research led by undergraduate students at Kapi‘olani Community College. Though the project initially utilized a Western urban resilience planning framework, it evolved to integrate Indigenous methodologies based on feedback from students and community members. This adaptive pedagogical strategy was essential for effectively engaging

Native Hawaiian and Pacific Islander students, as well as other students from underrepresented groups, by recognizing and valuing their cultural backgrounds and knowledge systems. It not only enriched student learning experiences but also highlighted the importance of culturally responsive research and teaching practices in academic institutions. Lessons learned, future suggestions, and reflections from students and community members are reported.

The Action 15 Resilience Hub Project was launched in 2022 to establish a network of resilience hubs across O‘ahu aiming to form partnerships, identify suitable

locations, and collaborate with community members on programs and services (City and County of Honolulu Office of Climate Change, Sustainability and Resilience, 2023).

Key stakeholders for the project included the City and County of Honolulu, the Department of Urban and Regional Planning at the University of Hawai'i at Mānoa, and the Center for Resilient Neighborhoods (CERENE) at Kapi'olani Community College. This collaboration successfully engaged over 3,000 residents through an island-wide survey and 110 outreach events, including 17 workshops. The project emphasized community-based participatory approaches and equity-centered design (City and County of Honolulu Office of Climate Change, Sustainability and Resiliency, n.d.) and sought to engage vulnerable community groups including Native Hawaiian and Pacific Islander communities. The initial CERENE research team included several research staff along with 15 student leaders, called Resilience Corps Leaders, from Kapi'olani Community College.

Though the original emphasis of the project was focused on Western urban planning and hazard mitigation approaches, student and community member feedback prompted a shift toward Indigenous methodologies. This shift not only contributed to increasing social justice and equity outcomes for the project but also greatly enhanced student engagement and learning.

Background

The inhabitants of Hawai'i, one of the most geographically isolated human populations on Earth, face significant climate change impacts, including sea level rise, increased flood events, drought, extreme heat, wildfires, and more dangerous storms. The increasing risks from extreme weather and climate change threaten Hawai'i's socio-economic and biocultural resilience (Fletcher et al. 2024). To address these challenges, resilience planning in Hawai'i has come to the forefront. Following the devastating fires that destroyed the entire Lahaina town on the island of Maui in 2023, new socio-cultural-political "experiments" in resilience planning have emerged, with an emphasis on developing community resilience hubs (Fletcher et al., 2023). These initiatives involve local communities, government, non-profits, private businesses, and in

some cases institutions of higher education. Hubs serve communities year round, supporting local resilience and providing a coordinated response during emergencies (Urban Sustainability Directors Network, 2019). A unique feature of resilience hub planning, distinct from previous disaster planning efforts (Hawai'i Emergency Management Agency, n.d.), is the focus on place and physical buildings. This new emphasis has the potential to lift up Indigenous communities and practices and support greater cultural resilience.

Cultural resilience can be defined as the ability of a culture to withstand adversity, adapt and continue to grow (Holtorf, 2018). Cultural resilience allows Indigenous communities to uphold their identity and heritage despite external pressures, adapt to environmental changes, strengthen social cohesion, advocate for their rights, and support mental and emotional well-being (Holtorf, 2018; Kirmayer et al., 2011; Smith, 2021). Both cultural resilience and disaster management have been viewed most frequently through the lens of disaster risk reduction, identifying vulnerabilities to heritage sites and exploring social resilience in disaster scenarios (Fabbri-catti et al., 2020; ICORP-ICOMOS International Scientific Committee on Risk Preparedness, 2013). Despite this, though efforts were made during the COVID pandemic in Hawai'i to assess community resilience through a cultural resilience lens (Kamehameha Schools' Strategy & Transformation Group, 2021), discussions of the role of cultural resilience and 'āina-spaces ('āina-spaces is a term used by the authors for traditional fishponds, lo'ī [taro pondfields], heritage sites, etc.) and their connection to disaster management have been quite limited.

'Āina-spaces may yet hold the key to modeling the psycho-spiritual resilience needed to weather the storms to come while also modeling the practical skills (such as identifying famine foods, medicinal plants, fresh water sources) for self-sufficiency that will be greatly needed for all. Thus, the role of Indigenous Knowledge systems in shaping resilience planning initiatives is crucial. However, there is no one-size-fits-all approach, and best practices are needed to guide this integration.

