Climate Change and the Lāhainā Wildfires: Raising Global Awareness as Native Hawaiians

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Abstract

On August 8th, 2023, Lāhainā, the first capital of the Kingdom of Hawai'i, experienced one of the deadliest wildfires in US history in over a century. Through historical and cultural data, the role of westernization in Maui's regional climate change is investigated. Since the 1800s, Lāhainā has fallen victim to climate-change-driven human activity. Whaling altered the ocean's carbon sink, the sugar industry diverted water from Native Hawaiian farmlands and increased carbon dioxide emissions, the opportunistic invasive, more flammable grasses predisposed the land to fire, and tourism perpetuated these harmful environmental impacts. Combined with climate change on a global scale, these factors contributed to the destruction in Lāhainā and to the physical and mental toll on its people, especially the Native Hawaiians. This manuscript's primary focus is to discuss the impact on Native Hawaiians given the deep ancestral connection with the land and the ancestry of the authors. As Native Hawaiians, this article serves as a platform for the authors' personal experiences to advocate for climate change awareness as future physicians and to emphasize inclusion of Native Hawaiians in the rebuilding of Lāhainā.

Abbreviations

None

Glossary

Ahupua'a = land divisions from the mountain to the sea
'ai pono = healthy food
'āina = land
Ali'i = Hawaiian royalty
Aloha 'Āina = love of land
'auwai = water channels
'eha = pain
Hāloanakalaukapalili = name of taro ancestor of all Hawaiian people
'Imi na'auao = seek knowledge
Kāhea = call to action
Kāko'o = support
Kanaka = Native Hawaiian
Kia'i = protect
Kuleana = responsibility
Kūpuna = ancestors
Lāhui = Native Hawaiian nation
Lo'i kalo = taro patches
Loko i'a = fish ponds
Mālama = nurture
Nānā i ke kumu = look to the source
Ola mau = perpetuate
Pono = balance

Introduction

"Ola ka 'āina, ola ke kānaka, ola ka lāhui. The health of the land, is the health of the people, is the health of the nation." - Noa Emmett Aluli, MD

Aloha 'āina is the deep love that Hawaiians have for the land that can be genealogically traced in the creation story from every Hawaiian to *Hāloanakalaukapalili* (name of taro ancestor of all Hawaiian people).[1] This sacred belief establishes the Native Hawaiian familial connection to the land. Any insult to the land causes great *'eha* (pain) to the people. This article's primary focus is to explore the impact on Native Hawaiians based on the deep ancestral connection with the land and the Native Hawaiian ancestry of the authors.

The article acknowledges all experiences brought about by climate change, however, the first author's ancestral roots in Maui and the first-hand accounts of Lāhainā before, during and immediately after the wildfires provide a profound insight into the effects of climate change to sacred land and its inhabitants.

A history of Lāhainā

Lāhainā or ka malu 'ulu o Lele is located in the West on the island of Maui, the second largest island in the Hawaiian archipelago. Lāhainā is watched over by the Kahalawai mountains, graced with the Ma'a'a wind and nourished by the Pa'ūpili rain. From the valleys of Kahoma, Kanahā and Kaua'ula flowed life-giving water into many *'auwai* (water channels) that sustained the entire district.[2] Lāhainā was known as the land of the chiefs and the capital of the Hawaiian Kingdom with 27 *ahupua'a* (land divisions from the mountain to the sea) created by the early Hawaiians to divide resources among everyone.[2,3] *Ahupua'a* was a practice of peace with a collective understanding to share all bounties of land and ocean. Since the land was viewed as

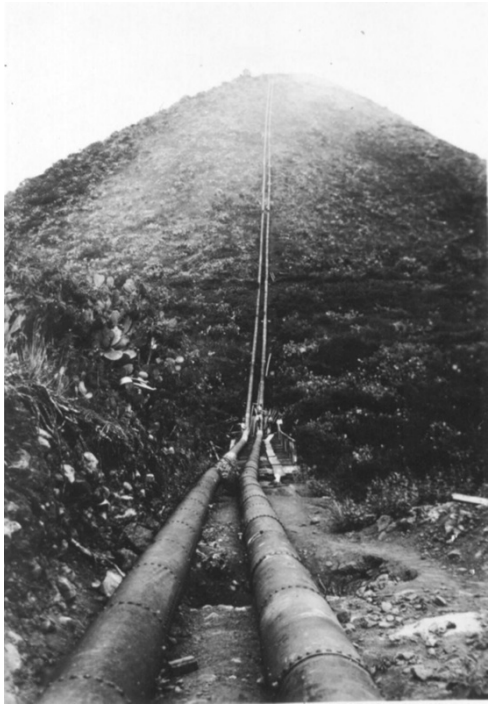

Figure 1. Irrigation Pipes for Pioneer Co. Mill in Lāhainā Circa 1905 Diverting Water from Native Hawaiian Agriculture. Used with permission (Lahaina Restoration Foundation, 2023).[9]

an ancestor, it belonged to no one and was always kept in a state of *pono* (balance).

