

2013

Food Security on Maui: Reinventing Agriculture in the Aloha State

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Recommended Citation

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**FOOD SECURITY ON MAUI: REINVENTING AGRICULTURE IN THE ALOHA
STATE**

by

JADE SILVER

SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE DEGREE
OF BACHELOR ARTS

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7 DECEMBER 2012

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Acknowledgements

I would like to acknowledge Rob Parsons and Ryan Earehart who were fundamental in helping me research this topic. I would like to thank Kana Costello-Ladoux for all the help he provided in developing and writing my thesis. I would like to acknowledge Professor Rick Hazlett, and Professor Nancy Neiman Auerbach, for taking time out of their busy schedules to help me edit my thesis. I would also like to give a special thanks to Char Miller for providing continual advice, encouragement, and help throughout the writing process. Lastly, I would like to give huge thanks to my friends and family for their support. In particular, I would like to thank Alyssa Boyle who spent countless hours by my side both motivating me and helping me de-stress.

Introduction

Growing up on Maui was an incredibly unique experience. My home in Kula, a rural agricultural town, is a short drive to sandy beaches, bamboo forests, a barren volcanic crater, and a plethora of other microclimates. Temperatures are consistently within the 80s, and the sun is always shining somewhere on the island.

While it may sound cliché, I never fully appreciated the beauty of Maui until after I returned to the island for my college summer and winter breaks. Standing on the deck of my house on the slopes of the Haleakala volcano, I could see the West Maui Mountains carved out by millions of years of erosion. Surrounding the lush greenery of the mountains was an artist's palette of hues; the deep blue of the sea, the sugar cane's bright green, and the reds and oranges of the setting sun. While I have seen this view thousands of times, this past summer the immense beauty of the landscape deeply resonated within me. Before this, I had never fully realized how my life on Maui has shaped me.

My appreciation towards Maui's natural landscape has been heavily influenced by my studies as an Environmental Analysis major. As I progressed in my education, I began to realize how vulnerable Maui is in terms of its environmental health. While Maui is known as a tropical paradise, it is threatened by overpopulation and urban sprawl, a loss of green space, sea level rise, invasive species, coral bleaching, and a myriad of other adverse environmental effects. This is particularly disconcerting because Maui's tourist economy is based on its environmental health. After studying Environmental Analysis at Scripps College, I realized the need to bring my studies back home.

Over the course of my college career, I have taken quite a few courses addressing food production, food politics, and agriculture. This subject has fascinated me, and therefore, I decided that I wanted to research food production on Maui. After tourism,

agriculture is Hawaii's biggest industry. Based on this, I suspected that Maui would be relatively self-sufficient in producing food to feed its population. After reading an article in the *Maui News*, however, I was shocked to discover that an estimated 92 percent of all the food consumed on Maui is imported.¹ This makes Maui extremely vulnerable to supply disruptions such as natural disasters and oil shortages. These factors will likely lead to higher priced food products for Maui's consumers. Despite this dependence on imported food, Maui's temperate climate makes it possible to grow crops year round. Maui also has a unique and diverse set of climatic conditions, weather patterns, and elevation levels that allow for many different types of crops to be grown.

My thesis focuses on the past, present, and future of food sustainability on Maui. I will begin by explaining ancient Hawaiian agriculture and how this complex system of agriculture was deeply rooted in the customs and traditions of the Hawaiian people.

In my second section, I will explore how this sustainable agricultural system changed after the arrival of Captain Cook in 1778. After western settlement, land that was once a communal resource became privatized. As land ownership shifted, the traditional subsistence agricultural system of Hawai'i began to change. Export crops such as sugar cane and pineapple dominated the land. As these crops shifted the way land was utilized in Hawai'i, the islands reduced the amount of crops grown for local consumption and became increasingly reliant on imported foods.

My last section stresses the necessity of increasing the production of locally grown food on Maui. I will discuss the locally grown food movement that has developed on Maui,

¹ "Measure Aims to Boost Local Supply of Food." *Maui News*. N.p., 5 Apr. 2012. Web. 23 Sept. 2012. <<http://mauinews.com/page/content.detail/id/559835/Measure-aims-to-boost-local-supply-of-food.html?nav=5031>>.

and address the obstacles that prevent more food from being grown locally. Lastly, I will suggest strategies to increase the amount of food produced for local consumption so that Maui can secure a more sustainable agricultural future.

PART I: Ancient Hawai'i Model of Subsistence Agriculture

Geography

The Hawaiian archipelago is comprised of eight major islands: Hawai'i, Maui, Kaho'olawe, Lana'i, Moloka'i, O'ahu, Kaua'i, and Ni'ihau, followed by a chain of hundreds of smaller islands spanning a distance of 1,500 miles. These islands owe their existence to an undersea magma source called a hotspot. Over time, the Pacific tectonic plate has drifted northwest over this stationary hotspot, slowly giving birth to new island volcanoes in this archipelago. Consequently, the youngest and most active volcano is found on the big island of Hawai'i at the southeast tip of this island chain.

Located in the middle of the Pacific Ocean, Hawai'i is the most isolated archipelago on earth. The eight major islands lie approximately 2,400 miles from California, 3,800 miles from Japan, and 2,400 miles from the Marquesas, the origin of Hawaii's first settlers. Hawaii's remote location explains why it was one of the last places in the world to be settled. It is often said that prior to Polynesian settlement, plants and animals could only have arrived by wind, waves, or wings.

Early Settlement

Through complex navigation of the stars and the sky, Polynesians successfully navigated the Pacific waters and settled in Hawai'i. It is believed that these first settlers left their island home of the Marquesas and landed in the Hawaiian Islands between 300 and 600 AD. Because these settlers did not have a written language, evidence of their lives

before western contact comes from archeological records, oral traditions, and written records by Captain Cook, the first individual to provide an account of native Hawaiian life.²

While the islands were lush with flora and fauna, there were few indigenous plants that could be consumed for food. There were some native ferns and berries that provided subsistence, but birds and fish likely provided the main sources of nourishment for the first settlers. On their voyage, these settlers brought with them the plants that they wished to cultivate in their new homeland. These crops included *kalo* (taro), *mai'a* (banana), *nui* (coconut), *ulu* (breadfruit), and *'uala* (sweet potato).³ Once they had established themselves in the Hawaiian Islands, subsequent voyages were made back to the Marquesas to acquire more crops. It is estimated that the Polynesians brought forty plant species in total to Hawai'i, combining their knowledge of introduced plants with the native plants of the *aina* (land).⁴ Early settlers found the islands heavily forested, leading them to inhabit areas near the shoreline where seafood was abundant and forest canopy thin. As more plants were introduced through subsequent voyages between Hawai'i and the greater Pacific, settlers cleared the dense jungle to make room for agriculture.⁵

Native Hawaiian Agricultural Complex

The Hawaiian's agricultural system is distinguishable from other island communities because of the *ahupua'a*, a unique method of subdividing land. The *ahupua'a* system was a land tenure system that gave the Hawaiians access to resources from both the land and the sea. The island was split in strips, from the top of the volcano, to the seashore. To account

² "Economic History of Hawai'i." *Economic History Services*. N.p., 1 Feb. 2010. Web. 06 Oct. 2012. <<http://eh.net/encyclopedia/article/lacroix.hawaii.history>>.

³ Te Rangi Hiroa. *Arts and Crafts of Hawaii*. Vol. 1. [Honolulu]: Bishop Museum, 1964. Print.

⁴ Vitousek, P. M. "Soils, Agriculture, and Society in Precontact Hawai'i." *Science Mag* 11 June 2004: n. pag. Web. 6 Oct. 2012.

⁵ Handy, E. S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui. *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Honolulu: Bishop Museum, 1972. 12. Print.

for the fact that some areas of the island were more abundant than others, larger tracts of land were parceled off in more arid, scarce zones. This ensured that each island community would have fair access to the land's resources. The *ahupua'a* system was ideal because it represented a sustainable way of living. Each piece of land had the necessities that the ancient Hawaiians needed to survive.

Ahupua'a were governed by chiefs or *ali'i ai ahupua'a* and overseen by land managers called *konohiki*. The *konohiki* ensured that the *ahupua'a* were being maintained, and that the resources in the *ahupua'a* were being consumed in a responsible manner.⁶ Within the *ahupua'a* system, a mutual give and take existed between the *ali'i* and the *maka'ainana*. The *maka'ainana* were required to tend to the land and pay taxes in the form of crops to the *ali'i*. In return, the *ali'i* gave the *maka'ainana* land tenure rights. Additionally, the *ali'i* interceded with the gods to ensure good harvests and to prevent natural disasters.⁷

The functioning of ancient Hawaiian society was dependent on the *ahupua'a*. Occasionally, there were trades between individuals of different *ahupua'a* to obtain specialty crops found in different regions of the island. Yet, these trades were not as common as the sharing among members of different zones in a single *ahupua'a*. An *ahupua'a* was comprised of many *'ohana*, or families. Between members of an *'ohana*, there were constant exchanges of resources. Family members living near the ocean would trade goods such as coconuts and fish for foods that grew at higher elevations such as breadfruit and taro.

⁶ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. Print. 225

⁷ "Kapu." *Kapu*. N.p., n.d. Web. 10 Nov. 2012. <<http://www.donch.com/lulh/kapu.htm>>.

Throughout Polynesia there have been two main types of agricultural systems: wetland and dry land. The native Hawaiian's development of these two systems was highly complex and was demonstrated by the multitude of crops cultivated throughout the varying climatic zones. Wetland agriculture is characterized by highly complex irrigation and drainage systems that occupied the valley and gulches of the windward sides of the islands where rainfall is abundant. Here, water sources were used primarily to cultivate wetland taro varieties. Wetland agriculture is an intensive agricultural system requiring water diversions for irrigation of wetland taro. Dry land agriculture, on the other hand, was defined by slash and burn farming and took place on the leeward sides of the islands where there are rolling hills. Dry fields were used to cultivate yams and breadfruit. Compared to wetland agriculture, the farming in dry regions was much more labor extensive.⁸

Among the crops that were cultivated, the most cherished were taro, sweet potato, and breadfruit. The ancient Hawaiians particularly revered taro, known in Hawai'i as *kalo*. They developed several hundred different cultivated varieties of taro, with certain types suited for dry land conditions and other varieties suited for wetland conditions. Wetland varieties of taro were grown by clearing a field for crop production. Once the ground was prepared, it was laid with branches and leaves, which allowed the soil to absorb nutrients. Eventually the perimeter of the taro patch was embanked with mud. It was then flooded and taro cuttings were planted in the muddy field. After two weeks, the field was drained and then flooded again two weeks later. This water remained in the taro patch until the taro was harvested a year later. In some areas where water was not readily available, dry land varieties of taro were cultivated instead. This cultivation was usually done at the beginning

⁸ Clark, Jeffrey T. "Continuity and Change in Hawaiian Agriculture." *Agricultural History* 60.3 (1986): 1-22. Web. 26 Oct. 2012. <<http://www.jstor.org/stable/3743652>>.

of the rainy season. Unlike wetland taro varieties, dry land taro cuttings were placed into holes in the soil. When these cuttings began to root, the holes were covered with soil.⁹ Wetland taro was more popular in ancient Hawai'i and to cultivate the crop, complex irrigation systems were developed throughout the islands. The Hawaiians dug channels in the ground that were used to return water from the flooded taro fields back to stream sources. This method of irrigation ensured that enough water was used for one farmer's needs and that excess water could be used by farmers downstream.

The native Hawaiians not only developed advanced crop cultivation techniques with taro but with other crops as well. In low elevations near the sea the soil was dry and very few crops grew favorably. Sweet potatoes and gourds, however, thrived in these arid conditions. This climatic zone was known as the *kula kai*, or the lowest agriculturally productive zone. Further up, in the *ko kula uka* zone, both elevation and moisture increased. Here, dry land taro and sugar cane thrived. Increasing in elevation was the *kula* zone, characterized by rolling hills. Here, upland taro, wild bananas, and wild yams could be found.¹⁰

The tools used by the native Hawaiians for farming were relatively simple. The main implements used for agriculture were one's hands occasionally augmented by the use of digging sticks. Despite the simplicity of tools used, the agricultural methods used by the native Hawaiians were complex compared to their Polynesian counterparts. The Hawaiians terraced the land for taro cultivation and employed techniques such as dry land farming, mulching, manuring, and hybridization to develop new varieties of crops. The ancient

⁹ "Taro." *Hawaii History*. N.p., n.d. Web. 27 Sept. 2012.
<<http://www.hawaiihistory.org/index.cfm?fuseaction=ig.page>>.

¹⁰ Handy, Edward Smith Craighill., and Mary Wiggan Pukui. *The Polynesian Family System in Kau, Hawaii*. [New Ed.]. Honolulu, HI: Mutual, 1978. 20-21. Print.

