

## A Campus Huaka'i: Weaving Geological, Historical & Cultural Perspectives in Hawai'i

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### **Abstract**

*The University of Hawai'i at Mānoa is striving to become a Native Hawaiian place of learning. As part of this effort, we developed a huaka'i (fieldtrip) to explore the intertwined geological, historical, and cultural influences on our campus. Our purpose is two-fold: (1) to showcase an example of how science can be taught in ways that honor Hawaiian culture and history; and (2) to stimulate interest and collaborations among faculty to develop additional place-based curricula offerings that draw connections between Hawaiian culture and Western science. Evaluations of a pilot fieldtrip generated considerable positive and constructive feedback, which was used to significantly improve the fieldtrip. In this paper, we share an abbreviated version of the current fieldtrip, and sincerely welcome any additional comments and suggestions.*

**Keywords:** Hawai'i; Earth System Science; Indigenous Science; Hawaiian History; Hawaiian Culture; Place-Based Teaching.

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## **1. Introduction**

### ***1.1. A brief synopsis of recent Hawai'i history***

In 1778, the British Captain James Cook arrived in Hawai'i. Over the next few decades, the Indigenous Hawaiian population was decimated by western diseases, declining by ~84% by 1840 (e.g., Swanson, 2019). Hawai'i remained an independent nation until 1893, when a group of American businessmen and sugar planters, with support from the United States (U.S.) military, overthrew the reigning monarch. To avoid the bloodshed of her people, Queen Lili'uokalani abdicated her throne and was placed under house arrest. A few years later, in 1898, Hawai'i was annexed as a U.S. territory. Throughout the 20<sup>th</sup> century, Hawaiian language and culture were suppressed and almost lost. By the 1970s, there were only about 2,000 native speakers of the Hawaiian language remaining (Goo, 2019).

Currently, the University of Hawai'i (UH) is striving to be a "Native Hawaiian place of learning" (UH, 2019) but amidst this history, and UH's own history of evicting Native Hawaiians (see *Section 2.5*), what does that really mean? And how can Earth science classes participate in this endeavor? We don't claim to have the answers, but we nevertheless recognize that it is our *kuleana* (responsibility) to work with others to find them, and believe a critically important first step is to acknowledge historical truths.

### ***1.2. Place-based Teaching***

Place-based teaching can be defined as using place, people, and their resources as a foundation for learning. It has been shown to be effective across many subject areas and grade levels. A survey conducted at the UH Mānoa (UHM) School of Ocean and Earth Science and Technology (SOEST) revealed that most faculty and students agreed that (1) place-based teaching is important and effective; and (2) all instructors should teach in the context of place (Böttjer-Wilson & Bruno, 2019). However, 87% of SOEST faculty are not from Hawai'i (let alone Native Hawaiian), and many questioned their own ability to teach in a way that incorporates place. Thus, the mandate is clear but a challenge remains: How can SOEST faculty effectively implement place-based teaching approaches in their classes?

## **2. Campus *huaka'i***

We developed a *huaka'i* (fieldtrip) to explore the intertwined geological, historical, and cultural influences on the UHM campus: it examines the landscape and how it has been shaped by geologic processes, Native Hawaiians, and immigrants. Our purpose is two-fold: (1) to showcase an example of how science can be taught in ways that honor Hawaiian culture and history; and (2) to stimulate interest and collaborations among SOEST faculty to develop additional place-based curricula offerings that draw connections between Hawaiian culture and Western science. This *huaka'i* is based on three existing fieldtrips: (1) *Nā Mo'olelo o*

*Mānoa Campus Tours*, led by Dr. Kaiwipuni Lipe (Native Hawaiian Affairs Program Officer), which inspired the development of this fieldtrip; (2) *Mapping kuleana: Hawaiian geography and the "untold" history of UH Mānoa campus tour*, led by Dr. Christina Higgins (Chair and Professor, Second Language Studies) and Kapua Adams (Graduate Student, Second Language Studies); and (3) an introductory geology fieldtrip developed by Dr. Scott Rowland (Specialist, Earth Sciences) and colleagues.

