

Leone-STEM

Iutita Savali & Sarah Su'a

EDCS 640: Place-Based STEM

### Abstract

Greetings and Talofa! We teach at Leone Midkiff Elementary School and we both hail from the beautiful village of Leone. Leone Midkiff is surrounded with a lot of resourceful departments, locations and is especially rich with culture and history. For this presentation, Sarah and I delved into the history of some of Leone's landmarks, and particularly how people made use of available resources for daily living – specifically the use of rocks and quarries for stone-tool making. As a result of this research, we have come to appreciate the natural resources that used to sustain our ancestors and aim to maintain a clean and pollution-free environment.

## Leone-STEM

**Community Mapping:**

East of Leone Midkiff includes the police sub-station, Leone Clinic, Leone High School and what used to be a Leone Airfield. The police sub-station assists the school in any cases that many involve legal action and even does routine check ups for any intruders. If ever students are in need of immediate medical attention, the Leone Clinic is readily available in the area. Within the same stretch from Leone Midkiff up until the Leone High School, there is a strip that was once called the Leone Airfield. This was built around the time of World War II, and was an emergency bomber airstrip. To the west of Leone Midkiff and near the coastal shoreline is the Fagalele Bay. In close proximity to the bay was an all boys' school named Fagalele Boys School. Near this location is another landmark, one of the many quarries where stone tools such as the adze used to be fashioned and grinded. Deep impressions on the basalt rock called facets can be seen, signifying the different types of shapes of adze that were made. Further west is the Tsunami 2009 Memorial named the Healing Garden. Every year a candlelight service is held here to remember those who died from this tragedy. Past the Leone bridge is where the Leone Wetlands are, including the Puna Mai Springs. According to an interview with archaeologist Epi Suafo'a, wherever there was a stream it is most likely a quarry where stones from the Tataga-Matau are collected and brought down to be grinded into stone tools (2018). Another landmark in the area is the lone island called Niuaveve. This has survived numerous natural disasters, from cyclones to even tsunamis, and it still does to this day. It never bears fruit and never seems to die out. Last and most important is the Leone Falls, of which the Tataga-Matau quarry is located. This is the location of the core rock to be collected and carried down to streams and quarries for grinding.

**Historical Background:**

American Samoa was once a united Samoan archipelago with their neighboring islands Upolu and Savaii. It was during a rivalry between the empirical nations U.S.A., Britain and Germany, in the late 1800s, did they agree to split up the two Samoa amongst themselves into an Eastern and Western state. The eastern part of Samoa, known today as American Samoa is still under a U.S. colonial control, while the western part of Samoa, now known as Samoa is an independent country with their own government and currency. (Ashcouncil.org, 2018)

Before the pre-western contact of the Samoan archipelago the people were worshipping a god of their making called *Tagaloa*. The Samoan people had their own unique way of living free from the influence of western civilization. There were archeological studies conducted in many areas of the islands that show the use and production of sophisticated technologies using natural resources found around them. For example, an adze or ancient ax was constructed using a particular stone found near streams. These stones weren't just any rocks lying around, but special care went into finding the right rock for creating a functional tool. Another technology developed by the islanders was the production of ceramics. Local and outside scientists have found sherds scattered all over the Samoan archipelago. According to Epi Suafo'a (2018), on one account two whole large ceramic pot-like containers were excavated on the islands of Manu'a. To the archeologists' surprise there were "umu" rocks found at the bottom of the pot with fish and turtle bones on top. They concluded that the islanders used the ceramic artifacts to cook their food inside at first before the makings of the "umu".

When the eastern Samoa was first in contact with European settlers there was a huge impact on the Samoan way of living. John William, a missionary that brought Christianity to American Samoa, upon arriving Leone over 180 years ago, slowly shifted Samoans away from

paganism to the Christian belief system (Ashcouncil.org, 2018). The making of rock tools slowly disappeared. The perception of time was important, which led to an easier and quicker way of doing things. In turn, the production of ceramic ware was dissipating because it was tedious and time consuming to produce a ceramic pot just to cook food (Su'afoa, 2018). Samoans found it faster using underground-heated rocks otherwise called the "umu" to cook food faster and efficiently.