Hawaiians were also able to adjust their farming techniques based on soil type, weather patterns, and altitude.¹¹ In other Polynesian islands, farming was much less intensive. Once crops were planted, the amount of work needed until the harvesting of the crop was minimal. In Hawai'i, however, the farmers were constantly tending to the *aina* (land).¹²

Farmers were finely in tune with Hawaii's weather patterns and based their agricultural practices on this knowledge. They divided the year into two different growing seasons, a warm season and a cooler season. The warmer agricultural season, known as the *kau*, took place during the months of May through October, and was characterized by frequent trade winds. The cooler and wetter agricultural season called the *ho'oilo* spanned the months of November through April. The ancient Hawaiians timed when to plant on the basis of these two seasons. Staple crops such as sweet potato were ready for consumption around the month of June, during the *kau*, while other crops could be harvested in the winter months. Furthermore, the ancient Hawaiians also used the phases of the moon as a basis for when to plant and harvest. The astute knowledge and monitoring of weather patterns demonstrates that the Hawaiians were constantly tending to their crops.

The ancient Hawaiians developed a complex system of sustainable agriculture. They were able to harvest crops, but realized the impact of over-consumption. In order to ensure that there were enough resources for future seasons, island priests placed *kapu* (taboo) on fishing and the harvesting of plants during certain times of the year. The *ali'i* had control over which plants and animals were harvested and consumed, thus ensuring that resources would not go scarce. The *ahupua'a* system, diversified crop production, and strict laws monitoring fishing and harvesting demonstrate ways in which the ancient Hawaiians lived in

¹¹ Ibid

¹² Ibid.16.

harmony with their environment. The native Hawaiian's deep connection with the land is an example of *aloha 'aina*, which literally translates to a "love of the land". The idea of *aloha 'aina* represents environmental ethic lost in today's modern agriculture.¹³

Population Dynamics

As more settlers arrived on Hawaiian soil, and as subsequent generations were born, more land was cleared and tilled for agricultural purposes. This agricultural intensification is evidenced by irrigated taro *lo'i* (flooded taro patches) and their associated *au'wai* (water canals connecting the streams to the *lo'i*) which exist in the upper valleys on many of the islands. While modern development has not reached these areas, the ancient Hawaiians manipulated this land extensively for agricultural purposes.¹⁴

This elaborate agricultural system supported a sizable population. While population estimates before western contact are all approximations, it is believed that the island of Maui supported a population of over 120,000 people, or 170 people per square mile before the arrival of Captain Cook in 1778. Other population calculations estimate that there were more than 260,000 native Hawaiians living on Maui. This demonstrates that population figures vary greatly.¹⁵ It should be noted that as of 2010, the island of Maui supported 154,834 residents, while receiving 2,092,069 visitors per year for an average length of stay of 8 days.¹⁶ $2,092,069 \text{ visitors per year} \times 8 \text{ days per visitor} = 16,736,552 \text{ visitor days per}$

¹³ "Hawaiian Language." N.p., 1997. Web. 02 Dec. 2012. <<http://www.aloha-hawaii.com/hawaii/language/>>.

¹⁴ Dye, Tom. "Population Trends in Hawai'i Before 1778." *Hawaiian Journal of History* 28 (1994): n. pag. Web. <<http://hdl.handle.net/10524/482>>.

¹⁵ Stannard, David E. *Before the Horror: The Population of Hawai'i on the Eve of Western Contact*. Honolulu, HI: Social Science Research Institute, University of Hawaii, 1989. Print.

¹⁶ Hawai'i Small Business Development Center, and Hawai'i Business Research Library. Rep. Comp. County of Maui Office of Economic Development. N.p., 2011. Web. Dec. 2012. <<http://hisbdc.org/Portals/0/MCDB/2011/PDF/2011%20Maui%20Data%20Book%20reduced%20size.pdf>>.

year / 365 days per year = a yearly average of 45,853 visitors per day. So on any given day the island of Maui hosts an average of 200,000 residents and tourists combined.

While population numbers on Maui are approximate, the agricultural system maintained by the native Hawaiians suggests that the diets of the Hawaiian people were quite nutritious. In his journals, Captain Cook noted that Hawaii's inhabitants were "above the middle size' of Europeans, a rough indicator that Hawaiians generally had a diet superior to eighteenth-century Europeans."¹⁷ While we cannot be certain of all of the agricultural techniques utilized by the ancient Hawaiians, the size of this population suggests the agricultural methods were capable of sustaining a sizable and healthy population.

Hawaiian Mythology

The native Hawaiians practiced a complex system of subsistence agriculture that was deeply rooted in religious worship and societal rules. According to Hawaiian mythology, the first-born son of *Papa* (earth mother) and *Wakea* (sky father), was a premature stillborn by the name of *Haloa-naka*. Unable to survive, *Papa* buried him in the ground. Surprisingly, the first taro plant grew out of his navel. The second born son of *Papa* and *Wakea*, also named *Haloa*, survived to become the original ancestor of the Hawaiian people. He was charged with the *kuleana* (responsibility) of his older brother. Thus, it is said that the younger brother that is mankind must take care of and protect his older brother that is taro,

¹⁷ "Economic History of Hawai'i." *Economic History Services*. N.p., 1 Feb. 2010. Web. 06 Oct. 2012. <<http://eh.net/encyclopedia/article/lacroix.hawaii.history>>.

so that in turn the older brother can take care of and nourish his younger brother. This is a prime example of the native Hawaiian's *aloha 'aina*.¹⁸

The people of Hawai'i attributed much of their agricultural prosperity to their gods, *Kane*, *Kanaloa*, *Lono*, and *Ku*. Each of these gods represented different eras of settlement within the islands, and were responsible for introducing different plants and animals to Hawai'i. *Kane*, the god worshiped by the first inhabitants of Hawai'i, is associated with taro, sugar cane, and bamboo. Thus, it is believed that these were the first crops brought to the islands. The god *Kanaloa* followed *Kane*, and brought bananas to the islands. *Ku* is associated with the coconut tree and the breadfruit. These crops were not staples among the first settlers of Hawai'i, and therefore, it was believed that these crops made their way to Hawai'i during later voyages to the islands. The god *Lono* is linked with the sweet potato and gourd. Because *Lono* is not linked to any of the creation myths, it is believed that *Lono* came to the islands once an agricultural system was already established. The attribution of different crops to different gods represents the immense ties between agriculture and religion. For native Hawaiians, the two were inseparable.

The ties between religion and agriculture are further demonstrated by the celebration of the *Makahiki* festival. The *Makahiki* was a four-month-long celebration from October to February that commemorated the annual return of *Lono*, and honored the sustenance that he provided. Besides being linked to sweet potato and the gourd, *Lono* was also recognized as the god of peace, music, fertility, agriculture, and rainfall. The *Makahiki* festival began with a collection of offerings made by the high chiefs who were representatives of *Lono*. It was believed that these offerings would lead to a bountiful and plentiful new year. Until these

¹⁸ Handy, E. S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui. *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Honolulu: Bishop Museum, 1972. 331. Print.

offerings were received, a *kapu* was set on the land, limiting the harvest of crops. After all the contributions had been received, the *kapu* was lifted and the people of Hawai'i partook in feasting and games.¹⁹

The ancient Hawaiians were deeply connected to the land, and as a result, many common Hawaiian words are linked to environment. The word '*oha* (taro sprout) is rooted in the word '*ohana* (family), demonstrating the belief that life was derived from taro. The word *aina* (land) is composed of two parts, '*ai* (to feed) and the suffix *na*. The word *aina*, therefore, connotes sustenance. Additionally, the word *aina* is also found in the words *maka'ainana* (island commoner), and *kama'aina* (island native). The *maka'ainana* therefore, were the commoners who tended to the land, while the *kama'aina* were the children of the land.²⁰ The interrelation between the ancient Hawaiian's religion, culture, language, and agriculture demonstrates their intrinsic relationship to the natural environment.

The development of agriculture by pre-contact Hawaiians was sophisticated and successful in both its productivity and sustainability. However, this sustainability was lost over the last 200 years due to a number of environmental, ecological, economical, cultural, and socio-political changes following western contact in Hawaii.

¹⁹ Handy, E. S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui. *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Honolulu: Bishop Museum, 1972. 331. Print.

²⁰ Ibid. 18.

PART II: A Changing Landscape

Western Settlement

In 1778, Captain Cook and his crew became the first westerners to set foot on the shores of Hawai'i. Cook's discovery of the islands sparked a new era of exploration to Hawai'i and the greater Pacific. As ships and seamen became increasingly common within the islands, their ideals, culture, and values began to infiltrate Hawai'i. The incorporation of western customs changed island life significantly.

Westerners introduced new animals and plant species to the islands at an unprecedented rate. During the first 1,500 years of Hawaiian inhabitation, about 40-50 plant and animal species were brought to the islands. Within the first century following western contact, about 175 alien plants and animals were added to the landscape.²¹ Goats and cattle were two introduced animals that were particularly harmful to native vegetation. These animals roamed throughout the islands clearing vast plots of land and crushing native vegetation in the process.

In addition to non-native plants and animals, westerners brought disease, which led to a sizable population decline and destruction within the islands. When westerners arrived, the native Hawaiians had no immunity to foreign illness: syphilis, gonorrhea, tuberculosis, and influenza, took huge a toll on the their population. As more westerners began to settle in Hawai'i, measles, whooping cough, dysentery, and smallpox ravaged the native

²¹ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 146. Print.

population.²² By 1823, it was estimated that 40 percent of the native Hawaiian population had died from illness introduced by westerners.

This sizeable population decline reduced the amount of people who were able to work in the fields, which decreased agricultural output and led to the abandonment of many agricultural lands.²³ By 1848, the native Hawaiian population had plummeted to only 88,000 people.²⁴ This severe population decline, coupled with the prevalence of western culture disrupted the balance of a once thriving and sustainable system of agriculture.

The Sandalwood Trade

One of the first major changes to the ancient Hawaiian agricultural system was the sandalwood trade. Beginning in 1810, large quantities of sandalwood began to be harvested for profit. There was a high demand for the prized wood, especially by the Chinese for incense and woodworking. From 1812 to 1830, the sandalwood trade peaked in the islands. As a result, huge tracts of forests were cut down to meet this demand.

The intense harvesting of sandalwood led to severe changes in the natural landscape as well as changes within Hawaiian society. By 1827, the *maka'ainana*, or the Hawaiian commoners, were required to harvest sandalwood to pay off a \$500,000 debt that was owed by Kamehameha II for purchases spent on American goods. As a result, traditional agriculture was abandoned and plots of land were neglected. Island *ali'i* ordered the

²² Stannard, David E. "Disease and Infertility: A New Look at the Demographic Collapse of Native Populations in the Wake of Western Contact." *Journal of American Studies* 24.3 (1990): 25-50. *Journal of American Studies*. Web. 26 Oct. 2012. <<http://www.jstor.org/stable/27555362>>.

²³ *The Effects of European Contact on Hawaiian Agricultural Systems - 1778-1819*. Ross H. Cordy. *Ethnohistory*, Vol. 19, No. 4 (Autumn, 1972)

²⁴ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 173. Print.

maka'ainana to burn forested areas so that the fragrance of the sandalwood could be detected.²⁵

As sandalwood became even scarcer, trips to acquire the wood became increasingly lengthy. This meant that agricultural lands were left unattended for extensive periods of time, and eventually, in 1811, widespread famine hit the islands.²⁶ Despite food shortages, sandalwood continued to be logged until 1830, when the industry completely collapsed due to overharvesting.

In addition to famine, the mass harvesting of sandalwood led to the dispersion of the native Hawaiians. As trees were harvested for timber, the natural landscape changed and communities that had thrived among this landscape were no longer able to live in homeostasis. According to Reverend William Shipman in *The Polynesian Family System in Kau, Hawaii*, the sandalwood trade resulted in the scattering of communities and the abandonment of agricultural pursuits. Taro patches were neglected, houses were deserted, education neglected, meetings forsaken, and the people were becoming barbaric.²⁷

Whaling

As the sandalwood industry began to decline due to a diminishing number of trees, the whaling industry took its place. In the 1820s, Hawai'i emerged as one of the world's leading whaling sites. In the following years, an increasing number of whaling ships entered the Hawaiian Islands to take part in the industry. Although whaling did not have firsthand effects on the terrestrial landscape, it created a market for providing food goods to ships.

²⁵ "Hawai'i Timeline." *Hawaii History*. N.p., n.d. Web. 03 Nov. 2012. <<http://www.hawaiihistory.org/index.cfm?t=1>>.

²⁶ *The Effects of European Contact on Hawaiian Agricultural Systems - 1778-1819*. Ross H. Cordy. Ethnohistory, Vol. 19, No. 4 (Autumn, 1972)

²⁷ Handy, Edward Smith Craighill, and Mary Wiggin Pukui. *The Polynesian Family System in Kau, Hawaii*. [New Ed.]. Honolulu, HI: Mutual, 1978. 241. Print.

On the islands, livestock, vegetables, and firewood were sold to meet the demands of the sailors. New crops such as potatoes, onions, melons, cucumbers, beans, cabbage, and oranges were cultivated to satisfy western palates. Local crops such as taro and yams were continually grown and traded among sailors, but in a much lesser volume than these newly introduced food sources.

While the sandalwood trade had changed the landscape through clear cutting and agricultural abandonment, the whaling industry brought demand for new plants and animals within the islands. These new plants took the place of traditional agricultural crops. The whaling industry continued to flourish well into the 1840s and 1850s and with it the land use within the islands was increasingly altered.

