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UTILIZING INDIGENOUS ANCESTRAL KNOWLEDGE TO ASSESS HISTORICAL BASELINES OF MARINE BIODIVERSITY IN HAWAI`I

Native Hawaiian ancestral knowledge about ocean and coastal management is critical for informing current and future decisions. In Hawai`i, advocacy for co-management of land and waters between local and Indigenous communities with state natural resource agencies has grown, with an aim to restore more place-based stewardship of the land and coast. However, American imperialism dismantled the Hawaiian kingdom and its cultural systems, resulting in significant information gaps for our understanding of baseline ecosystem resiliency and biodiversity. Among other solutions, one step toward achieving co-management of resources is understanding how to include Indigenous knowledge in Western resource management systems.

In this project, a team of researchers led by Dr. Rosie `Anolani Alegado, University of Hawai`i Mānoa, and Katy Hintzen, University of Hawai`i Sea Grant College Program, will center Native Hawaiian knowledge and perspectives to develop historical baselines of marine biodiversity in the nearshore ecosystems of Hawai`i. The researchers will use this knowledge to examine the impact of both natural and human-caused climate events throughout history which will better inform management decisions around marine biodiversity in Hawai`i. Results from this project will offer insight into Native Hawaiian resource management and facilitate critical conversations with state and federal agencies for how to broaden what forms of monitoring data can be used in management decisions.

CLIMATE VARIATION AND MARINE BIODIVERSITY OF THE HAWAIIAN ISLANDS

The Hawaiian Archipelago is a biodiversity hotspot, owing to its geographic isolation, unique ocean habitats formed by geological activity, and relatively consistent weather patterns. A strong awareness of biodiversity around the Hawaiian Islands is apparent in the rich vocabulary for terrestrial and marine life in `ōlelo Hawai`i (Hawaiian language). Many traditions and practices are aligned to include a holistic concept of health between `āina (land, seas, and atmosphere) and akua (revered natural elements) with biodiversity - that is, the health of the land, is the health of the people, is the health of the nation.

Although fairly consistent, climatic variation can impact biodiversity and surrounding communities. Seasonal events like the El Niño Southern Oscillation (ENSO) can cause fluctuations in precipitation resulting in lower rainfall during winter and higher rainfall in the summer. These events and their relationships with everyday kānaka (people) and marine life have been documented in Native Hawaiian practices like oli (chants), mele (poetry), and hula (traditional Hawaiian dance), and recorded in printed Hawaiian language newspapers. From these sources, there is much to be learned about natural phenomena and the environment. For example, in searching Hawaiian newspapers, researchers found that recruitment of marine ray finned fish (*Prichanthus meekei*) was episodic. By applying the `ōlelo no`eau (saying or proverb), "Pūpū i ke kai o alalauā" (the sea is thick with juvenile *Prichanthus*), researchers were able to correlate observations of the infrequently seen species with ENSO events.

PROJECT APPROACH: WEAVING INDIGENOUS KNOWLEDGE AND WESTERN SCIENCE

In 2021, the Bishop Museum began a multi-year partnership with the non-profit Awaiaulu to preserve and digitize Hawaiian language archives including newspapers. These records include testimony to the lives, lands, lāhui (nation), and environment of everyday kānaka. Using these records along with archival sources on climate phenomena from the Edith Kanaka'ole Foundation (EKF), the research team will reconstruct Hawaiian regional climate knowledge beyond instrumental data.

Phase 1: Develop a lexicon of Hawaiian language terms and phrases describing marine biodiversity and climate phenomena.

Researchers will first develop a lexicon of Hawaiian language terms and phrases which describe ENSO and other climate phenomena focused on 1850-1949, the period for which archival Hawaiian sources overlap with instrument data. Researchers will use the Papakū Makawalu methodology, a key epistemological framework, to categorize and organize the physical, intellectual, and spiritual modalities of the natural world from which cycles emerge. The team will rely on three major houses of knowledge that form the basis for understanding existence and our place in it: Papahulilani (comprises atmospheric phenomena and time), Papahulihonua (inclusive of earth and ocean and its transformation through natural causes), and Papahānaumoku (encompasses all things that engage in reproductive cycle of birth and reproduction, growth, and death).

Phase 2: Refine regional, fine-scale parameters that characterize climate variability in Hawai'i prior to 1850.

The research team will then use data from weather stations across the Hawaiian Islands to create a time series of seasonal rainfall, temperature anomalies, and fisheries catch. They will explore these further in the next step by comparing this data to Hawaiian observer climate variables, Kingdom of Hawai'i records, and records from the Hawai'i Sugar Planters Association, as well as the Climate Explorer Database.

Phase 3: Characterize the impact of historical climate anomalies on fish mortality, recruitment, and resource practices.

Finally, the research team will characterize how the environment and society within the Hawaiian Islands responded to ENSO variability historically. From this, they will craft guidance around adaptive management strategies for marine biodiversity of the Hawaiian Islands and partner with management agencies to align with management decisions. The research team will also develop scientific papers and reports that center Native Hawaiian knowledge in research outputs.

RESEARCH TEAM

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- Huihui Mossman-Kanahele, Edith Kanaka'ole Foundation
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CONTACT

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