Hunting and gathering was a way of survival before western influence. The men of the village were the hunters. They would hunt wild boars and fruit pigeons and fish the seas, while the women cooked the food that the men caught. Special leaves were woven for baskets and made into clothing. Food was fresh and organic; and hardly any diseases were known. There was no formal education. Trading back then was an exchange of adze for feathers (Suafo'a, 2018). The elders of the village would create oral stories that were passed down from generation to generation.

Today pigs are domesticated for consumption. Many foods are store bought and money is used mainly for trade. The men and women work for money. And the western movement brought about formal education, and an introduction to a new language, English. From a monarchy form of government, before Anglo-European contact the Samoan people now has to coincide with the Western model of governing. American Samoan is now a U.S. Territory that cannot vote for the President of the United States, but fortunately can keep its Samoan culture, traditions and lands.

When the U.S. President appointed the first Governor of American Samoa, a Caucasian Naval Officer, in 1900, a Census was made and put on record. It wasn't until 1977 did a Samoan finally come into power. Governor Peter T. Coleman was American Samoa's first elected Samoan Governor.

Census Date	Total	Eastern Tutuila	Western Tutuila	Manu'a	Swain's Island	Index 1900=100	Change Previous
1900	5,679	2,221	1,702	1,756	NA	100	
1901	5,563	2,342	1,618	1,603	NA	98	-2.0%
1903	5,888	2,441	1,752	1,695	NA	104	5.8%
1908	6,780	3,018	1,907	1,855	NA	119	15.1%
1912	7,251	3,186	2,268	1,797	NA	128	6.9%
1920	8,058	3,777	2,408	1,873	NA	142	11.1%
1926	8,763	4,221	2,395	2,060	*87	154	8.7%
1930	10,055	5,032	2,777	2,147	99	177	14.7%
1940	12,908	6,733	3,431	2,597	147	227	28.4%
1945	16,493	9,335	4,610	2,406	139	290	27.8%
1950	18,937	10,624	5,330	2,819	164	333	14.8%
1956	20,154	11,405	5,902	2,767	80	355	6.4%
1960	20,051	11,137	6,113	2,695	106	353	-0.5%
1970	27,159	15,955	9,018	2,112	74	478	35.4%
1974	29,190	16,828	10,520	1,808	34	514	7.5%

\* Swain's Island became an American possession in 1923.

Figure 1. Census (A COASTAL ZONE MANAGEMENT ATLAS OF AMERICAN SAMOA, 1981)

Before prewestern contact the population of eastern Samoa was 99.9% Samoans. Today there is a mix of different races with their own unique language and culture stemming from Asia (including Chinese, Koreans, Filipinos, etc), Caucasians (Americans and Europeans) and other Pacific islanders ( from Tonga, Tokelau, Niue, Fiji, etc). Also the introduction to the Internet has brought more influences than meets the eye.

Leone Midkiff Elementary student enrollment for the school years 2013 to 2016 was 880, 934, and 957 respectively. The student ethnicity was about 96% Samoan and 4% Asian/ other Pacific Islander. (Leone Midkiff WASC Report, 2016)

### **Rocks and Quarries in Leone:**

Our first findings were collections of Samoan folklore written and published in a book by the American Samoa Community College Samoan Studies Institute. They conducted a historical-cultural research by reaching out to the old folks and chiefs of assigned villages to share some of the oral histories of Samoa that was slowly dwindling away. According to this study, there is a Samoan proverb that relates to our focus: E fa'aילו e le Mauga o Ali'i tala o le aai. The expression means, "The sounds of rumblings from the mountains signal the passing of a high chief." The Samoan Study Institute describes that in the center of the mountain range is a cave with rocks that make a bell sound when in contact with each other.