With Western contact, the land system of *ahupua'a* evolved into one allowing ownership of land,[4] and Lāhainā became the epicenter of trade and industry starting with whaling. Despite targeting what seemed to be a small portion of the ocean's overall biomass, whaling altered the ocean's ability to store and sequester carbon[5-7] sparking climate change in Lāhainā.

When sugar became more profitable than whaling, water was diverted away from *'auwai* that supplied the *loko i'a* (fish ponds) and *lo'i kalo* (taro patches) of *kuleana* (responsibility) lands and supplied to sugar lands.[8] *Kuleana* lands are protected lands for Hawaiian farmers and their descendants. To sustain the growing sugarcane industry, foreign businessmen bought more lands in Lāhainā which only consumed more water (**Figure 1**).[9] By the 1940s, almost no viable *lo'i kalo* remained and the once-flourishing Mokuhinia *loko i'a* was filled to develop a baseball field (**Figures 2-3**)[2,10,11] prompting the generations-long Native Hawaiian to fight for water rights.

The sugarcane industry in Lāhainā continued to operate from 1862-1999 with its dark smoke clouds billowing above town (**Figure 4**).[12] A carbon emission level of 350 ppm and under is considered by most scientists to be the "safe operating space for humanity" to avoid irreversible climate change.[13] From 1958 to 1999, carbon emissions increased from 315.98 to 368.54 ppm,[14] highlighting the industry's negative impact on climate change. Resource diversion and carbon emissions were overlooked in exchange for economic growth.

Tourism has now supplanted the sugar industry. In 2020, the Maui County Department of Water Supply's top water users were hotels and resorts with a remarkable consumption of 226 000 gallons/day, in contrast to the average use of 400 gallons/day by a single-family dwelling, equating to the water use of 565 single-family homes per hotel in Lāhainā.[15]

Altered biodiversity contributed to the predisposition to fire. Lāhainā is considered a wildland-urban interface where wildland vegetation and houses are in proximity, increasing fire risk.[16,17] This environment is composed of invasive grasses commonly introduced for livestock forage or landscape décor.[18,19] With the decline in agriculture, plantation fields were abandoned, aggressive grasses grew and displaced native vegetation. Invasive grasses now cover 25% of Hawai'i's total land mass which poses a higher fire risk.[19,20] A 2018 book investigating fire ecology cited a Maui resident who said, "We don't even have to ask what the fuel type is if we know the location. Like, if it's at Lahainaluna School, I know it's in cane grass [*Arundo donax L.*] and that it's going to hit the big trees eventually."[21]

To investigate the possible implications of climate-aware management of water and biodiversity, a 2019 Maui study conducted climate projections which showed that increased irrigation and conversion of grassland to native forests improved groundwater recharge and mitigated the climate change effects.[22]

In addition to human-driven climate change, Lāhainā's leeward location made the area prone to drought. According to the US Drought Monitor, Lāhainā's drought conditions were rated severe with increased annual temperatures and decreased rainfall (**Figure 5**).[23] When combined with strong winds, devastating wildfires resulted.[24] Lāhainā's regional climate change combined with global climate change created the perfect storm (**Figure 6**).[25]

The Fire, Aftermath and Resilient Response

The fire burned an estimated 2170 acres of land in Lāhainā.[26] There were 102 confirmed fatalities.[27] This made the Lāhainā wildfires one of the deadliest in US history.[27] The loss of life and *'āina* (land) caused climate refugees with many still displaced to this day. Some refused shelter at a hotel and have chosen to stay within their community and the ancestral land. Others were too traumatized to leave their evacuation sites, fearing the sight of their burned homes or the possibility of being denied reentry. A young family shared their experience evacuating; they took separate cars to save both their vehicles. This family was fortunate to be reunited and to have survived. Many families who were separated were not reunited, or worse, did not survive.