A New Type of Agriculture

As the culture of Hawai'i began to change due to western influences, the landscape transformed as well. In 1839, Irish potatoes were introduced to Hawai'i and began to be cultivated on a large scale. Sailors were accustomed to eating potatoes on their voyages, and as whaling arose as an industry within the islands, the demand for the crop increased. The production of potatoes peaked during the California Gold Rush in 1849. In the following years, thousands of pounds of potatoes were shipped to California to feed gold miners. In 1858, missionary Lorenzo Lyons reported that thousands of acres of land were being converted for potato cultivation.²⁸ Although taro was still favored as a staple crop by Hawaiians, potatoes were preferred as a trade item, and subsequently, potatoes began to take over the areas where taro was traditionally produced.

²⁸ Clark, Jeffrey T. "Continuity and Change in Hawaiian Agriculture." *Agricultural History* 60.3 (1986): 1-22. Web. 26 Oct. 2012. <<http://www.jstor.org/stable/3743652>>.

In addition to the non-native plants being brought to the islands, non-native animals had dramatic effects on the landscape. Captain George Vancouver of the British Royal Navy introduced cows to the island of Hawai'i in 1793. Vancouver worked with King Kamehameha to set a *kapu* on the cows prohibiting their slaughter for a period of ten years, ensuring that the cattle would reproduce. Eventually, the cattle population grew so large that cattle freely roamed and grazed around the island and regularly entered farms destroying many crops and leading to the abandonment of many fields. At first, the effects of cattle on the land were minimal. However, by the mid 1830s the cattle population became so large that a business was born out of domesticating feral cattle.²⁹ This new industry further changed land use within the islands, and many acres of land that had been previously used for farming were converted to ranch land.

As *haoles* (Caucasians) began to settle the islands, traditional agriculture had to adapt to suit foreign food preferences. Westerners were not accustomed to many of the dishes that were prepared by the native Hawaiians. For missionaries, food was another item that separated them from the Hawaiians. They believed that many of the foods that were being consumed by the Hawaiians led to "laziness, gluttony, and sin, and further separated them from the 'civilized' behavior of foreigners like themselves." One missionary, Reverend Cochran Forbes, believed that *poi*, made from the pounded taro root and water, required little work, and therefore, led Hawaiian's to devote the "rest of their time... in lounging about or in scenes of wickedness."³⁰

²⁹ Ibid.

³⁰ Kashay, Jennifer Fish (07/01/2009). "Missionaries and Foodways in Early 19th-Century Hawai'i." *Food & Foodways* (0740-9710), 17 (3), p. 159.

Missionary Influence

The rise in the whaling industry was accompanied by the arrival of Protestant missionaries who arrived in Hawai'i in 1820. The missionaries' settlement in Hawai'i was auspicious for the traditional *kapu* law system that had governed the islands had been abandoned a year earlier. The *kapu* system in Hawai'i regulated all aspects of life from gender roles, politics, religion, and structured the life of the 'ohana. While the *kapu* system had defined the way people in Hawai'i lived, the native Hawaiian had begun to lose faith in their gods in a time of rampant disease and rapid population decline. Protestant missionaries were quickly able to win over the Queen Ka'ahumanu and convince her to abandon the system.

Protestant ways of life soon began to appear in Hawaiian society, and had an enormous role in altering traditional Hawaiian life. While the primary goal of the missionaries was to Christianize the Hawaiian people, missionaries left their mark on society in other ways as well. While missionary views often clashed with the views of the whalers who were eager to get their hands on alcohol and prostitutes, both groups agreed on one thing; changes were needed in the landholding system. The two groups allied together to pressure King Kamehameha III, who governed Hawai'i from 1825 to 1854, to make changes within the land tenure system. Westerners believed that everyone would benefit from the privatization of land, and missionaries argued that the "*maka'ainana* would become thrifty and industrious farmers and give up their indolent and sinful habits if given their own land."³¹

³¹ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 174. Print.

Missionary and whaling pressures eventually led to the Great *Mahele* of 1848. This event further altered the lives of the native Hawaiians and the landscape they inhabited. Before 1848, land was thought of as a communal resource that provided a shared source of subsistence for everyone. The Great *Mahele*, meaning land divide, changed the traditional way of communal land management and allowed for land to be bought and sold. Missionaries convinced Hawaiians that *ahupua'a* system was one of the things that resulted in population decline. They persuaded chiefs that privatization of land would help ensure that land would be protected and maintained in a time of increased colonization by the British, French, and Americans. The Great *Mahele*, however, did not go as the missionaries advised or the Hawaiians had hoped. Foreigners had the upper hand in purchasing land because they held much of the money within the islands.

The *Mahele* marked a shift from a subsistence economy to a capitalistic economy and is a key event that led to the altering of Hawaii's food system. One of the major consequences of land privatization was that large tracts of land could be acquired for the development of agriculture.³² While this seemingly would help promote food-self sufficiency within the islands, it instead allowed for westerners to establish large monocultures. Instead of a varied landscape, just a few crops dominated the islands. These crops were not used to feed the native and western populations that now mutually inhibited Hawai'i, but were instead shipped off as exports.

The Great *Mahele* not only physically changed the landscape, but had significant cultural implications as well. The Great *Mahele*, gave the *maka'ainana* an increased amount of freedom. They were no longer tied to the land and required to pay taxes to the *ali'i*. As a

³² Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 225. Print.

result, many Hawaiian commoners chose to adopt new professions rather than sticking to farming which was labor intensive and time consuming. As commoners began engaging in new types of work, they were no longer bound to the land. Caroline Ralston describes the changes that the Hawaii's working class experienced after the arrival of Captain Cook.

Between 1778 and 1854 life patterns from the *maka'ainana* changed from those of affluent subsistence farmers who were self-sufficient in terms of nearly all the essentials of life, albeit in a politically rather unstable world, to those of a class of unskilled and predominantly landless peasants who were dependent on their labour to supply the food and increasing number of goods of foreign origin necessary to sustain life.³³

As the years progressed, agricultural land found its way into the hands of westerners. In 1893, foreigners owned 90 percent of Hawaiian land.³⁴ For every acre owned by native Hawaiians four acres were owned by westerners.³⁵

Corruption

Western influence and the sandalwood trade led to political corruption among the high chiefs and commoners. As westerners began to bring guns, alcohol, clothing, and other luxury goods to Hawai'i, trade between the *ali'i* and the westerners became common. Foreign goods were seen as a status symbol among the *ali'i* and were used to augment traditional ways of life. As these items made their way into society, faithful rulers became increasingly corrupt. The *ali'i* had little compassion for the *maka'ainana*, and they ordered these workers to continually log sandalwood so that they could invest in foreign trade. In

³³ Ralston, Caroline. "Hawaii 1778-1854: Some Aspects of Maka'ainana Response to Rapid Cultural Change." *The Journal of Pacific History* 19.1 (1984): 21-40. Web. 28 Oct. 2012. <<http://www.jstor.org/stable/25168538>>.

³⁴ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 173. Print.

³⁵ Daws, Gavan. *Shoal of Time; a History of the Hawaiian Islands*. New York: Macmillan, 1968. 128. Print.

many areas, planting ceased, and the only food that was harvested was to meet the demands of the *ali'i* and their *konohiki*.³⁶

These political changes led to devastating consequences. Not only did the logging of sandalwood result in famine and population decline, but it also led to severe cultural impacts. The desire for sandalwood led to the corruption of the *ali'i*, and as a result, the fabric of Hawaiian society was drastically altered. The relationship between the *ali'i* and the *maka'ainana* was no longer a relationship based on a mutual giving and receiving, but rather, a relationship based on the exploitation of the working class by the ruling class.

Before the widespread corruption of the *ali'i*, a complex social structure was held within the Hawaiian society. In terms of agriculture, the relationship between the *maka'ainana* and the *ali'i* was one of mutual give and take. Exploitation of the *maka'ainana*, however led to a significant decline in crop production, and many *kapu* that were once established by the *ali'i* were no longer held in place. As westerners became more prominent in Hawaii's society, the fabric of the *ahupua'a* system began to change. Instead of relying on the sharing of resources within a common *ahupua'a*, trades were becoming more and more frequent with westerners to achieve foreign goods.

The fabric of the *ahupua'a* system was not the only agricultural custom that had become obsolete. Many of the religions and cultural traditions that were tied to agriculture were lost as well. According to Handy,

The gods of harvest were no longer honoured in the great winter festival of the *Makahiki*, at which time the produce of the land had been ceremonially divided between the gods, the *ali'i* and the people. The long

³⁶ Handy, Edward Smith Craighill., and Mary Wiggin Pukui. *The Polynesian Family System in Kau, Hawaii*. [New Ed.]. Honolulu, HI: Mutual, 1978. 235. Print.

season of labour no longer culminated in the refreshing and invigorating social season of athletic games and dancing.³⁷

The shifting of the Hawaiian culture under the influence of foreigners demonstrates a “paralysis of a once integrated culture.”³⁸

The Rise of Sugar Cane

Many introduced crops altered the landscape of Hawai'i, but no crop had as great an effect on the *aina*, as did sugar cane. As the whaling industry began to dwindle, businessmen began to turn to sugar which was seen as a more stable activity. Sugar cane or *ko*, was one of the plants introduced by the first Polynesian settlers of Hawai'i. This crop however was not a staple, but rather a sort of snack food chewed on for its sweet taste.³⁹ This was a subsidiary crop throughout ancient Hawaiian history, and it was not until the arrival of immigrants that there was a rise in sugar cane production.

A Chinese immigrant established the first sugar cane mill on record in 1802.⁴⁰ Thereafter, more mills began to sprout up throughout the islands. As the years progressed, the demand for sugar was realized, and the production of sugar cane increased. In 1837, Hawai'i sugar began to be exported. “By 1847, eleven sugar manufacturers were exporting about 300 tons, and by 1860 that production had more than doubled.”⁴¹ The first biggest surge that led to a significant increase within the sugar industry was the California gold

³⁷ Handy, Edward Smith Craighill, and Mary Wiggin Pukui. *The Polynesian Family System in Kau, Hawaii. New Ed.J.* Honolulu, HI: Mutual, 1978. 20-21. Print.

³⁸ IBID

³⁹ Te Rangi Hiroa. *Arts and Crafts of Hawaii*. Vol. 1. [Honolulu]: Bishop Museum, 1964. Print.

⁴⁰ "Hawai'i Timeline." *Hawaii History*. N.p., n.d. Web. 03 Nov. 2012. <<http://www.hawaiihistory.org/index.cfm?t=1>>.

⁴¹ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 175. Print.

rush. The gold rush of 1848 led to a greater demand of sugar by the west coast.⁴² As a result, within the following year, the islands produced 499,533 pounds of sugar for exportation.⁴³

The commencement of the American Civil War in 1861 sparked an even greater demand for sugar cane production. California could no longer rely on sugar cane from the southern states, and looked to Hawai'i to satisfy its sweet tooth. Following the civil war, the market became increasingly lucrative with the passing of the Reciprocity Treaty between the United States and Hawai'i in 1876. This treaty allowed for Hawaiian sugar to be shipped to the United States duty free, and in exchange, imported American goods were not taxed.⁴⁴

The demand for sugar coupled with beneficial treaties favoring sugar production in Hawai'i led to sugar cane becoming Hawaii's main cash crop. The prosperity brought by the sugar industry was only briefly interrupted from the years 1891-1894 when the U.S. McKinley Tariff Act was passed. The tariff removed all taxes on imported sugar, which no longer gave Hawai'i an edge in the United States sugar market. Close ties, however, were fostered between the United States and Hawai'i at this time, and investments were made in irrigation and more efficient methods of production.⁴⁵ The expansion of the sugar cane industry led to the increased need for cheap labor, yet the Hawaiian population which had steeply declined, could not provide the workforce. As a result, immigrant labor began to be used in the plantation fields. In the late 19th and early 20th century, workers were brought from China, Japan, Portugal, Korea, and the Philippines to work in the sugar cane fields.

⁴² Coulter, John Wesley. *Land Utilization in the Hawaiian Islands*. Honolulu, HI: Printed by the Printshop, 1933. Print.

⁴³ "Hawai'i Timeline." *Hawaii History*. N.p., n.d. Web. 03 Nov. 2012. <<http://www.hawaiihistory.org/index.cfm?t=1>>.

⁴⁴ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 175. Print.

⁴⁵ *Ibid.*

These new plantation workers changed the dynamic of Hawaii's population. Although many sugar cane workers returned to their native homes after their work contracts were up, many plantation workers chose to stay in Hawai'i, creating a multicultural society.⁴⁶

The sugar economy was one of extreme fluctuation based on the various treaties and agreements between Hawai'i and the rest of the world. When the McKinley Tariff Act was enacted, plantation owners saw huge profits. Although this act was later repealed, Hawai'i strengthened its ties with the United States, which gave Hawai'i an advantage over other sugar economies. Further relief came in 1898, when Hawai'i was annexed to the United States. This helped establish a steady supply and demand between the islands and America and led to continued growth of the industry. The annexation of Hawai'i by the United States further fostered the business relations between the two regions. Mainlanders saw the opportunity for profit and invested large sums of money in sugar cane.⁴⁷

While the sugar industry was widespread within the Hawaiian Islands, westerners largely dominated the market. Alexander & Baldwin, Amfac (American Factors), C. Brewer, Castle & Cooke and Theo Davies, or "Big Five" had control over the sugar cane market. Many of these businessmen started off supplying goods for whaling ships, but switched to the sugar cane industry when they realized the potential profits. Eventually, the "Big Five" collectively controlled all aspects of the sugar cane industry, including, planting, harvesting, processing and exporting. The Great *Mahele* allowed for the relocation of natives so that valuable land could be utilized for the production of sugar cane. Laws such as this one further disrupted traditional ways of Hawaiian life.