Initially, our project was designed using Western methodologies focused on urban planning and hazard mitigation as part of the City's Resilience Strategy (City and County of Honolulu Office of Climate Change,

Sustainability and Resiliency, 2019). However, through the research process, student and community member feedback highlighted the need for a more inclusive approach, leading us to incorporate Indigenous research frameworks inspired by *Papakū Makawalu* and “Weaving Indigenous and Western Knowledge Systems” (Wilkie et al., 2022). This shift, driven by deep partnership-building with community leaders in *‘āina*-spaces, is a direct outcome of our iterative and adaptive community-based resilience planning framework.

Though we did not plan on it initially, our inclusion of Indigenous Knowledge in this way is an example of a best practice in the decolonizing disaster risk reduction literature—the integration of Indigenous Knowledge in higher education (Ali et al., 2021). We argue that this adaptive pedagogical strategy is essential for effectively engaging Native Hawaiian and Pacific Islander (NHPI) students as well as other students from underrepresented groups, as it recognizes and values their cultural backgrounds and knowledge systems. This approach not only enriched the learning experience for the students but also demonstrated the importance of culturally responsive research and teaching practices in higher education. By integrating Indigenous Knowledge, we fostered greater student engagement and contributed to equity and inclusion within academic research. This model exemplifies how leveraging existing community strengths can enhance resilience and self-sufficiency, providing a pathway for best practices in both educational settings and broader urban resilience planning initiatives.

FIGURE 1. Community engagement workshop at Loko Ea Fishpond. Photo: Phillip Lampron.



Project Approach

The Action 15 Resilience Hub Network Project addresses resilience planning gaps on O‘ahu through community-based research conducted in part by a team of undergraduate students based in a two-year college. The project approach was informed by asset-based community development and participatory action research models (Kretzmann & McKnight, 1996; Fals Borda, 2006). The final iteration of the methodology actively sought to decolonize the research and reporting process (Smith, 2021), lift up Indigenous worldviews and values, and amplify feminist approaches to research and community development/risk management (Kovach, 2017; Wilson, 2020).

The project team employed qualitative research techniques such as comprehensive interviews, participatory mapping, focus groups, community workshops, and casual “talkstory” discussions with research subjects. The project operated at a neighborhood scale, grounding the work in a sense of identity and ownership for participants. There were both outcome-oriented and process-oriented goals. Outcome-oriented goals included identifying appropriate locations for resilience hubs. Process-oriented goals included striving for an equitable, community-led, and inclusive approach, bolstering community resilience and preparedness for disasters, and providing education and support for resilience hub planning. The approach was community led as much as possible and student centered, with the additional goals of fostering student empowerment and leadership development in STEM/Social Science, enhancing social capital and a sense of belonging, promoting intergenerational co-learning and interaction, and establishing enduring partnerships. In the initial launch of the project with the City between 2022 and 2023, approximately 3,260 participants were engaged by the student team-led outreach efforts. Outreach included participation and presentations at neighborhood board meetings, engaging key community stakeholders and neighborhood leaders, and facilitating workshops, focus groups, and follow-up discussions with regional partners. The student research team also joined community gatherings, festivals and fairs, and conducted six public Zoom webinars.

FIGURE 2. Community engagement workshop at the Japanese Cultural Center of Hawai'i. Photo: Phillip Lampron.



Another important aspect of community engagement involved reciprocity through participation in workday events and supporting the local community. Students volunteered for service Saturdays; assisted at community gardens and food distribution events; helped community partners with restoration projects such as biocultural forest restoration and making “Genki Balls” to clean the polluted Ala Wai Canal in Honolulu; and volunteered at loko i‘a (fishponds) and at other cultural resilience-focused activities such as the Hau‘ula Harvest Craft Fair and the Micronesian Youth Summit.

The research team worked closely with regional and local partners to determine the participant invitation list for each workshop (though the workshops were freely open to all members of the public), as well to enhance overall engagement and inclusion. The research team also worked with community partners to design the workshops and develop research questions.