Significant hazardous conditions remain. The ash in the air possibly contains cancer-causing chemicals like arsenic, lead, silica, and asbestos, and unsafe water containing volatile organic chemicals.[28] A resident who returned to see what was left of her house sustained serious chemical burns

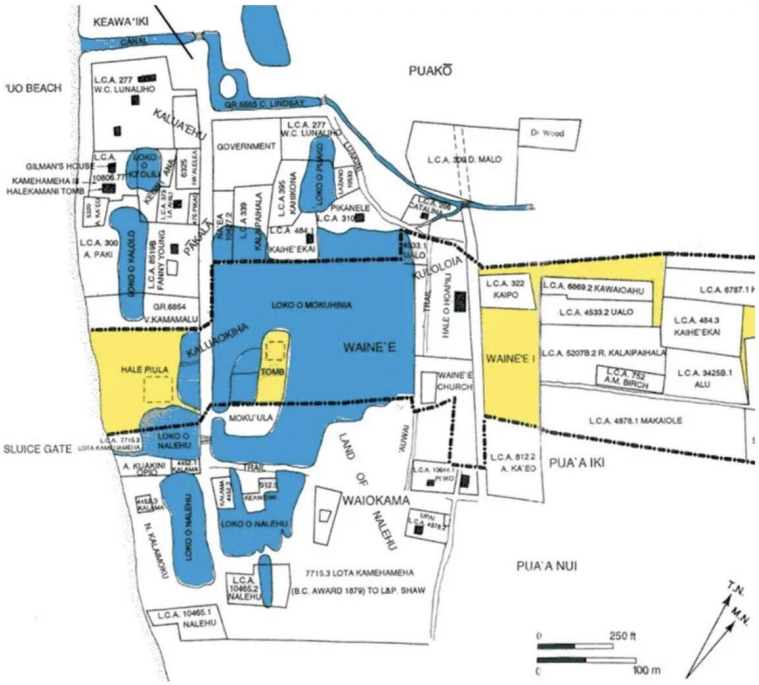

Figure 2. Historical Map of Mokuhinia Fish Pond and the Surrounding Areas in 1879. Labeled as "Loko o Mokuhinia," meaning fish pond of Mokuhinia. Mokuhinia was once a flourishing fish pond in Lāhainā until it was filled to develop a baseball field. Blue shading indicates bodies of water such as fish ponds, streams and canals. Yellow shading indicates landmarks of cultural significance (e.g. Hale Piula was the royal palace of King Kamehameha III, "tomb" is the mausoleum for relatives of Kamehameha, Keōpūolani, Liholiho, Kamāmalu and Nāhiʻenaʻena) (Young, 2019).[2,10]

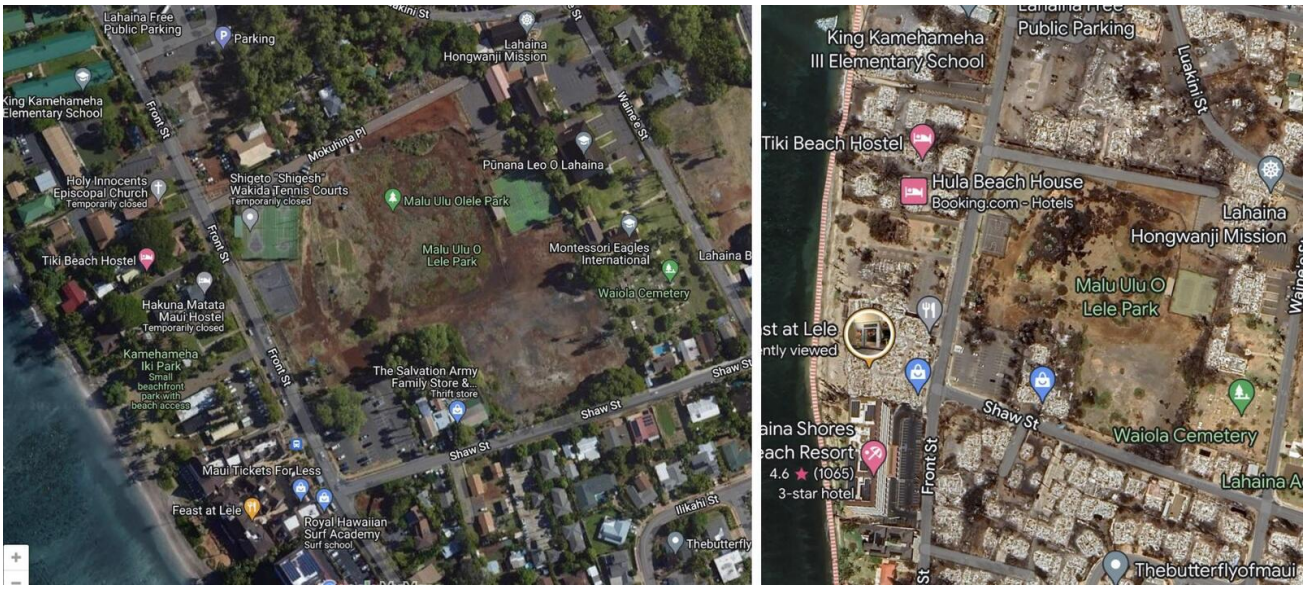

Figure 3. Mokuhinia Replaced by a Baseball Field Pictured in 2023 Prior to and After Wildfires (Google, n.d.).[11]