⁴⁶ "The Mahele to the Overthrow (1848-1893)." *Hawaii History*. N.p., n.d. Web. 03 Nov. 2012. <<http://www.hawaiihistory.org/index.cfm?t=1>>.

⁴⁷ Coulter, John Wesley. *Land Utilization in the Hawaiian Islands*. Honolulu, HI: Printed by the Printshop, 1933. 65. Print.

The Rise of Pineapple

While sugar cane became the dominant crop in the islands, pineapple soon became a lucrative addition to agricultural production in Hawai'i. It is unknown when pineapple (*'halakahiki*) first arrived in Hawai'i. The first documented harvests of pineapple were by Spanish navigator Francisco de Paula Marin in the early 1800s. While pineapple was successfully harvested at this time, the rise in popularity of the crop did not emerge until the late 19th century.

In 1900, American businessman James Drummond Dole, arrived to Hawai'i and purchased a 61-acre lot in Wahiawa, Hawai'i where he established Hawaii's first pineapple plantation. At this time, there was little demand for pineapple worldwide. Dole, however, knew that pineapple grew well in Hawaiian soil and through strategic advertising and the recent advancements made in canning, Dole successfully marketed pineapple as an export crop.

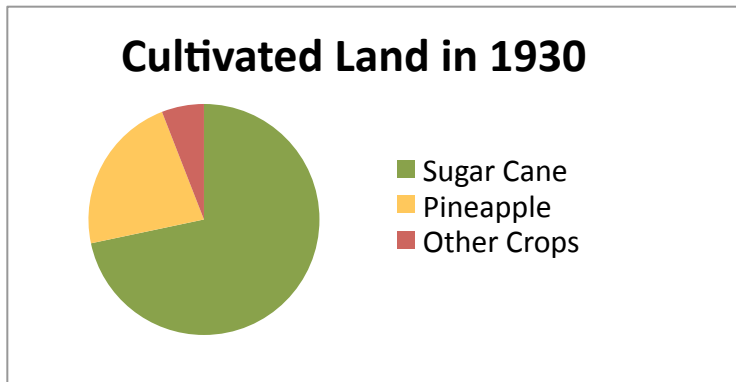
In 1901, Dole created the first pineapple cannery, which allowed pineapple to be preserved for long periods of time. This made it possible to ship the exotic fruit off to Europe and American consumers. While canning made pineapple readily available, very few people knew how to use the fruit, and therefore, marketing was essential to promoting sales of the product. Dole joined forces with other pineapple distributors in Hawai'i to advertise pineapple by creating new recipes for the fruit such as pineapple upside down cake and pineapple pie. Soon, pineapple became incorporated in common recipes across the United States.⁴⁸

⁴⁸ "History of the Pineapple." [Http://doleplantation.com](http://doleplantation.com). N.p., n.d. Web. 2 Oct. 2012.

The pineapple business continued to flourish, and in 1922, Dole expanded his enterprise by purchasing the island of Lana'i for pineapple cultivation. By 1930, pineapple became the second most lucrative industry in Hawai'i⁴⁹, and Hawai'i became the world's leading producer of pineapple, growing 80 to 85 percent of the world's supply.⁵⁰

Plantation Crops

The production of sugar cane and pineapple in the islands boosted Hawaii's economy immensely. These booming businesses, however, impacted nearly all aspects of society, and huge crop yields did not come without consequences. In 1930, sugar cane represented 71.69 percent of the total acreage of cultivated land and pineapple represented 22.39 percent of total acreage of cultivated land. At this time, less than 6 percent of agricultural land available for the production of other crops.⁵¹



This lack of diversified agriculture was recognized as early as 1901 when a U.S. agricultural experiment station was established in Hawai'i. The experiment station devoted "its principal attention to the demonstration of the possibility of growing crops other than

⁴⁹ Ibid.

⁵⁰ Coulter, John Wesley. *Land Utilization in the Hawaiian Islands*,. Honolulu, HI: Printed by the Printshop, 1933. Print.

⁵¹ Ibid.

sugar.”⁵² At this time, the only agricultural related industries that existed within the island were sugar, cattle raising, rice, taro, pineapple, and coffee. Rather than promoting diversified agriculture to ensure self-sufficiency, diversified agriculture was supported so more potential cash crops could be produced and exported if sugar cane and pineapple no longer proved to be lucrative.

In addition, even though many people wanted to move away from a system of monoculture, the power and expanse of the sugar cane industry overshadowed many of these interests. Sugar cane was simply too much of a force to be reckoned with. Despite this, even in the 1930s the harms of being reliant on export crops were recognized. According to John Coulter in *Land Utilization in the Hawaiian Islands*, “The people of the Territory are not yet paying enough attention to their personal exchequer; are not keeping among themselves money that they might keep in circulation here.”⁵³ This idea was voiced again by members of a commission from the federal government in Washington. After visiting the islands they observed:

It is neither socially, industrially, nor economically wise for Hawai’i to import such a proportion of its total food supply as it does now... The distance between Hawai’i and the mainland of the United States, or any other country for that matter, is so great that importations of articles necessary for the sustenance of life and the ordinary comforts of living add so greatly to the cost of these things that eventually these living costs will defeat the purposes of a cheap labor supply drawn from no matter where.⁵⁴

Even at this early time it was realized that Hawaii’s isolation made it impractical to rely on such a sizable amount of imported goods. Sugar cane however, was so profitable that businessmen could not fathom using the land for other purposes. As a result of an increase

⁵² Ibid.

⁵³ Coulter, John Wesley. *Land Utilization in the Hawaiian Islands*,. Honolulu, HI: Printed by the Printshop, 1933. 126. Print.

⁵⁴ Ibid.

in land devoted to plantation crops, Hawai'i began to see a loss of small-market, locally grown crops. Monoculture crops proved to be more profitable than growing a diversity of crops on a smaller scale for the consumption within the islands. Because an emphasis was placed on large-scale agriculture, markets for locally grown crops were never highly developed.⁵⁵

As the land tenure changed within Hawaiian society, Hawai'i shifted from a self-sufficient subsistence based economy to an economy that based its wealth on the production of exports. In 1874, before the Reciprocity Treaty was passed, \$1,311,000 worth of imports arrived in Hawai'i while exports totaled \$1,773,000. Ten years later, in 1884, \$4,638,000 worth of imports arrived in Hawai'i, and \$8,095,000 worth of goods were exported. 50 years later, in 1924, \$78,652,000 worth of imports arrived in Hawai'i, while \$109,889,000 worth of goods were exported. In 1974, 99 years later, \$2,471,700,000 worth of imports arrived in Hawai'i, while exports totaled \$932,200,000. These statistics show the trends of imports and exports over time, and demonstrate the shift of Hawaii's economy. As plantation crops became more and more prevalent, Hawaii's wealth was increasingly defined by its exportations. As a result of being financially dependent on export crops, Hawai'i became reliant on food imports. The import and export data show that over time Hawai'i had to significantly increase its amount of imports.⁵⁶

As export crops began to dominate the Hawaiian landscape, the Hawai'i people no longer had the same diversified agricultural system that they had once established. As cane fields and pineapple spread amongst the landscape, there was less and less room to produce

⁵⁵ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 251. Print.

⁵⁶ "Hawai'i Timeline." *Hawaii History*. N.p., n.d. Web. 03 Nov. 2012. <<http://www.hawaiihistory.org/index.cfm?t=1>>.

food to feed Hawaii's population. As a result food had to be imported in to sustain Hawaii's people. Considering that the value of agricultural exports declined from the 1920s throughout the 1970s while imports increased, it was only a matter of time before Hawai'i would be exploited by a much needed tourism industry to replace an increasingly unprofitable agricultural sector.

Rapid Expansion of Tourism

A rapid rise of tourism in the mid twentieth century also led to a significant change of land utilization in Hawai'i. Hawai'i became the 50th state in 1959, the same year in which air flights were first offered from the West Coast to Honolulu. As a result, a huge influx of travelers began to visit the islands for vacations. Hawai'i was seen as a safe, yet exotic escape for many Americans and for foreigners as well. In 1960, a total of 296,294 people visited the islands. Ten years later, in 1970, 1.75 million people visited Hawai'i. This number continued to increase over the decades. In 2005, 7.49 million visitors made their way to the islands.⁵⁷

While tourism provides an enormous amount of income to the islands, tourism has trumped agriculture as Hawaii's leading industry, thus compounding Hawaii's vulnerability when it comes to food shortages. Tourism, coupled with an increasing population has led to increased development within the islands. As the industry expanded, hotels and condominiums sprouted up to suit the needs of a growing tourist population. Development has not only led to a decline in agricultural space, but has also led to more food needed within the islands. According to the Hawai'i Department of Agriculture, between 1960 and

⁵⁷ Southichack, M. Inshipment Trend and Its Implications on Hawaii's Food Security. Published by the Hawaii Department of Agriculture, May 18, 2007. Exists in PDF format. Accessed November 12, 2012 (http://www.kohalacenter.org/pdf/HDOA_hawaii_food_security.pdf).

2005, imports of fruits and vegetables grew substantially. Over this 45-year period, fruit imports increase from 49.1 percent to 58.9 percent and vegetables imports increased from 43.6 percent to 65.5 percent.⁵⁸ The added population that tourism brings makes Hawai'i more susceptible if there were ever delays of imports.

Agriculture and a Shifting Landscape

As the tourism industry grew, the agriculture industry dwindled. Statehood led to better labor conditions among sugar cane and pineapple workers. As a result, plantation costs increased, and companies began to move their operations abroad to India, Cuba, Puerto Rico and the Philippines. Plantation crops had dominated the Hawaiian landscape until the mid-1960s, but were “dying a slow death” in the 1970s and 80s.⁵⁹ In the 1990s, many large sugar cane plantations shut down.

Today, the Pu‘unene sugar mill is Maui’s sole sugar cane factory. Like sugar cane, pineapple production has dwindled as well. In 1955, pineapple production peaked, with 1.5 million tons being produced. By 2006, however, this volume had dropped exponentially to just 18,000 tons. In 2007, Maui Land & Pineapple Co. Inc., the state’s last producer of canned pineapple, ended its canning operations, and in 2010, Maui Land and Pineapple Co. Inc. stopped planting pineapple. The primary cause of the decline in production and the closure of facilities can be contributed to increased competition around the world. Like sugar cane, the pineapple industry cannot compete with Costa Rica, Mexico, and Ecuador who can produce large quantities of pineapple at a much cheaper price.⁶⁰

⁵⁸ Ibid.

⁵⁹ "Hawai'i Timeline." *Hawaii History*. N.p., n.d. Web. 03 Nov. 2012. <<http://www.hawaiihistory.org/index.cfm?t=1>>.

⁶⁰ Hao, Sean. "Island Pineapple Canning Will End." *The Honolulu Advertiser*. N.p., 1 May 2007. Web. 03 Dec. 2012. <<http://the.honoluluadvertiser.com/article/2007/May/01/In/FP705010361.html>>.

As the total output of plantation crops shrank, the land used to grow these crops shrank as well. Between 1986 and 1999, the total acreage of sugar cane land was reduced by 64 percent. From the mid 1980s to 1999, there was a 39 percent reduction in cultivated pineapple land and only 21,000 acres on pineapple in production statewide.⁶¹ Sugar cane and pineapple not only saw a decline in production, but the agricultural sector as a whole has also seen a decrease in profits and acreage as tourism has become Hawaii's primary industry. Total cultivated agricultural land declined from 314,260 acres in 1950, to 245,500 acres in 1989.⁶²

In spite of decreased production in plantation crops, plantation closures have sparked a new type of agriculture within Hawai'i. Fallow land has allowed for a more diverse agriculture to emerge. By 1989, diversified agriculture represented 17 percent of the agricultural market, an increase of 12 percent since 1959. As the first decade of the 21st century closed, plantation crops captured less than 20 percent of the agricultural market while diversified agriculture captured the remainder of the market. Today, diversified agriculture continues to expand.⁶³

Within this new diversified agriculture, there are two main categories of crops; new export crops and commodity crops. New export crops such as coffee, macadamia nuts, and tropical flowers are extremely important in today's agricultural economy. Along with sugar and pineapple, these new export crops account for 68 percent of total agricultural sales.⁶⁴ Commodity crops include fruits and vegetables grown for the local market. While

⁶¹ Ibid.

⁶² Office of Planning Department of Business Economic Development and Tourism. *Increased Food Security and Food Self-Sufficiency Strategy Volume II: A History of Agriculture in Hawaii and Technical Reference Document*. Tech. N.p.: n.p., 2012. Print.

⁶³ IBID

⁶⁴ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 247. Print.

diversified agriculture has increased tremendously in the last two decades, imports of fruits and vegetables greatly outweigh produce that is grown throughout the state of Hawai'i.