After developing the script, we offered a pilot fieldtrip to 20 SOEST faculty and graduate students in July 2021. Fourteen completed a post-trip survey (70% response rate). First, survey respondents evaluated various aspects of the fieldtrip on a scale of 1 (low) to 5 (high) and the results were very positive: Overall Usefulness (4.8), Overall Content (4.7), Discussion (4.6) and Handouts/Guides (4.6). Next, we asked for open-ended feedback. Several participants noted that the integration of Western science and Hawaiian cultural comments was not seamless. For example, one respondent wrote: *"The geology tour was most interesting when it intersected with post-colonial and indigenous themes...I wonder if more local aspects of campus geology can be emphasized to strengthen these connections"*. Another respondent commented: *"I like the merge of geology, Hawai'i, and history. These should in theory be merged in a way that we don't know where one starts and stops."* When we reflected on these comments, we realized that we needed to do a better job of drawing connections and demonstrating that Hawaiian culture is rooted in science. This led to considerable revision and, we believe, considerable improvement.

Here, we share an abbreviated version of our revised fieldtrip script with five stops. Each stop begins with the sharing of a historical truth and ends with reflection and discussion. A key focus is on relationships: how geology affects us and how we in turn affect the land.

### **2.1. Stop 1: Kapa'akea (Dole) Street @ Kānewai lo'i**



*Figure 1: Ka Papa Lo'i o Kānewai*

Truth: Much of Hawaiian culture is observation-based (i.e., scientific) and includes people's relationships with nature. Hawaiians (and other Indigenous people) tend to view themselves as part of nature – not separate from nature.

Native Hawaiians are Polynesians who settled in Hawai'i about 1000-1200 CE. Sailing thousands of miles across the Pacific Ocean requires advanced knowledge of oceanography and astronomy. Furthermore, upon arrival, Hawaiians set up an *ahupua'a* (ridge-to-reef land management) system indicative of their deep understanding of the connectivity between mountains and ocean.

In Hawai'i, trade winds blow from the Northeast, causing the Northeast sides of the islands to be wet and the Southwest sides to be considerably drier. Each area has distinct rain and wind patterns, names for these rains and winds, and stories that relate them to the place and teach a wise lesson. Mānoa's misty rain is Kuahine (Ua Tuahine) and Mānoa's wind is Kahaukani -- these are the parents of Kahalaopuna, the most beautiful woman in Mānoa. When she was murdered due to jealousy, her parents turned into the wind and rain (Adams & Higgins, 2018; Wehewehe Wikiwiki, n.d.).

Largely due to its abundant rainfall and gentle slopes, Mānoa valley has a rich agricultural history. When Kamehameha I conquered O'ahu in 1795, he came to Mānoa because he knew there was enough *kalo* (taro) to feed his troops. In the early 1980s, a small group of UHM Native Hawaiian students uncovered the remnants of an *'auwai* (irrigation channel) and set out to restore it under the guidance of *kūpuna* (elders) such as Harry Mitchell. Their efforts resulted in these *lo'i* (irrigated taro fields) today, called Ka Papa Lo'i o Kānewai (Adams & Higgins, 2018).

Although it rains almost daily in Mānoa, the probability of extremely heavy rainfall and thunderstorms have been historically low, about 2% per year (National Weather Service, 2018). But Hawai'i's rain patterns are changing. Overall, the islands are becoming drier, but when it does rain, it often rains a lot harder (e.g., National Weather Service, 2018).

Reflection: As we walk across the street to the next stop, reflect on how people, rainfall, stream, rocks, and the mud under our feet are related to each other.

## 2.2. Stop 2: Basaltic Lava flows at Kapa‘akea (Dole) Street Bridge, near Kānewai lo‘i



Figure 2: Basaltic Lava Flows

**Truth:** Hawaiian “deities” are the Westernized translations of Hawaiian observation & culture.

These lavas formed ~2 million years ago, when O‘ahu was over the Hawaiian hot spot. Often we read that Pele is the goddess of volcanoes. This is a Western perspective. To Hawaiians, Pele IS volcanism: Pele is not a person who sends lava down a mountain, but rather Pele IS the lava that flows down the mountain (as well as every other manifestation of volcanism).

Hot spot volcanism is one process that shaped Mānoa. Another is erosion: streams continually erode material from the mountains. The word *mānoa* means “vast or thick, as a substance having breadth and depth” (Wehewehe Wikiwiki, n.d.). In fact, Mānoa valley used to be even deeper, before it was partially infilled by alluvium as O‘ahu subsided.

