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**FOOD AND FARMING IN HAWAII**

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**by**

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# **Food and Farming in Hawaii**

A study of the obstacles to establishing resilient  
systems of local food production in Hawaii

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## I. Abstract

The purpose of this study is to identify existing obstacles to establishing resilient systems of food production in Hawaii, and to determine what some of the best practices in planning would be to address the same. The obstacles identified, have been bucketed widely into three categories, namely, obstacles related to land-use; policy related obstacles; and systemic issues.

The methodology employed was primarily in-depth semi-structured interviews, respondents were selected through the snowball technique. This was accompanied by an online survey to determine respondent's food habits and preferences, here, the respondents were selected again through the snowball technique. The third element was mapping of data using the mapping tool ArcGIS, to determine the degree to which land-use related obstacles relate to the research.

The literature indicated that the three most significant obstacles were the military land holdings, the Jones Act and large-scale crop monocultures. However, the findings indicate that invasive species and pests, the lack of labor and the high cost of land are the three most considerable obstacles to be tackled.

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## V. Introduction

This research is aimed at identifying the most significant obstacles to establishing resilient systems of food production in Hawaii. Further, it aims at identifying some of the best practices in the field of planning to tackle the same. For the sake of clarity, the findings have been classified widely under obstacles related to land use; policy related obstacles and systemic issues.

Hawaii is a particularly pertinent site for study for a few reasons. The first is that the island is a state of the United States, however is geographically non-contiguous and isolated. Further, the island currently imports over 85% of its produce (Island of Hawaii Whole System Project Phase I Report, March 2007). These two conditions in combination with each other lead to a uniquely vulnerable situation that Hawaiians must contend with. To further exacerbate the vulnerability, according to interview respondent 6, the island usually only has a 5 to 7-day supply of food. The Hawaii Emergency Management Agency recommends that all citizens have a 14-day supply in the case of an emergency (<http://dod.hawaii.gov/hiema/>). Thus, given the findings in the literature, this region in particular would benefit dramatically from the adoption of local systems of food production and consumption, especially considering that the region is prone to natural disasters such as floods and volcanic eruptions. The above factors fueled my interest in the topic, and they were furthered when I learned that the region also experiences a high incidence of food insecurity according to Azizi Fardkhales's research on "Food security and self-sufficiency" (Dec 2019). The literature also revealed that maritime law such as the Jones Act that has been in place since 1789 (Lewis, Justin, 2013) causes the cost of produce to be inflated by an estimated 61% (Lewis, Justin, 2013).

The simple act of growing food locally, at a small-scale, and utilizing mixed cropping, might prove to be the tonic to reversing some of the ills in the systems of food production and

distribution in the region of Hawaii. While repealing policies in place since 1789 and the reclaiming of land from the stronghold of the military might seem like endeavors beyond our realm of influence, the simple act of creating self-sustaining loops of production and consumption, might well be the answer to reversing some of the ill effects of the existing system of food production and distribution, such as cost inflation and poor food quality. According to the paper, “Completing the picture: How the circular economy tackles climate change” by the Ellen Mac Arthur Foundation:

*This paper further finds that the circular economy has the potential to increase resilience to the physical effects of climate change. For example, in keeping materials in use, businesses can decouple economic activity from the consumption of raw materials vulnerable to climate risks, and therefore build greater flexibility. In the food system, regenerative agriculture improves the health of soil leading, for instance, to its greater capacity to absorb and retain water, increasing resilience against both intense rainfall and drought.*

In this way simple interventions prove to tackle several issues at once, in the above example, establishing regenerative systems of agriculture, improves the health of the soil, which can then provide higher levels of rainwater retention, and increase resilience against both intense rainfall and drought. All of these issues remained unsolved through the previously applied methods of inorganic farming and large-scale crop monocultures.

The study will have a specific focus on the capacity for localized food systems. The Ellen Macarthur foundation defines the circular economy in the following terms:

*It will require moving away from today's 'take-make-waste' linear model towards an economy that is regenerative by design. In such an economy, natural systems are regenerated, energy is from renewable sources, materials are safe and increasingly from renewable sources, and waste is avoided through the superior design of materials, products, and business models.*