after discovering a leaking pipe. Lāhainā residents were also threatened by visitors who were attempting to purchase their land.[29] Yet, Lāhainā remains strong. The people who lost their homes created community Hawaiian-style hubs, coined "*kanaka* (Native Hawaiian) Costcos" (**Figure 7**).[30] The leaders of these gathering places were Native Hawaiian families with deep ties to the *ʻāina* of Lāhainā. They were trusted to assess the needs of the community and appropriately distribute resources. Although health care organizations were at the county's distribution centers, locals preferred to visit the hubs. A grassroots Native Hawaiian organization called Mauna/Maui Medic Healers Hui provided the author access to the hubs since they were entrusted by the hub leaders to provide both medical care and alternative medicine options. Families came for medical care, *ʻai pono* (healthy food), acupuncture, talk therapy, tra-

Figure 4. Pioneer Co. Mill in Lāhainā with Dark Smoke Clouds Circa 1900. Used with permission (Lahaina Restoration Foundation, 2023).[12]

ditional Hawaiian medicine, massage, singing princesses, face painting, and pet therapy. They watched the children play while some wept for the children who cannot. Witnessing the resiliency of Lāhainā will forever shape the authors as future physicians, solidifying our belief that patients have the determination to take their fate into their own hands.

The University of Hawai'i John A. Burns School of Medicine supports climate change awareness through a certificate of distinction in One Health, an elective program that integrates human, animal, and environmental health.[31] Incorporating disaster-response, psychological first aid, and climate change health effects are warranted in the medical school curriculum. Disaster response training can be integrated into the emergency medicine rotation, while psychological first aid can be added to the psychiatry rotation. Rural health programs should prioritize these areas given the limited infrastructure and resources, as seen in the flooding in Kaua'i,[32] the volcano eruptions on Hawai'i island,[33] and the fires on Maui. Medical schools should consider adding the health effects on climate change to their graduation objectives.[34]

Conclusion

As Lāhainā continues to rebuild, it is important to look at the past to inform the future. Since western contact, Lāhainā has changed from a landscape of vast *'auwai* to dry *kuleana* lands, from a system of *ahupua'a* to private ownership, and from a renowned land of the *ali'i* (Hawaiian royalty) to a tourist destination. It is imperative to reflect on Dr. Aluli's philosophy that the health of this *'āina* is the health of our people. As Native Hawaiians, the authors are tasked with the *kuleana* of *aloha 'āina* and remains steadfast in the wisdom of our *kūpuna* (ancestors) which states to take care of the land so the land takes care of us.

The data, research, and history should be used to inform future policies on resource management. The *pono* that the *'āina* once held to bring back the health of the *lāhui* (Native Hawaiian nation) needs to be restored. Climate change awareness among all health care providers is possible by bringing attention to the resolution passed by Indigenous physicians committing to climate justice.[35] 'Ahahui o nā Kauka, the Association of Native Hawaiian Physicians, echoed this resolution in a statement rooted in Native Hawaiian values: to *nānā i ke kumu* (look to the source) of