Well after O‘ahu moved off the hot spot and the Ko‘olau volcano stopped erupting, volcanism reawakened and new vents formed. Lava from one of these new vents (Pu‘u Kākea) flowed down into Mānoa valley and ponded, becoming a dense thick layer. UHM is built on this Kākea lava flow, which was also quarried and used in many local buildings.

**Reflection:** How does geology affect our everyday lives in Hawai‘i? And how are we in turn impacting the ‘āina (land)?

## 2.3. Stop 3: Campus entrance marble pillar @ East-West Road

**Truth:** Hawai‘i was an independent nation until 1893, when a group of American businessmen and sugar planters forced Queen Lili‘uokalani to abdicate. Fifty years earlier, in 1843, Hawai‘i briefly lost its sovereignty when a British Naval officer (Lord Paulet) occupied the Hawaiian Islands for five months. Paulet’s occupation was later reversed by his commanding officer, Rear-Admiral Thomas ([HawaiiHistory.org](http://HawaiiHistory.org), 2021a).



Figure 3: Marble Monolith

UHM is striving to be a Native Hawaiian place of learning (UH, 2019), and this monolith was installed to establish a sense of place. The phrase on the plaque, *Ua Mau ke Ea 'o ka 'Āina i ka Pono*, is often translated as *The life of the land is perpetuated in righteousness*. Another translation of *ea*, instead of life, is sovereignty. King Kamehameha III said this on July 31, 1843, when the sovereignty of the Kingdom of Hawai'i was returned by Rear-Admiral Thomas. Ironically, this phrase was put on the Republic of Hawai'i seal in 1896, shortly after the overthrow of Queen Lili'uokalani, as well as on the Territory of Hawai'i seal in 1900. It became the Hawai'i state motto in 1959.

As we stand here, we should also reflect on the street name. Some sources (e.g., UHM, 2007) indicate that Dole Street used to be called Kapa'akea Street, and was renamed in honor of Daniel Dole, father of Sanford Dole. Sanford Dole was a key player in the 1893 overthrow of the Hawaiian Kingdom. He also served as the President of the Provisional Government of Hawai'i that was formed after the coup, and then as Governor of Hawai'i.

Now let's look at this stone. This is marble, a metamorphic rock made of calcite (light colored crystals), with flecks of pyrite (darker crystals). Marble does not form in Hawai'i.

**Reflection:** Does this pillar or the name Dole Street evoke a sense of place in you? If you were to use rocks to evoke a sense of this place, what would your creation look like? For example, what material would you use?

#### 2.4. Stop 4: Webster Hall



Figure 4: (l) Basalt/Gabbro with Hawai'i state motto. (r) Kukui tree

**Truth:** Basalt is the most common rock in Hawai'i and can help evoke a sense of place.

The light gray tiles surrounding the word “Mālamalama” are basaltic lava. Basalt flows on the surface of the Earth and cools quickly. That is why it is fine grained. The darker letters and rings are made of gabbro. Gabbro has the same chemistry as basalt, but it cools slowly inside the Earth, which allows larger crystals to form. With hand lenses, you can identify pyroxene, olivine, and plagioclase in the gabbro.

Plants can also help evoke a sense of place. Kukui was brought by Polynesians to Hawai'i because of its many uses. Its English name is “candlenut” because the oil can be lit on fire to produce light. Metaphorically, kukui represents enlightenment, which is why college graduates wear lei made out of kukui leaves (Adams & Higgins, 2018).

**Reflection:** Compared with Stop 3, does this rock mosaic and kukui better reflect a sense of this place and our *pilina* (relationship) with this land? Why or why not?

#### 2.5. Stop 5: Queen Lili'uokalani Center



Figure 5: (l) Ahu (rock altar) and (r) Limestone, with vugs and fossils

**Truth:** UHM, like the State, has some ugly history. This includes the erasure of Native Hawaiians in pursuit of development.

An ahu is an altar made of rocks. This ahu, *Ke Ahu 'o Kamaka 'eha*, was dedicated to Queen Lili'uokalani, the last monarch of the Hawaiian Kingdom (Hawai'inuiākea, n.d.). Most of the rocks in this ahu are basalts (some are partially altered to chlorite, appearing greenish). There are also coral heads. Looking at the building, the rocks on the lanai and along the stairs are limestone, a rock found in Hawai'i (although this particular limestone is probably not from Hawaii). You can see vugs (cavities) and fossils (such as shell fragments) in the rocks on the lanai and along the stairway railings.