Facilitation of the workshops consisted primarily of “tabletop” exercises conducted either at physical tables with four to ten participants or virtually in breakout rooms. The tabletop activities were led by CERENE Resilience Corps Leaders, community leaders, or volunteers interested in supporting this work. Students underwent three rounds of training to prepare them for facilitation, which included a peer mentoring component where more

FIGURE 3. Community engagement workshop at Waikiki Community Center. Photo: Authors' Collection.



experienced leaders had newly trained facilitators play an assisting role before taking on the role of lead facilitator. The workshops and tabletop discussions aimed to create a supportive, engaging, and collaborative environment for participants to share ideas, brainstorm, and learn from one another. Icebreakers and discussion prompts were used to foster familiarity among participants and facilitate intergenerational exchanges of knowledge. Resilience Corp Leaders led participants through various activities such as identifying hub locations on the maps (using stickers), ranking hub locations, evaluating building functionality, and discussing future directions and priorities. Each activity was explained in detail and every table was facilitated by two student leaders. We discovered that it was important to allow tables to progress at their own pace, and that it was crucial to have trained facilitators at every table to allow participants to explore topics in depth and adapt the research protocol to their specific needs.

The main emphasis for the project design was this community-based and -directed approach, valuing data sovereignty and honoring diverse perspectives and approaches to discussing subject matter. Establishing enduring partnerships with community leaders was a key aspect of our approach and resulted in important feedback and learnings for our research team. Co-learning was a consistent theme, allowing for an iterative feedback process, refining workshop formats and reports to incorporate community input, and enabling the community to lead as much as possible.

Students and community partners received training in qualitative interviewing, data analysis, and research

ethics through weekly and monthly Zoom calls. Leadership training and mentorship were also provided. This enabled the students to support community partners during follow-up interviews where we clarified and built on previous workshop findings, identified how to best manage and share community-held data, determined primary contacts for data inquiries, and supported follow-up collaboration and communication.

Data analysis and training with community partners and students was conducted in three phases. In the first phase, notes were transcribed, digitized and organized into themes to support thematic analysis and summary of the discussions suitable for inclusion in the Action 15 Report produced for the City. In the second phase the research team (including community partners) was invited to learn grounded theory and thematic analysis using computer-assisted techniques, for a deeper understanding of the data (Charmaz et al., 2006). In the last phase, we applied “Weaving Indigenous and Western Knowledge Systems” and “Two-Eyed Seeing” frameworks—which we later expanded to *Papakū Makawalu* (see below)—to the report writing (Bartlett et al., 2012; Wilkie et al., 2022). This served to deepen our relationship within our writing team and helped us to explore concepts more deeply, while engaging in a reflective auto-ethnographic/participant observation.

Student Learning Outcomes

Student leaders were at the heart of our research team in this community-based research process. Our students themselves come from very diverse backgrounds including Native Hawaiian, Filipino, Fijian, Persian, Chinese, Japanese, Korean, Kosraean, Jamaican, and other ethnicities. As such they were able to draw from wisdom, reflections, and traditions from their own heritage as they engaged with others in this work. Many students had the opportunity to attend a workshop for their area and also to attend their very own neighborhood board meetings as part of this work. As a result, they were extremely well received by community members and met with positive enthusiasm. This was also seen in cross-cultural contexts, where youth were met with curiosity and overall encouragement. The students at the heart and helm of this work

not only experienced deep learning for themselves but also enriched the process tremendously.

Student learning was evaluated throughout the process through regular surveys as part of the CERENE Resilience Corps Leaders program. A subset of the students was also evaluated as part of their coursework for those enrolled in a sustainability certificate program. The surveys we administered included Likert scale questions with a scale of 1 to 5 with 5 being the highest score, as well as open-ended questions to prompt deeper reflection. One hundred percent of students sampled reported agreement on the level of 4 or 5 that the experience was positive, valuable, met their expectations for the program, and increased their confidence as a leader (individual questions). Near the end of the Action 15 Project we began to work more actively in *‘āina*-spaces and to include more Indigenous research methodology into their mentoring and training. We found in our most recent sample that over 90% of students reported high levels of learning regarding “community-based research” and “Indigenous methodology,” and 90% reported medium to high levels of learning regarding “*‘āina*-spaces and resilience hubs.” Students reported gaining a comprehensive understanding of several key concepts including reciprocity, resilience, cultural resilience, resilience hubs, community resilience, and leadership. A significant part of the learning journey involved personal growth through direct community engagement and leadership roles. As one student notably expressed:

This training has really centered my thinking into what, where, and how to prepare for a disaster before and after it happens. From talking with community members through this course I ... realized how many people are unaware of resiliency hubs and how crucial they are [for] our resilience as a community. Through blue skies and gray skies, CERENE has given me more skills and knowledge than I could've imagined.