Agriculture on Maui

Much like the rest of the state, agriculture on Maui has become more varied. Maui produces 36 percent of the total Hawaiian sales in vegetables and melons, and leads the state in terms of vegetable production.⁶⁵ Within the island, there is much regional crop diversity. Kula is a particularly productive zone. Some agricultural specialties include strawberries, onions, cabbage, persimmons, lavender, and protea flowers. Recently, farmers in the area have begun to experiment with non-traditional crops such as olives and asparagus. Other parts of the island are known for coffee production, lychee, mangos, citrus, bananas, avocados, salad greens, tomatoes, sweet potatoes, peppers, and much more.

According to the 2011 Maui County Data Book, 402,354 acres of Maui's land is zoned for agriculture, and 225,568 acres of this land is being used as farmland.⁶⁶ While seemingly much of the land on Maui is devoted to agriculture, it is important to note that many of the crops produced are not edible. Seed corn, for example, is Hawaii's most valuable crop. The seed corn industry is valued at 250 million dollars a year, and employs an estimated one out of every four people who work in the agricultural industry.⁶⁷ In addition, many of Maui's crops, such as flowers and coffee, continue to be grown for export and are not being used to feed Maui's domestic population.

⁶⁵ Ibid. 247.

⁶⁶ Hawai'i Business Research Library, and Hawai'i SBDC Network, comps. *Maui County Data Book 2011*. Rep. N.p., 2011. Web. 1 Dec. 2012. <<http://www.hawaii.gov/dbedt/info/economic/databook/>>.

⁶⁷ Hervey, Tiffany. "Boss GMO." *Honolulu Weekly*. N.p., 4 Jan. 2012. Web. 04 Dec. 2012. <<http://honoluluweekly.com/cover/2012/01/boss-gmo/>>.

Part III: Increasing Food Security on Maui

Maui's Landscape

Located in the middle of the Pacific Ocean, the Hawaiian Islands are the most isolated island chain in the world. As a result of the archipelagos isolation, people, plants, and animals had to travel vast distances to arrive to the islands. Similarly, today, food travels immense distances to reach the plates of consumers in the Hawaiian Islands. While Hawai'i is located 2,506 miles from the continental United States, between 85 percent and 90 percent of the food consumed within the islands is produced elsewhere. This dependence on imported foods makes Hawai'i incredibly vulnerable to supply disruptions such as natural disasters and oil shortages. Although there is food produced within the islands, this amount of food would only sustain resident and visitor populations for a short period of time. If a major supply disruption were to occur, it is estimated that there is less than a week's supply of food in stores at any given time.⁶⁸ Therefore, increasing food self-sufficiency within the islands is of vital importance. Maui's Environmental Coordinator, Rob Parsons, believes that food security on Maui is a critical situation.

Since we are so accustomed to being able to run to the grocery store and buy whatever we want, whenever we want, we don't realize that if there were a big natural disaster, economic event, or some sort of nuclear accident, there would be a big domino effect. And, as isolated as we are we don't have a backup plan.⁶⁹

Parsons, stresses the urgency of Hawaii's food situation and his words demonstrate the necessity of becoming more food self-sufficient. Essentially, all of Hawaii's eggs are in one

⁶⁸ "Hawai'i Home Grown Food Abundance." Agroforestry Net, Inc., 19 Nov. 2012. Web. 1 Dec. 2012. <<http://www.agroforestry.net/hhfa/#Anchor-Introduction-49575>>.

⁶⁹ Parsons, Rob. Personal interview. 23 Aug. 2012.

basket, and this is neither ethical in terms of energy management perspective, moral in terms of managing our environment, or wise from a security perspective.⁷⁰

Locally Grown Food Movement

In the 1950s, small-scale farms and local grocery stores were largely replaced by a new type of food system, one based on long-distance transport and regional specialization. Cheap gasoline prices and a new national highway system coupled with reliable transportation and refrigeration made it possible to ship food from the east to the west coast and everywhere in between.⁷¹ The vast distance that our food travels has not only resulted from better transportation, but is also a result of increased regional specialization. Florida, for example, has created a market for oranges and produces these oranges in large quantities for consumption around the world.

This long-distance, high efficiency food system has detached many people from food, agriculture, and the environment. Today, it is estimated that on average, processed foods in the United States travel a distance of 1,300 miles, while produce travels an average of 1,500 miles.⁷² The distance that food travels to Hawai'i exemplifies how removed our society has become from our food. In most cases, we do not know who has grown our food, nor where this food was produced. Recently, however, there has been a shift from the globalized food economy that dominates our agricultural system, to a food economy that is smaller in size. There has been an increased interest in eating locally, and as a result, we have seen a rise in the local food movement.

⁷⁰ Halweil, Brian. *Eat Here: Reclaiming Homegrown Pleasures in a Global Supermarket*. New York: W.W. Norton, 2004. Print.

⁷¹ Halweil, Brian. "Home Grown: The Case for Local Food in a Global Market." *Worldwatch*, Washington, DC, November 2002.

⁷² Pretty, Jules N., et al. "Farm costs and food miles: An assessment of the full cost of the UK weekly food basket." *Food Policy* 30.1 (2005): 1-19.

Unlike other food terms such as organic, there is no standard definition of a “local food”. Generally, locally grown food is defined as food that is consumed near the site where it was harvested or produced. Locally grown food, therefore, is often linked to geographic proximity. Despite this, there is no agreed upon distance that constitutes a “local food”. Locavores, proponents of the local food movement, dine solely on locally grown produce. These individuals define local food as food that is consumed within a 100-mile radius of the point of production. Other times, local food is defined as food that is consumed within the same state that it is produced.⁷³ The definition of local is ambiguous. Local food can be food grown within the state of Hawai’i or within the island of Maui. For the purposes of this paper, local food will be defined as food grown on Maui.

Eating locally presents many benefits over our contemporary food system. These benefits are not only advantageous on a personal, individualized level, but can also provide larger community advantages. On an individual level, eating foods close to the point of production are known to be healthier. The sooner produce reaches the plates of consumers after it is harvested, the more fresh and nutritious the item will be.⁷⁴ In *Home Grown: The Case for Local Food in a Global Market*, author Brian Halweil states, local diets are “more diverse, less processed, and richer in fresh fruits and vegetables.” As American’s consume increasing amounts of non-local food, we are missing these three key items that are integral parts of a healthy diet. Nutritionists believe that much of the rise of obesity and obesity-related illnesses around the world can be linked to the spread of a non-local diet.⁷⁵

⁷³ John L. Stanton, James B. Wiley, Ferdinand F. Wirth, (2012) "Who are the locavores?", Journal of Consumer Marketing, Vol. 29 Iss: 4, pp.248 - 261

⁷⁴ Ibid.

⁷⁵ Halweil, Brian. “Home Grown: The Case for Local Food in a Global Market.” Worldwatch, Washington, DC, November 2002.

Besides direct health benefits, eating locally can help connect people to their food. In today's society, consumers often ignore where their food is comes from, who has grown it, and what is inside of it. When food is grown locally, it is much easier to identify this information. People all over the world have become increasingly disconnected from the food they are eating. They no longer know the seasonality of a fruit or vegetable, because these products can simply be grown in another region and then shipped to destinations around the world. Therefore, consumers have access to fruits and vegetables of all types year round, when in reality, many of these products have relatively short growing seasons. The transportation of food goods makes it possible for someone in a frigid northeast winter to access exotic fruits and vegetables grown halfway around the world.⁷⁶ The ability to eat what we desire whenever we desire, has created a mindset that is quite flawed. It has allowed us to forget where our food is coming from and who is producing this food, and has distanced us from the act of farming.

Eating locally can be an educational experience from a seasonal perspective. Because eating locally means eating in season, the very act of putting food in your mouth teaches one what is currently in season in one's geographical "backyard". Since crops mature at different times over the course of a year the diets of locavores change accordingly. This way eating locally incites the consumer to learn about the environment that they live in.

Eating locally also has positive effects on a community as a whole. By choosing to purchase local foods, one is investing in their local economy and keeping the wealth within the community instead of exporting it elsewhere. In rural areas, purchasing local food can positively benefit the economy by eliminating money given to a middleman. Today, farmers on average receive less than 10 cents of every dollar spent on food. The rest of the money

⁷⁶ Ibid.

spent goes to processing, packing, and distributing produce. Farmers' markets are a way to alleviate this problem. At farmers' markets, 90 percent of profits on produce sales go directly to farmers.⁷⁷ Small farmers directly benefit by receiving a greater share of profits, or even the entire share of the price of their produce. The biggest way in which locally grown food can positively affect the economy is that a greater production of local food results in a decrease in imported food goods. The local population will likely accumulate the money saved by decreasing the amount of imported food.⁷⁸

Another advantage to eating local food is food shipped long distances requires more energy for transportation. In comparison, locally grown foods, require less fuel to get them from the point of production to the point of consumption. This not only means that locally grown foods may be cheaper because of minimal transportation costs, but can also have less impacts on the environment. The distance food travels has a direct correlation with the amount of fossil fuels, pollution, and greenhouse gasses emitted. Because Hawai'i lies approximately 2,400 from the continental United States, imported food must travel a farther distance than food shipped within the mainland. This added distance attributes to a greater amount of energy and fossil fuels used. Therefore, by decreasing the miles traveled by our foods, we are decreasing the amount of pollution and greenhouse gasses that are release into the atmosphere.

⁷⁷ Spector, Rebecca. "Fully integrated food systems: regaining connections between farmers and consumers." In *The Fatal Harvest Reader: The Tragedy of Industrial Agriculture*, Andrew Kimbrell (Ed). pp. 288-294. (Washington: Island Press, 2002).

⁷⁸ Martinez, Steve. "Local Food Systems Concepts, Impacts, and issues". Economic Research Service. Retrieved 10 September 2012.

Benefits of Locally Grown Food on Maui

On Maui, the benefits of producing and eating locally goes beyond the benefits found elsewhere. Limiting our dependence on imported food goods not only decreases Maui's vulnerability, but also results in an increased economic prosperity, and consumer, community, and environmental health. Increased production of locally grown food fosters economic growth and development. Encouraging local agriculture creates new jobs, and keeps money circulating within the island of Maui. Within the current system of food importation, most of the money spent on food does not support Hawaii's economy, but rather the economy where the food is originally grown. According to economists Leung and Loke,

Food expenditures of local consumers in 2004-2005 amounted to \$3.7 billion. Assuming that 85% of the food we consume is imported, this translates to \$3.1 billion leaving our state. Replacing just 10% of the food we currently import would amount to approximately \$313 million. Assuming a 30% farm share, \$94 million would be realized at the farm-gate, which would generate an economy-wide impact of an additional \$188 million in sales, \$47 million in earnings, \$6 million in state tax revenues, and more than 2,300 jobs.⁷⁹

The nutritional content of food dramatically declines during transport, thus, consumers of local food benefit from healthier food products. In the continental United States, produce travels an average of 1,500 miles to the consumer. Because Maui lies 2,500 miles off of California's coast, food must travel more than the average 1,500 miles. As food travels vast distances to reach our plates, the nutritional content of a fruit or vegetable declines significantly.

Climacteric produce, products that will reach ripeness even if they are harvested when they are not ripe; tend to lose nutritional value after they are harvested. This may be

⁷⁹ Leung PS, Loke M. 2008. Economic Impacts of Improving Hawaii's Food Self-Sufficiency. Honolulu (HI): University of Hawaii. 7 p. (Economic Impacts; EI-16).

misleading to a consumer, because climacteric produce, such as tomatoes, can achieve a deep red color even though they may have been picked from the vine when they were still green. Typically, climacteric produce is harvested long before it is ripe so that it can be shipped off to far away markets. While these fruits may look ripe, climacteric produce often declines in nutritional value. According to the Harvard School for Public Health, “while full color may be achieved after harvest, nutritional quality may not. Total vitamin C content of red peppers, tomatoes, apricots, peaches and papayas has been shown to be higher when these crops are picked ripe from the plant.”⁸⁰

After the plant is harvested, the nutritional value of produce can also decline during transportation and storage. Refrigeration of produce has made it possible for these items to be shipped long distances but although refrigeration helps retain some nutritional value, there is still nutrient loss. Furthermore, if produce is bruised during transportation, there can be a further loss of nutritional value because bruising can increase the ripening process. The vast distance that produce travels to reach Hawai’i increases the likelihood for decreased nutrient loss. By eating locally, consumers benefit from healthier food products.

Like the rest of the world, Maui is threatened by urban sprawl. Growing neighborhoods, strip malls, hotels, and golf courses have sprouted up on Maui and threaten agricultural space. Maui’s temperate conditions, beautiful vistas and vast beaches make Maui a favorite vacation spot. As a result of the emergence of tourism in the 1960s, resorts were established on the southern side of the island in Kihei, Wailea, and Makena, and on the Western side of the island in Lahaina, Ka’anapali and Kapulua. As the population on Maui grows, the amount of land that can be utilized for crop production will become more scarce.

⁸⁰ Frith, Kathleen. "Is Local More Nutritious?" *The Center for Health and the Global Environment*. N.p., 1 Jan. 2011. Web. 05 Nov. 2012. <<http://chge.med.harvard.edu/resource/local-more-nutritious>>.