Queen Lili'uokalani was one of the first people to envision an institution of higher education in Hawai'i. In 1907, when Hawai'i was a US territory, the College of Agriculture and Mechanic Arts of the Territory of Hawai'i was established, and it eventually became UHM. At the time, Native Hawaiians were living on the land, tilling the land and "getting in the way of the construction" of the new college. Archived Board of Regents minutes note that "Hawaiians now dwelling on the land are an obstacle" (May 8, 1911) and "After some discussion on this matter, it was voted that Judge Cooper and Mr. Hemenway should act in conjunction with the Attorney-General to the end of removing these people entirely from the land" (May 15, 1911). Thus the Hawaiians were evicted, which has been a recurring theme all over Hawai'i since 1848, when the *Māhele* enabled land privatization (Adams & Higgins, 2018; HawaiiHistory.org, 2021b). Sadly, the experiences of Native Hawaiians parallel those of other Indigenous communities across the country, and the world.

Reflection: What can we as SOEST faculty & students do to create a Native Hawaiian place of learning?

### **3. Results & Conclusions**

This fieldtrip has been shared with SOEST faculty, some of whom have incorporated it into their courses in various formats. We hope that opportunities will arise for students and faculty to discuss their reflections, particularly the final one: *What can we as SOEST faculty and students do to create a Native Hawaiian Place of Learning?* Some ideas shared to date by fieldtrip participants include developing geoscience curricula that honor Hawaiian history and culture, commissioning Hawaiian-themed artwork for SOEST buildings, and changing building names. Currently, SOEST buildings are named by discipline (e.g., Pacific Ocean Science and Technology, Hawai'i Institute of Geophysics, Marine Sciences Building), and one suggestion was to rename buildings after prominent Native Hawaiian scientists. Names reflect values, and naming is taken seriously in Hawaiian culture.



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## References

- Adams, K. & Higgins, C. (2018). Mapping kuleana: Hawaiian geography and the "untold" history of UH Mānoa campus tour. Walking tour at the Piko'oko'o Conference, University of Hawai'i at Mānoa (October 6, 2018).
- Böttjer-Wilson, D. and Bruno, B.C. (2019). Place Matters! Fostering place-based geoscience teaching at the University of Hawai'i at Mānoa, *Proceedings of the 5th International Conference on Higher Education Advances (HEAd'19)*, 243-251, <http://dx.doi.org/10.4995/HEAd19.2019.9237>.
- Goo, Sara Kehaulani (2019), The Hawaiian Language Nearly Died. A Radio Show Sparked Its Revival (June 22, 2019) Available at <https://www.npr.org/sections/codeswitch/2019/06/22/452551172/the-hawaiian-language-nearly-died-a-radio-show-sparked-its-revival>
- Hawai'i inuiākea (n.d.), About UH Mānoa Campus' Ahu. <https://manoa.hawaii.edu/hshk/hawaiinuiakea/about-us/about-uh-manoa-campus-ahu/>
- HawaiiHistory.org (2021a). Lord Paulet temporarily claims Hawai'i for Britain <http://www.hawaiihistory.org/index.cfm?fuseaction=ig.page&PageID=286&returntoname=Short%20Stories&returntopageid=460>
- HawaiiHistory.org (2021b). The Māhele to the Overthrow (1848-1893). <http://www.hawaiihistory.org/index.cfm?fuseaction=ig.page&PageID=359>
- National Weather Service (2018). Record Kauai and Oahu Rainfall and Flooding – April 2018. <https://www.weather.gov/hfo/RecordKauaiandOahuRainfallAndFlooding-April2018>
- Swanson, D. (2019), A New Estimate of the Hawaiian Population for 1778, the Year of First European Contact (July 3, 2019). Hūlili 2019, Available at SSRN: <https://ssrn.com/abstract=3917957> or <http://dx.doi.org/10.2139/ssrn.3917957>
- University of Hawai'i at Mānoa (2007), Named Buildings, Dole Street. <https://libweb.hawaii.edu/names/dole.html#:~:text=Dole%20Street%20%7C%20Building%20Names%20%7C%20University,annexed%20by%20the%20United%20States.>
- University of Hawai'i (2019). Native Hawaiian Place of Learning Advancement Office. <https://manoa.hawaii.edu/nhpol/>
- Wehewehe Wikiwiki (n.d.). <https://hilo.hawaii.edu/wehe/>