Overall, the students' reflections express the depth of their learning and the personal transformation experienced through the program. One student leader shared a deep appreciation for the community and cultural insights gained, stating:

Learning from the communities we have worked in has been a privilege To sit down and participate in

intentional conversations about our relationship with and responsibility to ‘āina [land, environment] has been the highlight of this semester for me.

Our integrative approach to education not only equipped the student participants with practical research skills but also fostered a profound connection to their community and cultural heritage, shaping their professional and personal lives.

Reflections and Learnings from the Research Team

To build relationships with our readers and honor our commitment to decolonizing the report-writing process, we are sharing direct reflections from our research team. These voices exemplify the “Weaving Indigenous and Western Knowledge Systems” approach (Wilkie et al., 2022), allowing us to elevate the experiences and perspectives of those directly involved in the project and report. Below are reflections from two student leaders and one community partner—all three of them co-authors of this report—highlighting the impact and significance of their contributions to our collective work.

Being a part of this work has enriched me with a stronger sense of responsibility to my community and culture. I have had the opportunity to be directly involved with each step of the research process, from community conversations to data analysis. As someone who is just beginning to test the waters of academia, this chance to directly participate has been very welcome. Through collaboration and accountability to the land and people, I’ve felt a strong sense of reciprocity and belonging in Hawai‘i. I see myself as a lifelong learner, one who has much to learn not only from external knowledge systems, but our own Indigenous systems as well. – Lomani H. Rova (Student Leader and Author)

I have learned about resilience, cultural communication, and collaboration. Analyzing data through AI thematic analysis was tricky at first, but then it got easier. Listening to workshop audio recordings and analyzing data was a long process, but it was meaningful. I have also improved my academic writing skills and learned to manage

overwhelming tasks by pausing to take a breath and to stay focused. Just being able to be present, whether it’s with government officials from a tiny island [or with] my fellow colleagues and learning from each other—it is all incredibly enriching and meaningful. – Kaua Kalaiwa‘a (Student Leader and Author)

As a community member and cultural advisor, this partnership has excelled in addressing resilience in Hawai‘i, centering ‘āina spaces and the ahupua‘a [land division] system. The Loko Ea x CERENE workday facilitated open dialogue about climate change and culturally informed resilience hubs. Parents and partners from various community-based organizations joined the conversation, emphasizing the responsibility I feel deeply as kanaka a ‘ōiwi: to restore and protect the sacred spaces we have left in Hawai‘i. The work is only beginning and I am excited to continue developing solutions to make ‘āina momona [fertile] once again. – Honu‘āina Nichols (Community Leader and Author)

Lessons Learned and Suggestions for the Future

Importance of ‘Āina-Based Resilience, Values, and Practices

‘Āina-based resilience practices are critically important to this work, because they help lift us up and build stronger *pilina* (relationships/connections) to the *kaona* (hidden meanings) of *‘ike kupuna* (ancestral knowledge) and deepen teachings of *aloha ‘āina* (love of the land) that are necessary for long term sustainability planning on our planet. For example, such practices create space for grief, healing, and connection with nature and the sacred, and they provide opportunities to honor and care for each other and ourselves. The approach creates spaces that are the antidote to the illness of being out of balance, the *piko* (center) of our strength. Community members, regardless of their heritage and cultural background, can experience profound centeredness and connection through these practices, experiencing a grounded sense of belonging and harmony with nature. As one of our traditional teachers shared, “This is the medicine the world needs”

(Susana Xochitlquetzalli, personal communication, 2024). It is not enough to teach about how to prepare an emergency “go kit” or how to store solar batteries, and it is not enough to develop a neighborhood evacuation plan, because such measures will only help us weather the storms better. They will not help us move into a space of living in harmony with our surroundings so that we might begin to reduce those storms (both metaphorical and physical). We all need this spiritual centeredness and places to teach us the wisdom that we have lost.