If Maui can increase local food production while preserving land, it will ensure that green space is protected in a time where urban sprawl is dominating the landscape. Therefore, growing local food helps preserve open space on Maui, which in the past, has been a rapidly filling up to meet urban and tourist needs.

Another benefit of increasing the amount of local food grown on Maui is that this indirectly helps protect Hawaii's complex, yet fragile ecosystem. As foods are imported, there is the chance that non-native animals and plants can hitchhike to the islands. Despite quarantine regulations, about five new plant species and up to 20 to 40 new insect species are introduced to Hawai'i every year.⁸¹ Unwelcome invasive species can then become pests and cause significant crop damage to existing agriculture. Therefore, growing local food is one step that can be taken to reduce the likelihood that these alien species will make Hawai'i their home.

Most importantly, growing local food helps the people of Hawai'i form a connection with their food and the 'aina. Today, there has been a severe disconnect between what we eat and where it comes from. People have forgotten that they are dependent on the land for nourishment and survival. In *Home Grown: The Case for Local Food in a Global Market*, Halweil suggests that people no longer know how to garden and identify edible plants. These skills were necessary for survival just a couple of generations ago. In Hawai'i, many people have forgotten the islands' rich agricultural past. Today, Hawai'i is no longer the subsistence economy that it once was in the time of the ancient Hawaiians, but rather an economy that is dependent on imports. By increasing Maui's local food production Maui

⁸¹ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 149. Print.

can reconnect with its agricultural roots. The 2010 Hawai'i County Agriculture Development Plan states,

The traditional Hawaiian relationship to land is not about bending and forcing our environment to yield the greatest short-term harvest. Rather, the traditional Hawaiian relationship to land involves humans serving as familial caregivers of the 'aina, enjoying the food that the land provides while loving and caring for the land with respect and reciprocity. In practice, this respectful and loving relationship is predicated upon responsible harvesting, alignment with seasonality, and ensuring that balanced land-human relationships were maintained through cultural sanctioned prohibitions (*kapu*).⁸²

Eating locally and becoming involved with the process of growing and harvesting can help us remember these core Hawaiian values.

Investing in locally grown food will help Maui wean itself from its dependence on imported food, thus promoting food security within the island. "Food security means that enough food is available, whether at the global, national, community, or household level."⁸³

While the definition of the term varies in different contexts, for the purposes of this paper food security on Maui will be defined as having enough food produced within the island to sustain the population without having to depend on off-island resources. Similarly, the term food sustainability will be used when talking about decreasing Maui's dependence on imported food goods.

Growing Food for Maui's Population

Although Maui produces less than 10 percent of the amount of food that it consumes, the varied climatic conditions and microclimates that are found on Maui can support a wide variety of agricultural crops. Maui is known for its low day-to-day and

⁸² The Kohala Center. *The County of Hawai'i Agriculture Development Plan*. Rep. N.p.: n.p., 2010. Print.

⁸³ Pinstrup-Andersen, Per (02/2009). "Food security: definition and measurement". Food security (1876-4525), 1 (1), p. 5.

month-to-month variation in climatic conditions. There is very little fluctuation in temperatures, humidity, wind speed, and sunshine on any given year. Consistent with the early Hawaiians, there are two seasons observed in Hawai'i. The *kau*, or the warm season, spans from May to September, and the *ho'olio*, or the cold season spans from October through April.

Despite these fairly consistent climate and weather changes, there is tremendous regional diversity within Hawai'i. Rainfall, sunlight, temperature and wind can vary immensely in short distances. On Maui, Pu'u Kukui in the West Maui Mountains is one of the wettest places on earth, while Lahaina, not far away on the west side of the island remains dry for the majority of the year. The regional diversity of the island allows for a variety of flora and fauna to thrive.

While in many other regions the growing season is cut short due to frigid winters, Maui's temperate climate makes it possible to grow crops year round. Maui has a unique set of climatic conditions, weather patterns, and elevation levels. The regional diversity of the island conditions allow for many different types of crops to be grown.

While Hawaii's temperate climate make it possible to grow a wide variety of crops, the state continues to be dependent on agricultural imports. Some people have developed a flawed mindset, and believe that it is not possible for Hawai'i to become food secure. James L. Kelly contributing author to the Atlas of Hawai'i writes,

Although the climate and soils in Hawai'i are suitable for sugarcane and pineapple production, yields for many other crops are relatively low. In contrast, yields for many crops in California, as well as production and marketing efficiency there, rank among the highest in the nation. Consequently, Hawai'i-grown crops, especially vegetables, have not been able to compete with produce imported from the mainland. Moreover, given the state's mix of ethnic groups and the large number of visitors

from abroad, the state could hardly be self-sufficient in the wide variety of foods demanded in the Hawai'i market.⁸⁴

Hawai'i may not be able to grow everything that is demanded by its residents and visitors. But, in order to be self-sufficient, consumers will have to learn that sustainability means adjusting their food habits and eating local produce. That being said, the varying climatic conditions make it possible to grow a wide range of crops throughout the year. Additionally, if the native Hawaiians were able to support an indigenous pre-contact civilization of 200,000 on Maui in the past, than Americans should be able to do the same in the present. Therefore claiming that Hawai'i soil cannot compete with the soil of California is a moot point.

Local versus Imported Food

While there are widespread benefits of growing and eating locally, the local food movement on Maui has not been adopted to the extent that it could be. On Maui, people continue to purchase food that is imported rather than buying locally. Most consumers do not recognize the importance and benefits of buying local produce, and many individuals make purchases based on convenience. Often consumers purchase what they have access to, and if a locally grown food is not available, customers will opt for the imported food option. Another reason for buyers choosing imported produce over local produce is because there is a conception that locally grown food is more expensive. While, this is true in many locations in the United States, I conducted a short-term informal survey to see if this was

⁸⁴ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 251. Print.

true in Hawai'i, where there are additional transportation costs that can increase the price of food.

To find out if this held true, I went to several grocery stores around Maui and noted the prices of both imported and locally grown foods. I wanted to define "local" as crops grown on Maui, however, many times, produce was labeled "Grown in Hawai'i", or just "Locally Grown". Therefore, I could not be sure that these items were grown specifically on Maui. For these price comparison purposes, I considered locally grown food as anything that was grown in the islands of Hawai'i. I classified imported food as anything that was grown outside the state of Hawai'i.

For my data analysis, I focused on the pricing of five specific fruits and vegetables. I chose to concentrate on these crops because these items were both imported and grown locally on Maui as well. I figured that items that were both shipped to Maui and grown on island would be the easiest products to compare. I did not compare items like pineapples, which are commonly found on Maui, yet not frequently imported. Likewise, I did not include items that were commonly imported, like apples, yet not commonly grown locally in my investigation. I figured that if I analyzed the prices of these types of crops, there would be many more factors that contributed to the price variation.

The crops that I chose to research were bananas, avocados, strawberries, tomatoes, onions, and green bell peppers. I chose these fruits and vegetables because these products were often priced by pound (lb) increments. While other items such as lettuce are commonly grown throughout Maui, there was too much variation in packaging and pricing, and there was often variation in the weight increments in which these products are sold. Therefore, I

chose crops that had as little variation as possible in terms of packaging and were measured on a common weight scale.

I realized that local versus imported food were not the only factors that contributed to product price. To account for this, I also recorded the date, store, and whether the item was organic or not. I noted the date in my analysis because I thought that the date when the item was purchased could impact the product price. This factor did not appear to have much influence in the overall price of the product because all of my data was gathered in the summer months from June to August, when these crops were in season. If I had continued my analysis for a longer period of time, perhaps this factor would have had more of an effect on product price.

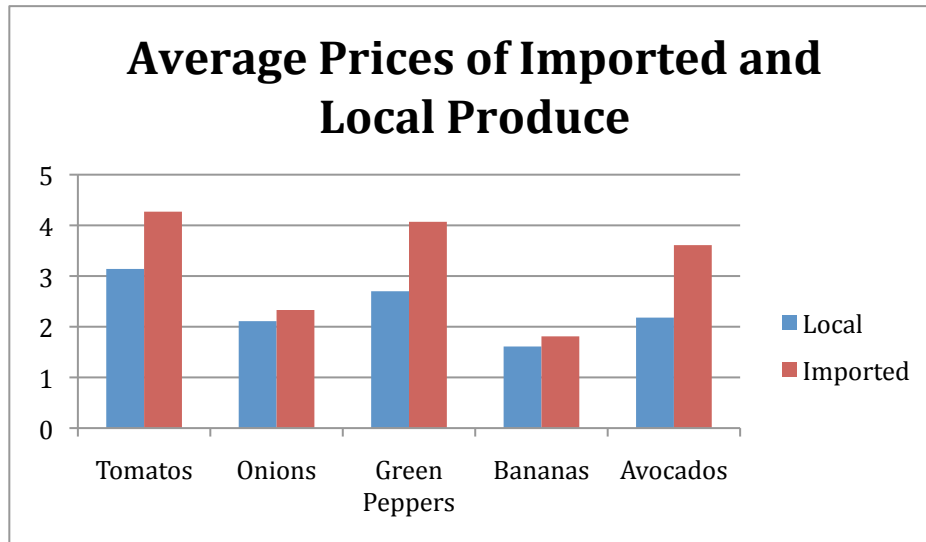
Another factor in my analysis was the store where the items were purchased. I compared produce from farmers' markets, large-scale national stores like Whole Foods, small mom and pop shops, and local Hawaiian chain stores. I thought that it was necessary to factor the store in my analysis because some stores could be more expensive than others.

Perhaps the most influential variable in my price analysis was whether the item was organic or not. Organic products do not use chemical fertilizers, pesticides or other artificial agents in crop cultivation, and as a result, are healthier and have less negative environmental impacts. These benefits can contribute to a greater product price. When comparing two items, I noticed that even if they were both imported or both local, if the items were organic, the price was significantly higher. Therefore, it was necessary to take this variable into consideration. However, while gathering my data, much of the produce that I investigated did not indicate whether or not the item was organic. In these cases, I assumed that the produce was not organically grown.

Lastly, using the products label, I noted where the food was produced. For example, some of my onions that I analyzed were labeled “local Kula onions” while others were labeled “USA imported white”. These notes helped me define the foods I analyzed as best as possible.

After analyzing my data I discovered that foods locally grown on Maui were, on average, cheaper than their imported counterparts. Bananas could be found at \$1.25/lb at several locations such as the Kaahumanu farmers’ markets and the Makawao farmers’ market. On average, locally grown bananas were priced at \$1.61 per pound, while imported bananas averaged \$1.92 per pound. The cheapest priced tomato was a locally grown Kula variety sold at the Kaahumanu Farmers’ Markets for a price of \$1.40 per pound. The most expensive was a Mexican vine ripe variety from Whole Foods priced at \$6.99 per pound. Locally grown tomatoes averaged \$3.14 per pound while imported tomatoes averaged a price of \$4.27 per pound. The average price of green Maui bell peppers was \$2.70 per pound, while the average imported price was \$4.07 per pound. For strawberries, there were not many varieties that were grown outside of the islands. However, I was able to find California strawberries at Whole Foods. These strawberries were priced at \$4.00 and at \$4.99. While these were not the highest priced strawberries (at Food Land local strawberries were priced at \$5.99) locally grown strawberries could be found for a significantly cheaper price elsewhere on the island. At the Pukalani Superette strawberries could be purchased for \$1.99. Because I only had a few prices to compare, I did not include strawberries in my data analysis. I found local avocados for a low price \$1.90 per pound at the Kula farmers’ market. This price was significantly cheaper than the cheapest imported variety at Whole Foods which was \$2.30 per pound. Sweet onions at the Kula’s farmers’ market could be

found for \$1.50 per pound. A comparable sweet imported onion was priced at \$1.80 per pound.



| Bananas | Store | Date | Local | Organic | Price | Unit | Description |
|---------|-------------------------|--------|-------|---------|---------------|------|-------------------------|
| | Whole Foods | 26-May | N | N | \$1.39 | lb | Ecuador |
| | Whole Foods | 7-Aug | N | N | \$1.39 | lb | Ecuador |
| | Hanzawas | 8-Aug | N | N | \$1.79 | lb | Ecuador |
| | Mana Foods | 14-Aug | N | Y | \$1.89 | lb | Mexico Cavendish |
| | Whole Foods | 26-May | N | Y | \$1.99 | lb | Organic Peru |
| | Whole Foods | 7-Aug | N | Y | \$1.99 | lb | Peru Organic |
| | Whole Foods | 15-Jun | N | Y | \$2.99 | lb | Peru Organic |
| | Imported Average | | | | \$1.92 | | |
| | Kula Market | 5-Aug | Y | N | \$1.25 | lb | Local Apple |
| | Makawao Market | 15-Aug | Y | N | \$1.25 | lb | Local Maui |
| | Ka'ahumanu | 17-Aug | Y | N | \$1.25 | lb | Hawai'i Bananas |
| | Ka'ahumanu | 17-Aug | Y | N | \$1.25 | lb | Local Apple |
| | Foodland | 31-Jul | Y | N | \$1.29 | lb | Local |
| | Whole Foods | 15-Jun | Y | N | \$1.39 | lb | Local Non-Organic |
| | Mana Foods | 28-Jul | Y | N | \$1.39 | lb | Local Apple |
| | Whole Foods | 7-Aug | Y | N | \$1.39 | lb | Local |
| | Hanzawas | 8-Aug | Y | N | \$1.49 | lb | Local Apple |
| | Whole Foods | 26-May | Y | Y | \$1.99 | lb | Local, Organic Williams |
| | Whole Foods | 26-May | Y | N | \$1.99 | lb | Local Apple |
| | Whole Foods | 15-Jun | Y | Y | \$1.99 | lb | Local, Organic Williams |
| | Whole Foods | 7-Aug | Y | Y | \$2.29 | lb | Local, Organic Williams |
| | Whole Foods | 7-Aug | Y | N | \$2.29 | lb | Local Organic Apple |
| | Local Average | | | | \$1.61 | | |

After gathering the data and charting it in Microsoft Excel, I imported my data into SPSS to further analyze the differences in prices between imported and local foods. I recorded the prices of sixty locally grown fruits and vegetables and forty-four imported fruits and vegetables. The mean of the locally grown produce was \$2.56, on average \$0.52 cents cheaper than the mean imported food at \$3.08.