Two long-time residents of Leone shared a first-hand account. According to Ioana Uli and Florina Scanlan, when they were young they heard of stories of two mountains in Leone named Mauga Ula and Mauga Sa. The Mauga Sa in particular, was the mountain that rumbles and signals the passing of a chief. It was at one evening when they heard those rumbling sounds, and later heard that the high chief Tuitele Fofu passed away. Another first hand experience was that of the passing of the high chief Avegalio Pesamino just last year, 2017. A resident at Asili heard the rumbling sounds from a mountain and found out later on that one of our high chiefs had passed. According to Epi Suafo'a, there is another mountain named Mauga o Alii within the vicinity of the chief that passed. (2018)

This brings us to our first interview with the director of American Samoa Historical Preservation Office, David Herdrich. He explains that in a journal of a 1985 survey by Simon Best, there are recordings of a Tataga Matau in Leone. In a similar survey conducted by Dr. Leach, Witter and assisted by Epi Suafo'a, they too concluded that the best quality and sharpest stone adzes were manufactured from the core rock from Leone's Tataga Matau. Fingerprinting

methods of stone tools discovered that the composition of adzes discovered on other islands match the rock composition found here at the Tataga Matau. Therefore leads to the conclusion that these adze tools were not just created for daily use but also for trading. (Leach and Witter, 1985)

In another interview with a long-time resident named Tino, he revealed that these stone tools were utilized for cutting (2018). Other functions of the adze most likely include carving of the canoe or “paopao”, and perhaps even as a weapon in warfare.

### **STEM Lesson:**

A STEM Lesson for all these findings may include the study of the three types of rock, the rock cycle and the importance of rocks to all living things, including humans. For example, identifying the important minerals that make up a rock that provide nutrients to plants as well as humans.

A lesson on density where students can apply and calculate it using the mathematical equation  $\text{density} = \text{mass} / \text{volume}$  to compare the density of various types of igneous rocks found on island.

Another lesson may include a study on Samoan manufactured tools and how our interactions with other islands by bartering and trading these stone tools can uncover how certain plants and animals that are not native to the islands were brought about. Students can discover the various similarities in the Polynesian islands, such as language and tools to track their point of origins.

In addition, a lesson in Samoan culture can be conducted where students learn about the various landmarks within Leone and the historical and cultural history behind it.



A literature lesson can be developed using a legend of the streams *Puna Loa* and *Puna Mai* and how it correlates to rocks and vegetation such as the wetlands and its importance to the environment. A copy of the legend written by Epi Suafoa (A Legend of Puna Mai and Puna Loa, 2013), based on the oral history from the HTC Silivelio Suafoa is available for view .

A lesson in music: students can learn a song that was composed and written by a local villager over 80 years ago, describing the native flowers found on mountaintops with facets, for making sweet smelling *leis* (flower necklaces).

LEONE VILLAGE SONG:

*USI LELEI LAU SILASILA I NAI MANU O LE FOAGA MA SI TEINE O AVEOLELA O LE TEINE E FAIGATA LAGA ALI O MAUGA SA MOSOOI MAI MAUGA ULA LAUMAILE MAI I LE GA'OA E TE TEU AI POULA OI AUE LE TAUSALA LA E SU'E MAI SAU PA'AGA SU'E MAI SAU TAUPEGA AFA I LE TEINE MOSO'OIPALA (Vou, 2018)*

One final project can be ways to preserve our landmarks from pollution and how to be a resilient community when faced with natural disasters. Many harmful chemicals and contaminants that may poison the minerals in rocks necessary for plant growth, as well as drinking water from streams, should be made aware to students. People need to avoid dumping harmful chemicals on the earth or into the waters. They need to learn how to dispose of hazardous materials safely.

**Place-Based Problems:**

After natural disasters such as the recent Cyclone Gita, bats and birds have been in desperate search for food (Samoa News, 2018). Many of their food source have been destroyed by the hurricane. Bats in particular have been spotted out in the light of day scrounging on fruits of trees such as noni and the pandanus uncommon to them. The Tsunami of 2009 brought about debris and pollution to the wetlands, beaches and ocean of Leone. Trash and debris collected at

the base of the mangroves pose a threat to marine life and the filtration of contaminants that flow to our streams (Samoa News, 2017). A restoration of mangroves and the “pulu” tree is needed to prevent coastline erosion and storm surges.