True Pilina and Relationship Building

Our preliminary findings highlight the need for continued relationship building and going as slowly as is necessary to build these relationships. This means decolonizing our sense of time (moving away from linear time), addressing the much larger challenge of denationalization (the loss of national identity), and healing intergenerational trauma for many Hawaiian families.

Because of Hawai‘i’s history of colonization and military imperialism, working in the disaster management and emergency preparedness space, which is heavily modeled after the military culture and complex, creates tremendous challenges that call for transformational healing, for instance through *ho‘oponopono* (restoration of balance) (Paglinawan et al., 2020; Le et al., 2023).

We need true relationship building and healing to decolonize the limiting structures of higher education and their greater contexts. The existing academic systems need to be re-thought and re-envisioned together with our community partners to create the kind of world that can be resilient to the incredible challenges we face. Like the grass growing, and the process of clearing it from fishponds featured in the Figure 4, we need to stand shoulder

FIGURE 4. Students working at Loko Ea fishpond.
Photo: Authors' Collection.



to shoulder in this work—mindful of systematic equity issues and what it means to stand in the pond together.

We also need to honor multiple ways of knowing while being sensitive; and balancing the goal of being place-based, Indigenizing, and amplifying feminist perspectives while also being supportive and inclusive of all our community and family. In practice, this means deep reflection and engaging in decolonizing and racial equity work at all levels with the help of Indigenous elders and skilled facilitators. Though this may seem like an impossible task, incredible work is already being done by local elders and *ho‘oponopono* practitioners our students are working with. A good example can be seen in the restoration of the Hawaiian fishponds in collaboration with military leaders at the Pearl Harbor Naval Base (Soileau, 2024). This research and examples like the Hawaiian fishpond restoration exemplify the approach we need to take in order to achieve this. We have discovered, however, that our own team still has much to learn about how to best implement these practices. *Papakū Makawalu*, which is understood as a foundation of constant growth, is a methodology and pedagogy for understanding and systematically organizing Hawaiian knowledge. We invite *Papakū Makawalu* into the space of resilience planning for our team and for Hawai‘i, and we invite others to share teachings from their place and lands that call forth this style of multifaceted, place-based reflection and exploration.

Students as Bridgers and Weavers

Students are in the best position to bridge worldviews and weave Indigenous and Western knowledge systems, develop innovative new uses for technology, and bridge the gap between modern and traditional practices. Students can leverage their digital literacy to introduce tools like Geographic Information Systems (GIS), interpret hazard maps, and analyze digital datasets, complementing Traditional Knowledge in a synergistic manner. When learning frameworks such as those we introduce here include intergenerational learning, they provide multiple benefits. Not only do our young people learn about traditional ways of practicing resilience and self-sufficiency, but they also create opportunities for *kūpuna* (elders) and older generations to be valued and seen. This intergenerational approach ensures that elders have meaningful roles and avenues to contribute, fostering a sense of purpose and

connection. At the same time, students enhance their contributions by drawing from their familiarity with advanced technology and digital tools, creating a positive synergy when used in tandem with Traditional Knowledge, effectively weaving together generational wisdom and youthful innovation.

Students and the younger generation have a special role in this work. In addition to their ability to weave Indigenous and Western Knowledge systems, they also help to provide a sense of hope and optimism for the future that may serve as an antidote to burnout in the community. They possess a unique ability to deliver urgent and impactful messages in a way that resonates deeply with others, exemplified by Kathy Jetñil-Kijiner's powerful address at the United Nations Climate Summit (Robinson, 2020). The next generation has the unique ability to share powerful perspectives and mobilize communities around climate action and social justice in a way only youth can. We saw this in our work on O'ahu at the neighborhood board meetings. Often, meetings are contentious, but when our students presented, the atmosphere visibly shifted; people began smiling, and expressions softened. Our students were very well received and often created a moment of levity in otherwise tense meeting spaces.