Table 1

Price

| | N | Mean | Std. Deviation | Std. Error | 5% Confidence Interval for Mean | | Minimum | Maximum |
|-------|-----|----------|----------------|------------|---------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0 | 60 | \$2.5680 | \$1.13627 | \$.14669 | \$2.2745 | \$2.8615 | \$1.25 | \$5.99 |
| 1 | 44 | \$3.0861 | \$1.26414 | \$.19058 | \$2.7018 | \$3.4705 | \$.79 | \$6.99 |
| Total | 104 | \$2.7872 | \$1.21362 | \$.11901 | \$2.5512 | \$3.0232 | \$.79 | \$6.99 |

After ensuring the data fulfilled the assumptions of normal distribution and equality of variance I ran a one-way analysis of variance (ANOVA) to see if the prices of the imported food were significantly different than the prices of the local food. My results showed that imported produce is significantly more expensive than local grown produce ($F_{df=1, 102}=4.798$, p-value=0.031).

Table 2

Price

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|-------|------|
| Between Groups | 6.815 | 1 | 6.815 | 4.798 | .031 |
| Within Groups | 144.891 | 102 | 1.421 | | |
| Total | 151.706 | 103 | | | |

I then ran a second ANOVA, which took into account whether or not the crop was organic. However, the statistical robustness of this test was impaired due to the fact that there was a much higher proportion of non-organic products compared to organic ones. There were only 21 organic items, while there were 83 non-organic items. Taking into account organic versus non-organic, I found that locally grown food is only marginally less expensive than imported produce ($F_{df=1}=3.551$, $p\text{-value}=0.062$).

Table 3

Dependent Variable: Price

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---------------------|-------------------------|-----|-------------|---------|------|
| Corrected Model | 8.731 ^a | 3 | 2.910 | 2.035 | .114 |
| Intercept | 322.831 | 1 | 322.831 | 225.794 | .000 |
| LocalYN | 5.077 | 1 | 5.077 | 3.551 | .062 |
| OrganicYN | 1.706 | 1 | 1.706 | 1.193 | .277 |
| LocalYN * OrganicYN | .046 | 1 | .046 | .032 | .858 |
| Error | 142.976 | 100 | 1.430 | | |
| Total | 959.635 | 104 | | | |
| Corrected Total | 151.706 | 103 | | | |

a. R Squared = .058 (Adjusted R Squared = .029)

However, these results should be taken with slight caution for several reasons. Firstly, the small sample size hinders the statistical significance of these findings. Additionally, one confounding factor is the fact that many of the local foods tested, while not officially certified as organic, could have in fact been grown in the same fashion as the certified organic ones. Additionally, these conclusions may be even more misleading, for the detrimental effect of the small sample size is further exacerbated by the fact that organic products always lead to higher prices.

It is important to consider that these products are not the exact same variety, and therefore, these price comparisons are a rough estimate. For example, some of the tomatoes analyzed were more expensive heirloom varieties. It is hard to compare these types of tomatoes with a Kula Dave variety that has a different look and taste. Often times, consumers are accustomed to purchasing a certain type of product, and will not settle for anything else. Sometimes, recipes require the use of a certain variety of produce, and therefore, customers are programmed to look for a specific type of fruit or vegetable.

Mana Foods, a health food store on Maui is committed to sourcing locally grown food. Currently, 50 percent of the produce sold at Mana Foods comes from local or backyard farms. While Mana Foods' is committed to sourcing as much local food as possible, there are many obstacles in supplying a small, independently owned grocery store with local produce. Ryan Earehart, the store's produce buyer, explains there are certain crops that customers willingly purchase locally.

Since apple bananas don't grow on the mainland, customers are more forgiving of the quality of apple bananas because they can't get this product elsewhere. Items like these are seen as unique products that customers can only get here at home.⁸⁵

Crops like apple bananas are unique to Maui, and therefore, are commonly purchased locally. Other bananas, however, cannot compete with what is imported from the mainland.

People can go to Safeway and get a perfect Cavendish banana that has a great shelf and lasts because it has been gassed and processed. This banana is a good quality product that looks nice. People are pretty conditioned in their minds of what this banana looks like. Local Cavendish bananas don't ripen as well naturally, so the window of edibility is much narrower as opposed to imported varieties. I still import some certified organic bananas from the mainland and feel super guilty about it, but the fact is when I put local backyard Cavendish on the shelf people turn up their noses and don't want it.⁸⁶

⁸⁵ Earehart, Ryan. Personal interview. 25 Aug. 2012.

⁸⁶ Ibid.

People have become conditioned to a certain type of crop and, therefore, choose imported produce over local produce because these products meet their expectations. Local varieties of the same crop may be fresher and more nutritious, but cosmetically cannot compare to what is being imported in. Earehart goes on to explain that even if he did stock a higher percentage of locally grown food, overall sales would drop because people would go elsewhere to buy the banana that they are accustomed to.

As imports became more common in Hawai'i, a bigger selection of produce became available, leaving buyers with an increased personal say in their shopping. This increased consumer choice has led to the heightened competition between local, mainland, and global farmers. Earehart explains that as imports became increasingly common, customers became increasingly picky.

In the past, customers weren't nearly as particular about what they ate. Now, blueberries have to look perfect, otherwise, people can go to Costco and get the product that they want. Before, when less imports lined shelves, there were not a lot of options, so customers chose what was available. Economically, farmers produced these crops and did not have the competition from the mainland.⁸⁷

Imports have led to heightened competition between small, local farmers and large-scale agribusiness. Through advanced farming techniques, large agribusiness can create produce that is blemish free. Although local Hawaii farmers grow more nutritional products, local farms lose sales to large agribusiness who have the ability to create more aesthetically pleasing produce.

To become more a sustainable food economy, consumers will have to make adjustments in their purchasing habits, and learn to eat and enjoy local varieties of produce

⁸⁷ Ibid.

that can be found within our island landscape. In order to do this, it is essential that Maui creates a market for its local produce and educates consumers about the importance of supporting locally grown agriculture. The Maui County Farm Bureau in coordination with the Maui County Office of Economic Development has established campaigns such as the “Grown on Maui” labeling program. This advertising campaign places labels on locally grown produce to help shoppers identify local goods.⁸⁸ Many of Hawaii’s consumers are not aware of the benefits of buying locally. Additionally, a recent study showed that Hawaii residents are willing to pay more for locally grown food, but have trouble identifying local products when store shelves are lined with imported produce.⁸⁹ Increased marketing and strengthening of Hawai’i labeling programs can help to address these problems. Furthermore, the labeling of locally grown products helps strengthen the market for local produce and can help increase the demand of local food.

Marketing must also be used to create increase demand for staple crops. Currently, Hawai’i imports all of its grains and nearly all of its starches. Traditionally, starches such as taro and sweet potato have been the staple crops of the Hawaiian people. Today, taro and sweet potato are no longer common in everyday diets. By creating a market for these crops, Maui can increase its food self-sufficiency. When pineapple was first cultivated in Hawai’i, there was little demand for the fruit. Advertising was essential in boosting sales of the crop, and in a short time, pineapple became a common item in household pantries. Similar to how advertising and marketing were use to sell pineapple, marketing schemes can be used to increase the desirability of these traditional Hawaiian crops. Cultivation of these crops can help connect the island with its agricultural past.

⁸⁸ Office of Planning Department of Business Economic Development and Tourism. *Increased Food Security and Food Self-Sufficiency Strategy*. Rep. N.p.: n.p., 2012. Print.

⁸⁹ Ibid.

After collecting my data, I observed that much of the cheapest priced local food was from farmers' markets. At farmers' markets, farmers sell produce personally, and therefore, there is no price inflation that is attributed to transportation costs or retail mark up. In addition to lower product prices, there are many other advantages that can be gained from purchasing food at farmers' markets. At supermarkets on Maui, smaller farms are at a disadvantage when supplying produce. Farmers' markets give market access to smaller farms, which can be denied access to grocery stores because they do not have a large and consistent supply of produce. Farmer's markets also give beginning or backyard farmers an opportunity to experiment with growing and selling products. At farmers' markets, consumers can engage in conversation with farmers and can learn how their fruits and vegetables are produced. Farmers can benefit from these interactions by getting direct feedback from customers. Additionally, these conversations can help bridge community gaps by fostering relationships between two groups of people who may not normally interact with each other. It is important to note that standards for selling produce in farmers' markets may differ from standards in place at grocery stores. Produce that is nutritionally good but cosmetically flawed can be sold at farmers' markets. These items most likely would not make the shelves of supermarkets. Thus, buyers who purchase from farmers' markets must learn to adjust their purchasing habits.

One problem with increasing and promoting farmers' markets across the island is that farmers' markets have traditionally denied access to people who rely on food stamps to purchase their food. In order to resolve this conflict, farmers' markets around the nation have begun to implement food stamp programs. In Michigan, farmers' markets have joined forces with Supplemental Nutrition Assistance Program (SNAP) to create the Double Up

Food Bucks program. The Double Up Food Bucks program uses money raised by foundations to match purchases at farmers' markets. Families who receive SNAP benefits, therefore, are able to double their purchasing power when they buy foods from farmers' markets.⁹⁰ In Hawai'i, establishing a local food stamp program would allow individuals to use food stamps to buy local food from local farmers. Consumers would bring their food stamps to local farmers' markets where they could exchange food stamps for produce. Developing a food stamp program that can be implemented in farmers' markets would increase access to healthy, locally grown food for all of Maui's community.

Increasing the Supply of Local Food

In order for customers to purchase more locally grown food, more food needs to be grown on Maui. While it is feasible to grow a much bigger supply of food on Maui, there are many factors that affect how much food is grown and produced in Hawai'i. One of these factors is the current utilization of land.

Land on Maui is zoned very specifically through the State Land Use Commission. Land is either classified as urban, rural, agricultural, or conservation land.⁹¹ Rural districts are categorized as areas that are mixed with small farms and low-density residential lots. In Kula, Maui, most lands are either zoned agricultural or rural, and many homes are found alongside small acreages of backyard farms. Homeowners whose properties are zoned agriculturally are technically required to produce some sort of agriculture product, yet many times landowners are able to cheat the system. As a result, the land is not being used for its

⁹⁰ "Double Up Food Bucks." *Fair Food Network*. N.p., n.d. Web. 06 Dec. 2012.

⁹¹ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. Print. 228

intended purpose. If this land was utilized correctly, more locally grown food could be produced.

Zoning laws have intended to protect agricultural areas, yet as Maui's population has become denser, there is less and less land available for agricultural use. As more land is taken out of agricultural use, Maui will become even more dependent on imported food goods. In order to resolve this problem, people living in rural and agricultural zoned districts need to be held more accountable for growing crops. In addition, individuals who have space in their yards should be encouraged to cultivate their own food.⁹² In agriculturally zoned areas, it is necessary to prevent future development by enforcing existing zoning ordinances.

Besides upholding zoning ordinances, policies can be enacted to facilitate the development of temporary farms on vacant land. At the 2003 Hawaii Agricultural Conference, agricultural economist Ken Meter estimated that 200,000 hectares of farmland were fallow and that 85 percent of farmland in Hawai'i was unused.⁹³ Maui Land and Pineapple Co. Inc., Maui's largest pineapple producer, went out of business in December 2009. While the company no longer grows pineapple, the company owns approximately 24,300 acres of land on Maui. Because pineapple production has ceased, this land is now fallow. This land could be temporarily leased for agricultural development. In order to facilitate cultivation of fallow land, an inventory should be made of all unused land. By creating a database, people can become aware of what space can be used for food production.

⁹² Delepart, Donna, and Jeffery Melrose. *Hawai'i County Food Self-Sufficiency Baseline 2012*. Tech. Comp. University of Hawaii at Hilo. N.p.: n.p., n.d. Print.

⁹³ Halweil, Brian. *Eat Here: Reclaiming Homegrown Pleasures in a Global Supermarket*. New York: W.W. Norton, 2004. Print.