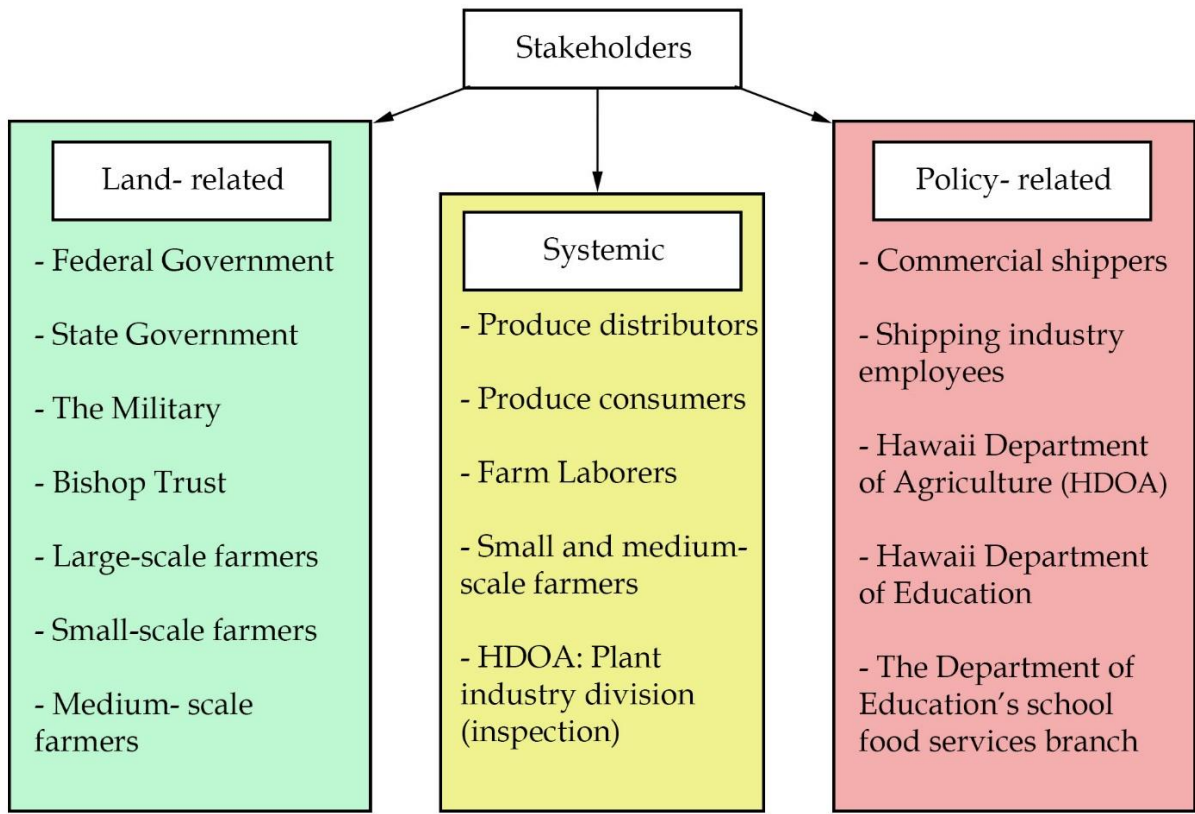


The cost of food in the region has seen inflation over time in a disproportionate manner to some of its mainland counterparts. Justin Lewis in his paper, “Veiled Waters: Examining the Jones Act’s Consumer Welfare Effect” (2013), states:

*My principal finding indicates that, without the Jones Act in place, coastal water transport in the United States would be approximately 61% cheaper and that consumers using these services would stand to gain a minimum of \$578 million annually in economic benefit.*

The state’s geographical positioning, paired with existing practices and barriers, have caused the price of basic necessities such as food to inflate in the region. Local food systems offer opportunities to address food insecurity. At the local level this would mean that it could be advantageous for Hawaiians to adopt small-scale local systems of food production both in urban and rural settings. These could range from small-scale land holdings, to community gardens and further, to modular units at the level of the home or office, manifested as urban gardens.

As I will illustrate through this research, there are several key players who have a stake in this issue. For the sake of clarity, I have bucketed the key stakeholders into the same three categories as the research buckets. Some of the key stakeholders related to land-use issues are the federal Government, the state Government, the military, the bishop trust and large-scale farmers. Under systemic related obstacles, some of the key stakeholders are distributors, consumers, farm laborers, small and medium scale farmers. Finally, under the policy-related obstacles, the key stakeholders are commercial shippers, the Hawaii department of Agriculture, the department of education (DOE) and the DOE’s school food services branch. I have created a diagram for the sake of clarity.



## VI. Key Terms

1. **Agricultural Labor-** According to NAL dictionary (2019), agricultural labor is defined as people gainfully employed by a farm operator to assist with the farm work, including regular, seasonal, local, migratory, full-time or part-time employment. The term is also used for agricultural workers, farm workers, and farmworkers. In this dissertation, the term worker or labor also includes non-paid agricultural workers such as volunteers but also people in training such as interns and apprentices.
2. **Alternative Farming-** According to the National Agricultural Library dictionary (NAL, 2019) alternative farming is production methods other than energy- and chemical intensive one-crop (monoculture) farming. Alternatives include using animal and green manure rather than chemical fertilizers, integrated pest management instead of chemical pesticides, reduced tillage, crop rotation (especially with legumes to add nitrogen), alternative crops, or diversification of the farm enterprise. Alternative farming is used as an overarching term for many other more specific concepts that are defined below. These include community food systems, community food security, small-scale farms, beginner farmer, new farmer, and community supported agriculture.
3. **Ecological Resilience-** According to the NAL thesaurus, ecological resilience is the level of disturbance that an ecosystem can undergo without crossing a threshold to a situation with different structure or outputs. Resilience depends on ecological dynamics as well as the organizational and institutional capacity to understand, manage, and respond to these dynamics.
4. **Food Insecurity-** Food insecurity is defined as having little to no access to fresh, healthy, affordable, or culturally relevant food (Kent, 2016).