Conclusion

This research framework presented here employs a student-centered approach to elevate and incorporate Indigenous Knowledge, serving as a model for fostering resilience and sustainability. It empowers students to integrate principles of resilience and sustainability into their future careers and communities. Teaching students the fundamentals of community-based research in the context of experiential learning within their own neighborhoods supports best practices in decolonizing research and higher education. This methodology contributes to the redesign of undergraduate research curricula and promotes the alignment between academic exploration and community needs. The approach is particularly impactful because it embeds research at the neighborhood level, working closely with community partners who are also neighbors of the students and research team. This practical integration of Indigenous Knowledge makes the work personal and meaningful for many students, as their

efforts may directly impact the well-being and support of their families and local community.

In addition to the personal and practical nature of this work, training students in community-based research methodologies, asset-based frameworks, and flipping the narrative of the top-down expert is critically important. This training enhances equity and ethics in research, creating space for solutions to emerge by honoring diverse ways of thinking and understanding the world.

While this project focused on student leaders in the CERENE Resilience Corps Leadership Award Program, future work should expand engagement to include a broader range of students, youth leaders, citizen scientists, community members, and especially *kūpuna* and older adults. Engaging *kūpuna* and older adults will bring invaluable wisdom and experience, fostering intergenerational learning and enriching the research process. From a practical standpoint, this work takes many hands, and we need all hands on deck. Island-wide planning at the neighborhood level is impossible without a committed team of student leaders and community members working together.

Further research is needed to understand and implement cultural resilience strategies in disaster management and urban planning, especially in *'āina*-spaces and sacred spaces, to lift up Indigenous Knowledge and worldviews. Such research can only be conducted in deep partnership with the land and people, beginning at the neighborhood level.

Ultimately, this collaborative, inclusive, and locally embedded approach not only strengthens community ties but also ensures the development of sustainable and resilient communities for future generations. By centering Indigenous Knowledge systems and fostering intergenerational collaboration, this model holds the promise of creating a more equitable and resilient Hawai'i. We can protect, promote and learn from Indigenous communities, to not only honor their heritages but also strengthen collective resilience regardless of the future challenges we face.

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About the Authors



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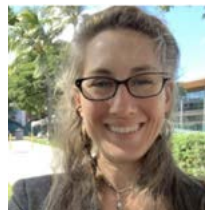


Honu'aina Nichols was born on Turtle Island, specifically on unceded Ohlone Lands, also known as San Jose, California. They were fortunate to grow up in their motherland and graduate from Kamehameha Schools Kapālama. Their genealogy traces back to the Wailupe/Kaimukī area along Keahupua o Maunalua, what used to be the largest *loko i'a* across the *pae 'āina* (the Hawaiian archipelago). Honu currently resides in Hālawa and has strong *pilina* (relational ties) to the *moku o Waialua*, specifically the *ahupua'a* of Kāwailoa. Honu works as the Climate Change Education Coordinator at Mālama Loko Ea Fishpond, a 500-year-old traditional Hawaiian fishpond for the *ali'i* (traditional nobility of the Hawaiian Islands).



Lomani Helen Rova was born in Fiji to a German mother and iTaukei (Indigenous Fijian) father. Her family hails from the island of Taveuni, in the province of Cakaudrove. Her worldviews have been largely influenced by her upbringing in the multicultural melting pot of Viti Levu, Fiji's biggest island. She draws from her family's traditional role as

gonedau or fisherpeople and custodians of the ocean, hoping to pursue a career as a marine biologist with a focus on weaving together Indigenous and external sciences. She currently lives in O'ahu, Hawai'i, attending Kapi'olani Community College and assisting with research at both the Hawai'i Institute for Marine Biology and the Center for Resilient Neighborhoods.



Miku Maria Lenentine was born in Seattle, the traditional territory of the Co-Salish people, and was raised in Alaska, Dena'ina Ełnena, the traditional homelands of the Dena'ina Athabaaan people. The bones of her ancestors on her mother's side are buried with the First People of Sinaloa, Mexico, though her family does not have any formal tribal affiliation today. Her mother's people are also from northern and southern Italy. Her father's people are from Devils' Bit Canyon, in Tipperary, Ireland, and are buried with the Gaelic peoples of primarily Irish and Scottish ancestry. Miku is the coordinator for CERENE, the Center for Resilient Neighborhoods, housed at Kapi'olani Kula Nui Kaiāulu, Kapi'olani Community College, at the University of Hawai'i.