**Conclusion:**

The development of this placed based paper using our backyard as a starting point has really opened our eyes to knowledge that wasn't known before. Much research and reading and more research in such a limited time frame has ignited in us curiosity and hunger for more depth of history and culture that we need to bring to life and make aware to our children before its goes extinct with that person that has the knowledge, but is kept secret, or finds it meaningless to share.

Moreover, to construct meaningful and engaging STEM based lessons that enrich students to think outside of the textbook and outside of the classroom. There were many information and photos that we wanted to include in our paper, but then again time was limited. But this paper can be the foundation for a continuation of research, and to build upon new knowledge and to develop a complete localized STEM place-based curriculum.

## References:

- A COASTAL ZONE MANAGEMENT ATLAS OF AMERICAN SAMOA. (1981). [ATLAS] American Samoa Archives, Tafuna.
- Ashcouncil.org. (2018). [online] Available at: <http://www.ashcouncil.org/wp-content/uploads/2014/09/A%20Brief%20Timeline%20of%20theHistory%20of%20American%20Samoa.p...> [Accessed 10 Jul. 2018]
- Ausage, T. and Aitaoto, T. (2009). *Ua Tala le Ta'ui, Untying the bundles of finemats*. American Samoa: Samoan Studies Institute, pp.38-41
- Enright, J. (2018). [online] Shouldbedigging.com Available at: <http://shouldbedigging.com/wp-content/uploads/2011/09/Enright-adze-production-Leone.pdf> [Accessed 10 Jul. 2018]
- Herdrich, D. (2018). *An explanation of what a quarry is and its historical importance; and briefly explains a theory he has written about how Samoans view boundaries versus the Caucasians*.
- Jps.auckland.ac.nz. (1992). *Journal of the Polynesian Society: Necromancing The Stone: Archaeologists And Adzes In Samoa, By Simon Best, Peter Sheppard, Roger Green And Robin Parker, P 45-85*. [online] Available at: [http://www.jps.auckland.ac.nz/document//Volume\\_101\\_1992/Volume\\_101%2C\\_No.\\_1/Necromancing\\_the\\_stone%3A\\_archaeologists\\_and\\_adzes\\_in\\_Samoa%2C\\_by\\_Simon\\_Best%2C\\_Peter\\_Sheppard%2C\\_Roger\\_Green\\_and\\_Robin\\_Parker%2C\\_p\\_45-85/p1](http://www.jps.auckland.ac.nz/document//Volume_101_1992/Volume_101%2C_No._1/Necromancing_the_stone%3A_archaeologists_and_adzes_in_Samoa%2C_by_Simon_Best%2C_Peter_Sheppard%2C_Roger_Green_and_Robin_Parker%2C_p_45-85/p1) [Accessed 10 Jul. 2018].
- Leach, H. and Witter, D. (1985). *Final Project Report on the Survey of the Tataga-Matau Fortified Quarry Complex, Near Leone, American Samoa*. [online] Core.tdar.org.

Available at: <https://core.tdar.org/document/224909/final-project-report-on-the-survey-of-the-tataga-matau-fortified-quarry-complex-near-leone-american-samoa> [Accessed 10

Jul. 2018]

Leone Midkiff WASC Report. (2016). Leone, American Samoa.

Samoa News (2018). Cyclone Gita affects American Samoa's bat and birdlife.

Samoa News (2017). Mangroves: Unappreciated heroes of land and sea

Scanlan, F. (2018). *Mauga Alii Adage*

Suafo'a, E. (2013). A Legend of Puna Mai and Puna Loa. *Oral History Collection from the Honorable Talking Chief Silivelio Suafo'a*, 1(1), p.3.

Suafo'a, E. (2018). *Samoan and Pacific History*.

Tino, T. (2018). *Culture Comparison Then and Now*

Uli, I. (2018). *Mauga Alii Adage*.

Uli, R. (2018). *Mauga Alii Adage*.

Vou, E. (2018). *Lyrics to song about flowers, mountains and facets in Leone*.