5. **Local Food Systems-** The NAL thesaurus defines local food systems as collaborative efforts that integrate food production, processing, marketing/distribution and consumption within a given geographical area, place or community. Local food systems may also be characterized by certain market and non-market distribution channels: farm direct marketing channels including farmer's markets, community supported agriculture (CSA), farm-to-institution programs; community and home gardening; and gleaning programs.

6. **Resilience-** The Oxford English dictionary defines the term resilience as the capacity to recover quickly from difficulties; toughness. In the context of this research I refer to resilient systems of food production. To define the term resilient systems of food production, within the scope of this research I am referring to systems of food production and consumption that have the required resilience to provide for the population of the region during times of natural disaster such as floods, earthquakes or volcanic eruptions. In addition, these systems must be able to whether the test of time, and have the longevity to provide for the region over time.

7. **Small Farms-** According to NAL dictionary (2019) small farms are defined as farms with less than \$250,000 gross receipts annually, on which day-to-day labor and management are provided by the farmer and/or the farm family that owns the production or owns, or leases, the productive assets. In 2017, about 95% of all Hawaii's farmers earned less than \$250,000 per year (USDA NASS, 2017). Within the purview of this research, I have also added the parameter that a small farm is below 300 acres in area.

8. **Sustainable Agriculture-** According to NAL dictionary (2019), sustainable agriculture is an integrated system of plant and animal production practices having a

site-specific application that will, over the long-term – (A) satisfy human food and fiber needs; (B) enhance environmental quality and the natural resource base upon which the agriculture economy depends; (C) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; (D) sustain the economic viability of farm operations; and (E) enhance the quality of life for farmers and society as a whole. The term is also used for regenerative agriculture, regenerative farming, sustainable agricultural production, sustainable animal production, sustainable crop production, sustainable dairy farming, sustainable farming, sustainable livestock production, sustainable plant and animal production.

## VII. Thesis Aim

One may then ask, why Hawaii? There are a few reasons why the region is an ideal case study. The first is that it is non-contiguous and geographically isolated. This means that in the case of an emergency, the island is completely dependent on external supply as there is hardly any local production. During a disaster such as a hurricane, when the port's infrastructure get's damaged, this sets the island back even further. To take the case of Oahu, summarizing from an interview with respondent 6, a researcher:

*So, the way that the food system struggles here is that we're importing overwhelming majority of the food. Most of the food comes in on shipping containers, primarily from California, they come in through the port of Honolulu, it very temporarily stays in warehouses in the port of Honolulu, and then it's onto the shelf and Safeway, Foodland and all of the other grocery retail. There's not commercial food storage here, it's very short term. So, the idea is there's no standing inventory. So, the food that stored in Hawaii is basically in a warehouse for a period of time. And that's literally for days at a time and then its sold, there is no commercial food storage in the state. It's constantly floating, there's no idle emergency function at all. I know who all the main commercial shippers are. What's estimated, and if you speak to D he'll tell you this, if you look at the population and the amount of food supply we have on the shelves, it's about a 5, no more than 7 day supply of food.*

*If there's an event, like a hurricane and this is what these guys look at studying? When a hurricane begins to approach area with critical infrastructure like the port of Honolulu or Georgia, they start to shut down the port, because elements of that infrastructure is brittle, and the whole thing will collapse if they don't do some degree of assembly to make it more structurally sound so they actually can get the ships out of the port, they take them out to sea, so if a hurricane*

*hits, all of the ships don't sink in the port, and then block the ability of goods being offloaded onto the port. And then they shut down elements of the port, but all the while they're already burning into the 5-day supply of food, several days in advance of the hurricane hitting, so if we have the 5-day supply of food, they're shutting everything down 2 days in advance. So, then you have a 3-day supply of food at best.*

The second reason is that the region is unique in the sense that there are an estimated 7000 small farms in Hawaii and a large percentage of agricultural production is from small farms. However, the majority of produce consumed on the island (over 85%) comes from imports (Island of Hawaii Whole System Project Phase I Report, March 2007). I would like to study the reasons for this occurrence.