While sugar cane production has declined immensely on Maui, it is still exported and constitutes much of the agricultural land on the island. Although sugar cane provides the island with financial gains, diversifying sugar cane land can be beneficial in several ways. Rather than growing an export crop, other crops can be cultivated to feed the island's population. Diversifying sugar cane land would result in many other benefits as well. Sugar cane burning has long been a problem for Maui's residents. When cane is burned, smoke and dust fills the air and can cause adverse health effects. Therefore, diversifying this land can lead to a healthier community. Like pineapple, sugar cane production is becoming less and less profitable. In the future, sugar cane may no longer be economically viable. Ideally, if sugar cane land became fallow, this land will be kept in agriculture, and a significant part of it would be put to local food production. This would ensure that green space is preserved on Maui.

Farmers on Maui face high land costs, and often have a hard time paying for their land. When farmers do not own their land they may encounter difficulty acquiring long-term leases or reasonable lease rates. In order to alleviate some of the pressures in obtaining farmland, state agricultural park programs have been established. Agricultural Parks are "areas set aside specifically for agricultural activities to encourage continuation of initiation of such operations."⁹⁴ Through these programs, land is obtained by the Department of Agriculture, and then is made available for lease. On Maui, the Kula Agricultural Park consists of thirty-one ten to thirty acre lots totaling a 445 acre area and supporting twenty-six farmers. The agricultural park is designed to promote the development of diversified

⁹⁴ "Agricultural Parks." *Hawaii Department of Agriculture*. Department of Agriculture, 2009. Web. 18 Nov. 2012. <http://hawaii.gov/hdoa/arm/arm_agparks>.

agriculture by providing agricultural lots at a reasonable price with long-term tenure.⁹⁵ “This program provides stable land tenure that is not subject to reclassification or rezoning, further subdivisions, lack of monitoring of activities, and introduction on non-agricultural uses.”⁹⁶

Another way to increase the productivity of local farmers is to ensure that there is access to consistent and affordable water. In order to promote local food production, it is necessary to maintain aging irrigation systems. Former plantation land already has the water infrastructure needed to support agriculture. As land use becomes more diverse, maintaining plantation irrigation systems can be a way to help support new, smaller agricultural endeavors on former mono-crop land.⁹⁷ Improving inefficient irrigation systems will rely largely on federal funding. The Department of Agriculture, the Army Corp of Engineers, and the Bureau of Reclamation are instrumental agencies in maintaining and improving irrigation systems throughout the state.⁹⁸ Another way to ensure affordable access to water is through governmental subsidies. The local government can assist farmers by providing water subsidies for agriculturally zoned land. These are feasible strategies that can be employed to ensure that farmers have access to affordable water.

Besides affordable access to land and water, there are many obstacles within the field of agriculture that can hinder farmers’ success. Farmers must pay for the transportation costs required to bring produce to market, as well as the costs of farm inputs such as fertilizers, farm tools, and labor. These costs can make farmers unsuccessful, or deter people from entering agriculture initially. In order to help alleviate these expenses, new farmers

⁹⁵ "Kula Agricultural Park." *Maui County, HI*. N.p., n.d. Web. 18 Nov. 2012.
<<http://www.co.maui.hi.us/index.aspx?NID=621>>.

⁹⁶ Office of Planning Department of Business Economic Development and Tourism. *Increased Food Security and Food Self-Sufficiency Strategy*. Rep. N.p.: n.p., 2012. Print.

⁹⁷ Office of Planning Department of Business Economic Development and Tourism. *Increased Food Security and Food Self-Sufficiency Strategy*. Rep. N.p.: n.p., 2012. Print.

⁹⁸ *Food and Agriculture*. N.p., 2010. Web. 9 Sept. 2012.
<http://www.neilabercrombie.com/index.php/issues/more/food_and_agriculture/>.

can be assisted with free seeds or plant starts. Governor Neil Abercrombie suggests that in order for local farmers to be competitive with mainland producers, lowering the costs of farm inputs is essential.

“We must also address the high cost of importing agricultural inputs—feed and fertilizer in particular—so that farming can be competitive and sustainable. We will form public-private partnerships to develop sustainable local feed and fertilizer, making it a focus of research in the UH system, employing extension agents, and designating experiment stations.”⁹⁹

These programs will not only help farmers increase their profit margins, but will also help draw more individuals to the industry.

In addition to agricultural expenses, Maui’s agricultural industry lacks a consistent labor force. In Hawai’i, the average farmer is 59 years old.¹⁰⁰ As Hawaii’s workforce ages, Hawai’i will suffer from a loss of farmers. This is compounded by the fact that many young people have lost interest in the agricultural industry.¹⁰¹ While our livelihood is dependent on farmers, often, there is a negative stigma against farming, and many people view farmers as unskilled laborers. Therefore, it is necessary to reverse this misconception by educating youth about the importance of agriculture. Implementing elementary school gardens and having internships for high school and college aged students are feasible methods to increase agricultural interest and awareness. These methods of promoting agricultural education should be practiced in conjunction with traditional Hawaiian agricultural methods. By incorporating these concepts, Hawaii’s youth can become more connected to the rich cultural past of Hawai’i. Governor Neil Abercrombie suggests,

The scope of “agriculture” must be broadened to include environmental/ecosystem education and integrate the teachings of the

⁹⁹ Ibid.

¹⁰⁰ Ibid.

¹⁰¹ Ibid.

Native Hawaiian host culture such as the concept of ahupua'a. Farmers and ranchers are Hawaii's front-line environmental stewards. We need our children to think critically about their place in the ecosystem.¹⁰²

In addition, programs can be established in coordination with organizations such as AmeriCorps. Typically it is very hard for young adults on Maui to find work. Establishing farming programs will employ youth, while teaching youth valuable agricultural skills, which are not usually addressed in the classroom.

Economically, other industries such as tourism are much more lucrative than agriculture. Furthermore, farming is physically labor intensive, and many individuals cannot justify the labor for the amount of money that they earn. Instead of hiring outside labor, which can significantly contribute to the costs of running and maintain a farm, farmers can employ WWOOFers. WWOOFing stands for Worldwide Opportunities on Organic Farms. In return for assistance on farms, farms associated with WWOOF host, provide food, and teach volunteers about organic lifestyles. Many farms on Maui have turned to WWOOFing as a source of cheap labor. On Maui in particular, WWOOFing is particularly attractive. WWOOFers are provided with housing in exchange for labor, and in their spare time can explore the beautiful island of Maui.

Market based problems also hinder the success of the locally grown food movement on Maui. Ryan Earehart explains that as a buyer, it is much easier for him to deal with large mainland based distributors rather than local farmers.

I can call a mainland distributor and buy thirty cases of lettuce within fifteen seconds. Mana Foods has been generous to the community and to me to in allowing me to take time to order those thirty cases of lettuce locally, but this may take two to three hours. I have to call farmer number one and he may say "it's almost ready", or "the deer came and ate it" or

¹⁰² "Food and Agriculture." N.p., 2010. Web. 9 Sept. 2012.
<http://www.neilabercrombie.com/index.php/issues/more/food_and_agriculture/>.

“its got spotted wilt virus”. Then, I have to call another farmer and ask how close his crop is to being ready. And then, I have to piece it all together – a case and a half here, three over here, six from here. So it’s a lot more communication and vocalization and working with these small growers.¹⁰³

Earehart goes on to say that small farms do not have the comparable resources to large farms. Small farmers are “focusing on growing and they don’t have a marketing team and someone doing statistics to figure out how much they are going to yield off of their planting. So, dealing with small growers is a lot more challenging and time consuming”. Demand for local produce needs to rise which will not happen until the people of Maui have a greater awareness of the many environmental, economic, and nutritional benefits that come from buying and consuming local food. When this happens, it will offset the ordering convenience, better packaging, and visual appeal that local buyers associate with mainland produce.

Tourism and Agriculture

One issue that has a tremendous impact on food security is tourism. The amount of tourists on the island on any given day makes up a huge percentage of the food demanded on Maui. It is estimated that there is one tourist to every three residents.¹⁰⁴ These additional people add to Maui’s population, and the locally grown food market would have to increase immensely to support these individuals. Another problem between tourism and creating a more secure food system is that tourists are less likely to know where their food is coming from as opposed to local residents. Most tourists eat at restaurants and are not aware if what they are eating is local or imported. Because many tourists are not cooking their own meals,

¹⁰³ Earehart, Ryan. Personal interview. 25 Aug. 2012.

¹⁰⁴ Juvik, Sonia P., James O. Juvik, and Thomas R. Paradise. *Atlas of Hawai'i*. [Hawaii]: University of Hawaii, 1998. 263. Print.

they are reliant on what the restaurants on Maui have to offer. As a result, restaurants in Hawai'i have a huge potential to create a difference in the locally grown food movement.

Restaurants can help influence what is demanded by customers, and thus, can have an immense impact on the food system. There are many steps that restaurants can take to incorporate more locally grown foods on their menus and increase consumer awareness. Restaurants can add local food products to their recipes and add information about the sources of their food to their menus. At Flatbread Pizza Co. in Paia, Maui, the menu provides the name of the farm where the ingredients are sourced. These small steps can help influence the customer to think about their food choices.

On Maui, local chefs are some of the forerunners in the incorporation of locally sourced foods into their recipes. In 1991, twelve of Hawaii's leading chefs collaborated to create Hawai'i Regional Cuisine, "a culinary movement that inventively blends Hawaii's diverse, ethnic flavors with the cuisine of the world."¹⁰⁵ Hawai'i Regional Cuisine prides itself in using locally sourced ingredients and supporting small Hawaiian farms. By linking local agriculture to the restaurant business, Hawaii's chefs are playing a much greater role in the local food movement than chefs on the mainland. By incorporating local sourced produce in their products, these chefs make Hawaiian Regional Cuisine a reflection of the community. Peter Merriman, one of the founders of Hawaiian Regional Cuisine is committed to supporting local agriculture. At Merriman's restaurants, 90 percent of all ingredients used are local.¹⁰⁶ Merriman's commitment to using locally grown ingredients

¹⁰⁵ "Hawaii Regional Cuisine." *Hawaii's Official Tourism Site*. N.p., 2012. Web. 05 Dec. 2012.

¹⁰⁶ "Merriman's Restaurants - Peter Merriman." N.p., n.d. Web. 06 Dec. 2012.
<http://merrimanshawaii.com/peter_merriman.htm>.

demonstrates that farmers and chefs can work together to promote change within Maui's local food movement.

Agritourism is another way to raise local and tourist interest in farming. In the past, the agriculture and tourism industries have clashed. As tourism grew, land became more valuable, and farmers sold agricultural land for non-agricultural purposes. This was seen as an easier way for farmers to earn money as compared to farming. Today, agritourism works to synergistically merge Hawaii's two main industries- tourism and agriculture. Agritourism can include activities such as farm tours, farm stays, cheese making, wine tasting, fruit and vegetable sampling.¹⁰⁷

On Maui, agritourism is another way to sustain a farmer, merging traditional farming practices with hospitality and education components. Maui hosts a wide array of agritourism farms such as Maui's Winery, the Ali'i Kula Lavender Farm, O'o Farms, and The Surfing Goat Dairy. O'o Farms, an eight acre lot located on the slopes of Haleakala, grows a variety of vegetables including lettuce, tomatoes, avocados, and loquats. Farm visitors receive a farm tour, and then proceed to harvest their own fruits and vegetables. After the ingredients are harvested, a chef uses the ingredients to prepare a gourmet lunch. Guests are able to watch the chef prepare the meal and can engage in questions regarding the preparation of the food.¹⁰⁸ At Ali'i Kula Lavender Farm, visitors not only can get a tour of the farm, but can also engage in activities such as wreath making using flowers grown on the farm grounds.¹⁰⁹ Through agritourism visitors can experience a more authentic Hawai'i, a much different experience than the typical resort stay.

¹⁰⁷ "Hawaii Agritourism - Diversified Hawaii Agriculture - Ag-Tourism." N.p., n.d. Web. 06 Dec. 2012. <<http://www.alternative-hawaii.com/agriculture/index.htm>>.

¹⁰⁸ "O'o Farm." N.p., n.d. Web. 06 Dec. 2012. <<http://www.oofarm.com/>>.

¹⁰⁹ "AKL Maui." N.p., n.d. Web. 06 Dec. 2012. <<http://www.aklmaui.com/>>.

Conclusion

Maui's current food situation is not only unsustainable but it is also dangerous. While Maui currently imports most of its food, it is possible to create a local agricultural system but this will require efforts from the government and local population. The County of Maui must provide incentives, and assist Maui's farmers so that farming is lucrative. There needs to be increased education coming from the agricultural sector so that people realize that eating locally is not only good for them personally, but is also good for the economy as well as for the beauty of the island. The most challenging obstacle of transforming to a local food economy will be changing the mindset of Maui residents. Most people are accustomed to eating a certain way, and it may be difficult to have them alter their eating habits. Despite these obstacles, if sound policies are established, Maui can transform its current food system into one that is more sustainable, profitable, and healthy. Although initial changes to our current food system may be costly, the benefits that result from investing in local food would pay for the costs. It is imperative that Maui's farmers, consumers, and the local government work together to reduce our dependence on imported food, and realize the sustainable benefits of locally growing the food consumed on island.