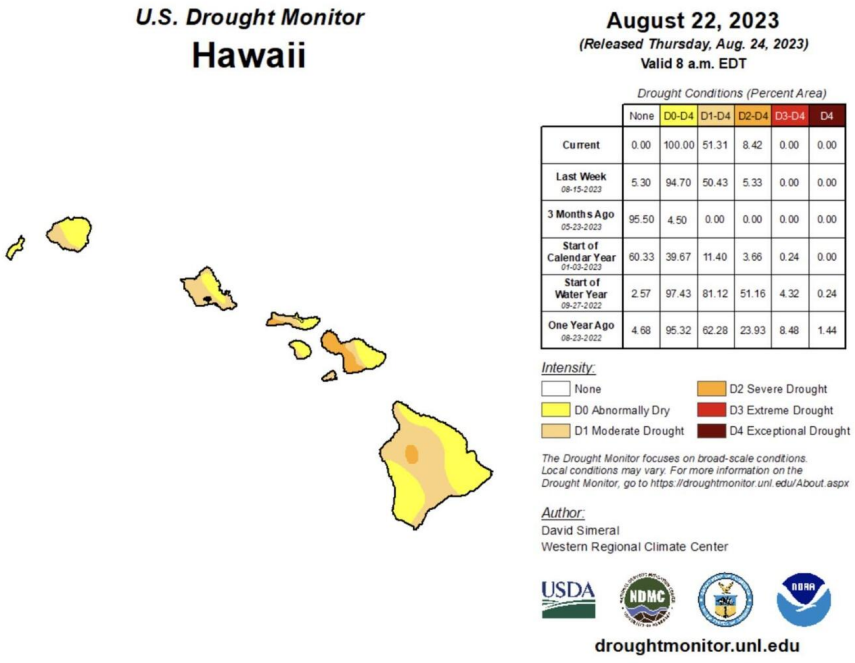

Figure 5. Hawai'i Drought Map August 2023 (U.S. Drought Monitor, n.d.).[23]

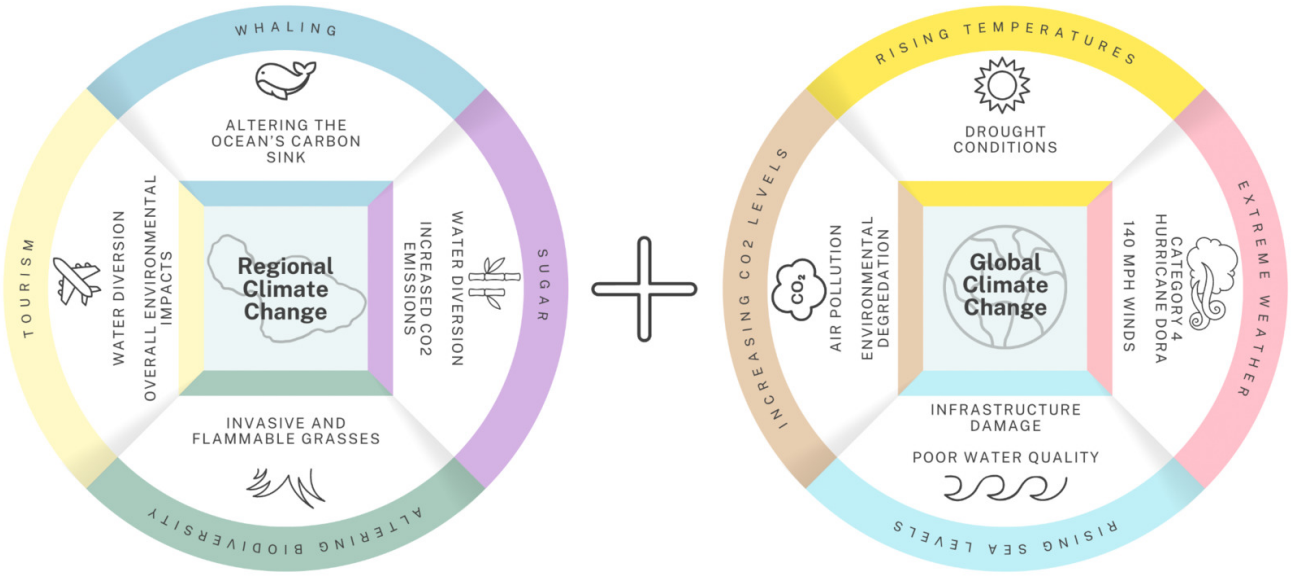

Figure 6. Regional And Global Climate Change Contributing to the Lāhainā Wildfires (Ashley Lee, 2024).[25]

Figure 7. One of the Resource and Respite Hubs, Dubbed "Kanaka Costcos" in Lāhainā (Ashley Lee, 2023).[30]

ancestral knowledge, *kāhea* (call to action) the efforts to mitigate climate change, *kākoʻo* (support) by denouncing harmful policies, *kiaʻi* (protect) by holding industries accountable, *ʻimi naʻauao* (seek knowledge) from allies to strategize initiatives, *mālama* (nurture) the development of affirmative policies, and *ola mau* (perpetuate) sacred places.[36] Clinicians must remain attentive to the needs of the Lāhainā community by providing transparency, listening to their stories, and responding to their physical and mental health needs. These community experiences can inform an ethical and culturally informed approach to disaster response.[37] As responders, it is important to understand and promote a sense of self-determination by asking what communities lost, what they seek, and what or who will help them achieve their goals of recovery. Above all, Native Hawaiians who are genealogically traced to the land of Lāhainā need to be a part of the conversation to rebuild it. Lāhainā, *kukui ʻaʻā mau pio ʻole i ke Kauaʻula*, the ever-burning torch never darkened by the Kauaʻula wind. Lāhainā is resilient and so are her people.

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