The third reason is that maritime laws such as the Jones Act, when applied to Hawaii, amplify the effects of cost inflation due to the geographic isolation of the region. The institution of maritime law as a protective measure for domestic shipping, has a long history in the United States. This dates back to 1789, when the first session of Congress imposed duties and taxes on foreign built, foreign flag ships engaged in U.S. Atlantic coast trade. Post-World War I, under an 1817 Act Concerning Navigation within the United States, a law required that domestic shipping be conducted only with U.S. flagged vessels. Essentially, only U.S. built ships could be flagged, and so, by implication, the Act barred foreign competition. Iterations of this law have been restated through the course of history, with updates and addendums. Thus, the cost of food coming in from the mainland is quite cost inflated, disadvantaging island-dwellers. This then leads to the fourth reason why the study is important, food insecurity in Hawaii. Drawing from Azizi Fardkhales's research on "Food security and self-sufficiency" (Dec 2019):

*Indigenous Peoples of what is now the U.S. include American Indians, Alaska Indigenous Peoples, and Indigenous Peoples of Hawaii. The Waianae Coast has the largest concentration of*

*Indigenous Hawaiians; 22.5% of people are Indigenous Hawaiians compared to 6% for all of Hawaii; 55.7% of people are Indigenous Hawaiian alone or in combination with 1 or more other races compared to 19% for all of Hawaii (UH Manoa, 2003). Compared to Caucasians in Hawaii, Indigenous Hawaiians experience excess deaths from heart disease, cancer, diabetes, infant mortality, and accidents (Heckler, 1985). In 2003, UH Manoa reported an annual income of \$13,027 for residents on the Waianae Coast; in other words, the average person earns \$80 above the monthly the U.S. poverty level. In the same year, every third child was born into poverty. (UH Manoa, 2003). Food insecurity is well documented on the Waianae Coast. More than 50% of residents are SNAP recipients (UH Manoa, 2003). Low-income regions tend to be void of stores that sell affordable and healthy fresh food (Minaker et al., 2011). The last statement is true for the Waianae region where more people suffer from food insecurity, which, is defined as having little to no access to fresh, healthy, affordable, or culturally relevant food, than in the rest of Hawaii (Kent, 2016). The exorbitant price of food and cost of living on Oahu only compounds the issue of food insecurity (Kent, 2016); in Waianae 33% of people live in households that are considered food insecure and, among ethnicities, Indigenous Hawaiian families have the lowest average family income (Baket et. Al., 2001).*

Considering the realities of food insecurity, I would like to provide some insight into some of the obstacles in the way of establishing resilient systems of local food production in Hawaii. In doing so, it would provide farmers, policy-makers and planners the required knowledge to create holistic, resilient and effective systems of food production. These systems could ensure that food is abundant, production is long-term, the primary source of food production is local and most importantly affordable to all.



## VIII. Literature Review

For ease of understanding, obstacles emerging from the literature review were bucketed under three major thematic headings.

### Theme 1: Obstacles related to land use

#### 7.1 Military land holdings

Historically the island of Hawaii has seen large scale possession of land under the military. These holdings comprise a variety of scales and functionalities, but often have the effect of bringing some degree of disruption to the traditional way of life for Hawaiians.

Catherine Lutz, in her book, “The bases of empire: The global struggle against US military posts” (2009), states:

*The bombing of Pearl Harbor on December 7<sup>th</sup>, 1941, provided the justification and opportunity for the military to finally bring Hawaii under military discipline (Anthony 1955). Plans for concentration camps and martial law which had been in the works for years, were implemented. Large tracts of land were also seized through presidential executive orders, swelling military land holdings to its peak of 600,000 acres in 1944.*

Today the U.S. Department of defense continues to hold onto large tracts of land in the name of military requirements. Over the years, the presence of the military has become such a regularized way of life for Hawaiians, that it is now difficult to divorce the adverse effects of the holdings from the advantages. For many locals, the military has come to imply a source of much needed employment, the only other steady source being the tourism industry (Lutz, 2009).

*According to the U.S. department of defense, the combined services in 2004 had 161 military installations in Hawaii, (Four large, four medium and 153 small installations), covering 6 percent of its total land area. On Oahu, the most densely populated island, the military controls*

*fully 22 percent of the island. The military also controls vast stretches of ocean, including 210,000 square miles of ocean military operating areas and 58,599 square miles of special use airspace around the Hawaiian archipelago.*

The cost of land in Hawaii is high, making it almost impossible for the citizen earning an average wage to own a home on the island. On densely populated islands such as Oahu, the scarcity of available land is a huge contributing factor to the escalating prices.

Drawing from Catherine Lutz's book, "The Bases of Empire: The Global Struggle against U.S. Military Posts", 2010:

*During World War 2, the military seized vast tracts of land for its operations, which resulted in the alienation of Kanaka Maoli from their ancestral lands, the loss of subsistence and cultural resources, and the contamination of air, land and water with toxic waste, unexploded ordnance, and radiation.*

*Militarization greatly accelerated the dispossession of Hawaiian lands. In 1898, the United States seized nearly 1.8 million acres of former national and crown lands of the Kingdom of Hawaii, existing in a kind of legal limbo, these so-called "ceded lands" are held in quasi trust status by the federal government and the state. In 1959 when Hawaii was admitted as a U.S. State, the military retained control of approximately 180,000 acres of "ceded lands" while the rest reverted to the state as trustee (Miyahira 1981-82). Approximately 30,000 acres returned to the state were simultaneously leased back to the military for 65 years (Rohrer 1987). In most cases the rent paid by the military was one dollar for the term of the lease. Today the "ceded land" makes up approximately 54 percent of the military controlled land.*

Today the military has a very notable presence in Hawaii, alongside the tourism industry, it is the second largest employer on the island. As stated above, the Kanaka Maoli have seen a great divide and sense of separation from the loss of their ancestral lands.

## **7.2 Large-Scale Crop Monocultures**

This brings us to the third factor affecting food and farming in Hawaii, which is the large-scale crop monocultures on the island. The film “Island Earth” brings to light some of the aggressive practices at play in Hawaii’s farming industry. Some of these include the large-scale production of cash crops, which are primarily used for the purposes of export. And the over-use of pesticides and fungicides among other chemicals to sustain the large-scale production of crops. Often-times lands are even abandoned once the nutrients have been leached from the topsoil and the land is deemed unusable. Based on the existing research, I believe that local, small scale farms are the way forward. They imply the maximum degree of resiliency since they can survive blight and disease through crop hardiness and variety. The aspect of large-scale land usage and inflation of land prices will be dealt with in the second and third parts of my research.

## **7.3 Land ownership under the Bishop trust and the Kamehameha schools**

The Bishop trust is a charitable trust formed on August 1<sup>st</sup> 1895, under very unique circumstances. The trust was created by Princess Bernice Pauahi Bishop, the last direct descendant of Kamehameha I, the 18<sup>th</sup>-century king who had unified the islands. The Princess married an American adventurer and banker named Charles Bishop against her family’s wishes. When she died, she left more than 400,000 acres of royal lands in trust to create a school.

Thus, was born the family of schools known as the Kamehameha schools. The Bishop trust owns large tracts of land, amounting to approximately 8% of the land in Hawaii (Todd S. Purdum, 1999). The wealth of the trust is now valued at over \$6 billion total (Todd S. Purdum),

all for the benefit of the Kamehameha schools, a 3,000 student institution for boys and girls in the lush landscape of Hawaii.

The trust was originally created to benefit Hawaiians, a population whose numbers had dwindled drastically on account of diseases brought in by white settlers. However, she did not explicitly specify that the school should give preference to native children. Even so, preferential treatment has been the practice of the admissions team for about 115 years. This is a practice that has sparked much debate over the decades.

For most of the history of the trust, the estate had been land-rich and cash-poor, but in the early 1980's the United States Supreme Court upheld a state law that forced the trust to sell off land to homeowners who had leased it for years (*Hawaii Housing Authority v. Midkiff*, 467 U.S. 229 (1984)), this generated a large amount of income for the trust.

#### **7.4 Shrinking agricultural lands**

On Kahului, Maui and other Hawaiian Islands, large tracts of farmland lie fallow, now proof of the death of Hawaii's once thriving plantation era. The last of the plantations met their end around 2016 when the state's last remaining sugar grower shut down a 146-year-old operation.

The sugar and pineapple plantations were once the state's major economic driver, However, today these lands are not redeveloping to accommodate diversified agriculture. As evidenced by the map in figure 4, Hawaii's total land use for agricultural production has shrunk by approximately 68 percent. This data is sourced from the Hawaii State office of Planning, Hawaii Statewide GIS Program and corroborated by the University of Hawaii.

Currently the seed corn industry dominates the state's agricultural land use, followed by commercial forestry and macadamia nuts. But none of these crops, even when all the crops

cultivated are combined, comes close to filling the economic and land use void created by the loss of sugar and pineapple. Department of Agriculture Director Scott Enright says:

*"There are tens of thousands of acres of good ag land, at least, currently sitting fallow in Hawaii, where we have some of the most expensive land in the world, at the same time, we've got a group of farmers who are aging out of the business. The next generation is coming in and finding if you're going to try and start up a farm when you're a 20-something with no track record, the banks aren't going to lend to you. That's a problem for us."*

Some areas of agricultural land have been sold and redeveloped under residential or commercial use, researchers fear that Hawaii's agrarian past could be lost to a more urban future (based on interview response). In 1980, Hawaii hosted 14 sugar and 4 pineapple plantations that farmed more than 300,000 acres. In 2017, the two crops account for less than 5,000 acres (Lyte, 2017).

When referencing the map in figure 4 comparing the total areas under cultivation, the sum for 2015 is 913,237.68 acres which is 43.77% less than the 1978-80 sum of 1,624,191.096 acres. Looking at the mean farm size, the mean size for 2015 is 181.77 acres, which is a whopping 76.19% less than the 1978-80 mean size of 763.61 acres. In figure 4, the non-agricultural lands are seen in brown, the agricultural lands for the year 2015 are seen in green, which are overlaid on the agricultural lands for the period 1978-80, seen in yellow. Hence the lands seen in yellow are effectively the amount by which the agricultural lands have shrunk. Judging from the map, it is clear to see the staggering shrinkage of land under cultivation in the period between 1978 and 2015.

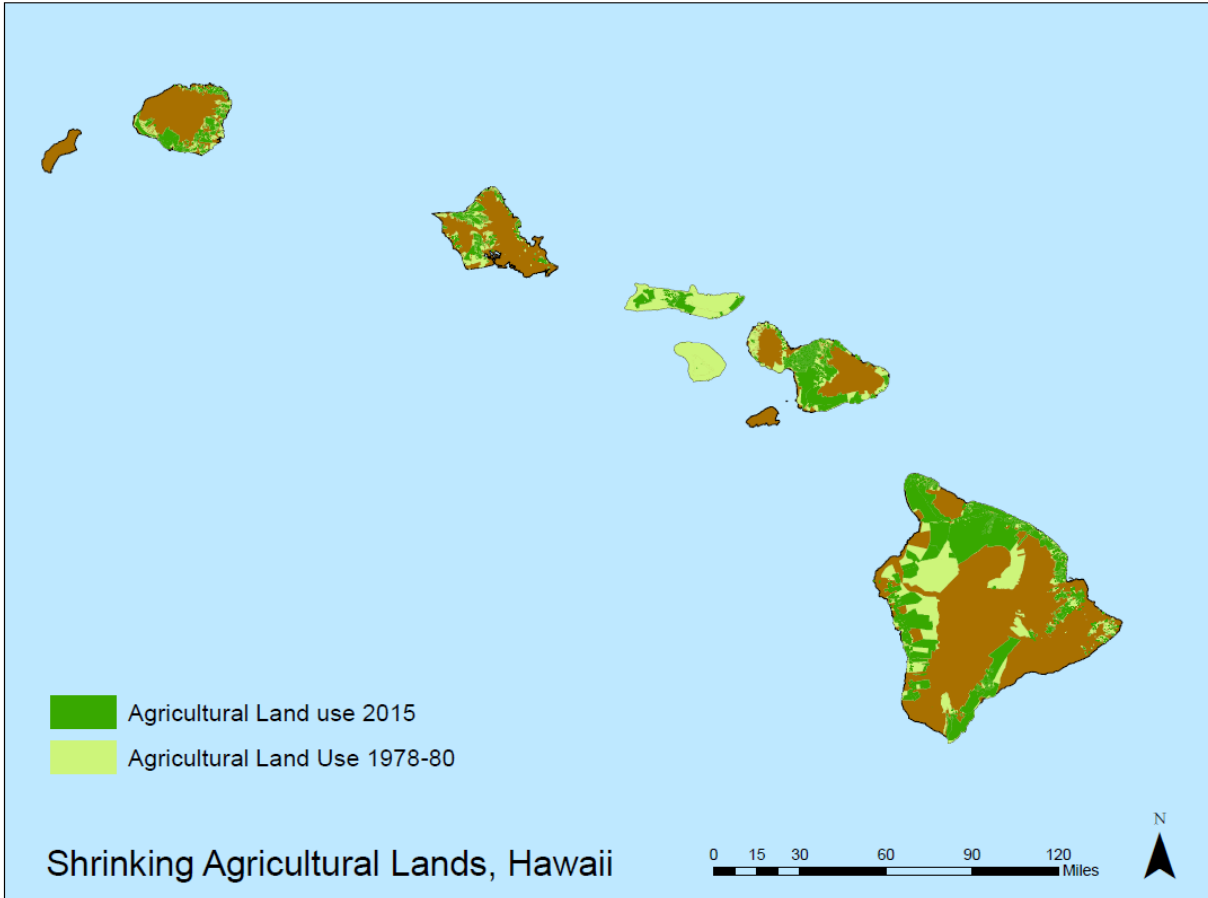


Figure 1: Shrinking Agricultural Lands, created by Kirthana Sudhakar, 2020, data source: Hawaii State office of Planning, Hawaii Statewide GIS Program. Retrieved from <http://geoportal.hawaii.gov/>

## **Theme 2: Policy related obstacles**

### **7.5 The Jones Act**

The institution of maritime law as a protective measure for domestic shipping, has a long history in the United States. This dates back to 1789, when the first session of Congress imposed duties and taxes on foreign built, foreign flag ships engaged in U.S. Atlantic coast trade. Post-World War I, under an 1817 Act Concerning Navigation within the United States, the law required that domestic shipping be conducted only with U.S. flagged vessels. Essentially, only U.S. built ships could be flagged, and so, by implication, the Act barred foreign competition. Iterations of this law have been restated through the course of history, with updates and addendums. Hence, although we know of the Jones Act or Merchant Marine Act was enacted in 1920, this policy has in fact, influenced global economy for over two centuries. The Jones Act requires that all waterborne shipping between points in the United States, be carried by vessels built in the United States and owned and operated by Americans.

The Act deals with “Cabotage”, which refers to the transport of goods or passengers between two places in the same country by a transport operator from another country. A 1986 study by Jackson McKetta addressed speculation that the Jones act has particularly harmful effects to non-Contiguous states such as Alaska and Hawaii, which rely heavily on expensive cabotage services to import most of their consumption and capital goods. In recent times, the act has become a particular point of contention with regard to restrictions imposed on the economies of the United States territories such as Guam and Puerto Rico.

In Justin Lewis’s paper titled “Veiled Waters: Examining the Jones Act’s Consumer Welfare Effect”, the author proceeds to estimate how the price range of domestic cabotage

services would differ if the Jones Act were not in place. He adopts the method of “shadow pricing” which simulates the removal of the Jones Act compliance costs, while adopting measures of market elasticities from the international trade commission’s Computable General Equilibrium Model. The findings indicate that without the Jones Act in place, coastal water transport in the United States would be approximately 61% cheaper, and that consumers using these services would stand to gain a minimum of approximately \$578 million annually, in economic benefit.

With respect to Hawaii, a 1988 General Accounting Office publication shows that an average Hawaiian family pays between \$1,921 and \$4,821 more than its mainland counterpart (Oyedemi, W. O. (2011). Cabotage regulations and the challenges of outer continental shelf development in the United States. *Hous. J. Int'l L.*, 34, 607.). Representative Gene Ward of Hawaii claimed that Hawaii residents subsidize the Jones Act by about \$1 billion per year; and because of the high price of goods due to the Act, this amounts to about \$3,000 per household in the state (Frittelli, J. (2013). *The Jones Act: An Overview*. CRS Report RS21566, 8.).

The Deepwater spill disaster of April 2010, spurred by the failure of a blowout preventer, causing a bubble gas leak to ignite an oil rig, resulting in an explosion that killed 11 crew members and left 17 others injured. Many believed that restrictions imposed by the Jones act, delayed the rescue and disaster management efforts significantly, which might otherwise have been attended to by Belgian, Dutch or other European vessels (Lewis 2013). In 2017, hurricane Maria caused widespread damage to Puerto Rico, here too, the efforts towards disaster relief were delayed due to the regulations mandated by the Jones Act. On September 28th, President Trump temporarily waived the Act towards relief efforts.



While the Jones act may have been intended as a protective tariff, today, the Act has served to prevent the development of competitive trade, and has inflated the cost of living, and especially of basic amenities such as food, in U.S. territories and non-contiguous regions.

The need for secure ship-building establishments, is one that might have been instrumental in keeping this policy firmly in place today. A second, often undiscussed purpose, is to protect American sovereignty over maritime commerce. These interests include, crude oil from California, grain from the Midwest, iron ore from Michigan and Minnesota, refined petroleum from the East, to name a few (Frittelli, July 8, 2003).

Hawaii has come to depend solely on American vessels in order fulfill all of its material needs, including all food and supplies. Today Hawaii has an ethnically diverse population for several reasons such as Western contact, colonization, immigration and tourism, and so, the region has seen a growing diversity of local cultural expressions (Lutz, 2009). This diversity, often entails cultural appropriation, meaning that the definition of words such as “local” and “traditional” acquire a fluid meaning. In light of the shift in food habits created by imported food, it becomes valuable to examine the progression of Hawaiian food traditions. Historically, the culture placed value on the concept of coexistence with nature as a way of life, and towards fulfilling nutritional, well-being and communal needs. Locals often struggle with the reality of prioritizing food affordability as a deterministic factor in food choice, this was clearly displayed in the results of the online survey conducted.

## **7.6 Restrictions attached to land leases**

Under the State of Hawaii’s Agricultural resource management division, one may apply for “Ag Lots”, by filling out an expression of interest. The site states that filling out a form will ensure that the individual gets notified when any agricultural lots become available. While this

system appears simple enough on the surface, the process is more convoluted than it first seems. To begin with, while the system of providing long-term leases at an affordable cost seems promising, as the website to book leases indicates, currently there are no leases available on any island in Hawaii. Which then brings us to the general lease conditions on the Agricultural parks. To excerpt from the general lease conditions:

*The lessee shall utilize the Agricultural Park lot only for the purposes specified in the lease, in accordance with a plan of development and utilization which, in the cases of original lessees of the Agricultural Park lots, shall be submitted for the administrator's approval prior to the issuance of the lease. The lessee shall not modify or deviate from the plan without approval of the Department and any unapproved modification or deviation from the plan may be cause for the termination of the lease.*

Thus, indicating that it is not permitted to build a residence of any kind on the land. This type of restriction is far from ideal for several reasons. To begin with, farmers must commute long distances to reach their farms. This is because it is difficult to be able to find a rental home that the new farmer can afford to rent in close proximity to the farm. Hence there is a heavy time cost to this mandate. Second, agriculture as a practice is a heavily labor and time intensive process. Hence missing out on the opportunity to live and work on the farm has heavy implications in terms of reduced productivity for farmers. Third, agricultural theft is a big problem and reality for Hawaiian farmers, hence the costliest aspect of this mandate is not being able to ensure the security of the farm, which would require farmers and laborers to live on the farm. Drawing from a Hawaii News Now article, "New farmers face obstacles to landing agricultural leases", a farmer laments:

*"Living on the farm land is, I think, one of the main things that Hawaii has gotten away from and that's posing a big obstacle to starting up farming."*

## 7.7 Challenges in establishing local food supply and the midday meal program

A recent opinion editorial by Sandra Lee Kunimoto, chairperson of the Hawai'i Board of Agriculture, summarized the benefits of "buying local":

*"Purchasing locally grown produce keeps the money flowing through our community. When you purchase foods grown elsewhere, you are supporting agribusinesses in other areas. Also, the nutritional content of locally grown foods is often higher, since many vegetables begin to lose their nutritional value after they are picked." (The Honolulu Advertiser, August 14, 2008)*

Additionally, consuming and producing more locally grown foods may decrease the "food miles" involved in transporting foods and thus may conserve energy and reduce our carbon footprint.

Hawaii, has only one school district which includes all 255 regular public schools throughout the Hawaiian Islands. The Hawaii Department of Education (DOE) ranks as the ninth largest school district in the nation, based on 2012-2013 school year enrollment figures, and is the only Statewide school district in the country. Hawaii also has 34 public charter schools and approximately 100 independent schools, most of which offer food service to their students.

The DOE's School Food Services Branch (SFSB) is the only authority for all regular public schools in Hawai'i managing school food. SFSB feeds about 100,000 students and school staff every day. Assuming 1.2lbs per meal, this translates to 120,000lbs of food each day. To promote efficiency, the DOE has generally sought school food contractors that can supply the entire district with a given item or category of items. While efficient, this approach constrains the DOE's ability to procure local food, as local food production levels generally cannot support procurement for the entire district.

Demand for local food in Hawaii exceeds supply. Hawaii imports approximately 85 percent of the food consumed throughout the islands, according to estimates by the Rocky Mountain Institute (Island of Hawaii Whole System Project Phase I Report, March 2007). Food distributors interviewed by The Kohala Center have reported that papaya is one of the few local crops available year-round. It is unlikely that any farm in Hawaii could consistently supply enough of a single crop for the entire school district or that local food distributors could consistently aggregate a sufficient quantity of local crops to supply the entire district.

### Theme 3: Systemic issues

#### 7.8 Invasive species and pests

The ecosystems of Hawaii and other Pacific islands have been greatly affected by invasive species, and ongoing deliberate plant introductions make it likely that additional pest plants will become established. To provide some context on the matter of invasive species and pests from Kimberly Burnett's "Prevention, Eradication, and Containment of Invasive Species: Illustrations from Hawaii":

*Hawaiian ecosystems provide excellent grounds for studying the economic consequences of ecological change due to invasive species for several reasons. These ecosystems developed in relative isolation, and before human-aided transport, species had to traverse approximately 3,000 miles of ocean desert in any direction before reaching the islands and becoming established. Human manipulations, including purposeful and accidental introductions, which began only with the arrival of Polynesians around the fourth century AD, are fairly well identified and understood. The limited geographical scale and incomplete biota (e.g., the only pre-contact mammal present in Hawaii was a bat, now extinct) render ecological changes both visible and potentially severe. Under such isolated conditions, adaptive radiation has generated unique biodiversity in the flora and fauna that is particularly fragile and susceptible to biological invasion.*

Fruit flies are among the most economically important pests, attacking soft fruits worldwide (White and Elson-Harris,1992). Of the fruit flies, four species in particular have been devastating Hawaiian agriculture for over 100 years by infesting more than 400 different host plants. These fruit flies include the Mediterranean fruit fly or medfly, the melon fly, the Oriental fruit fly and the Malaysian fruit fly.

These fruit flies cause damage in three ways in particular; they jeopardize the development of a diversified tropical fruit and vegetable industry; they require that commercial fruits undergo quarantine treatment prior to export; they provide a breeding reservoir for their introduction into other parts of the world due to unprecedented travel and trade between countries.

Finally, the widespread importation of fresh produce into Hawai'i greatly increases the risk of introducing harmful invasive pests that could unleash devastating effects on the islands' agricultural economy and their fragile ecosystems. The unwelcome introduction of fruit flies, miconia trees, coqui frogs, red fire ants and varroa mites have severe consequences beyond agriculture and require hundreds of millions in public dollars to fund eradication or containment programs.

## **7.9 Lack of Labor**

According to the United States Department of Agriculture, the average wage paid to agricultural labor during the reference week of January 6-12, 2013 was estimated at \$14.84 an hour; down \$0.21 from the estimated wage rate in January 2012. In the second quarter of 2013, the wage rate decreased further to an average of \$14.72 an hour. The United States Department of Agriculture attributes the drop in wage rates to the current status of the job market, and agricultural producers opting to hire more contract labor instead of maintaining workers on their payroll. The same reason was cited for the drop in hired agricultural work force over the same period. The hired agricultural workforce was estimated at 6,200 workers during the week of January 6-12, 2013, and 6,000 workers during the reference week of April 7-13<sup>th</sup>, 2013. These totals correspond to a decrease of 100 workers in January, and 500 workers in April from the estimated number of agriculture workers in Hawaii during the respective reference weeks a

year ago. The estimated number of sugarcane and pineapple workers in January 2013 was estimated at 800 workers, up 50 workers or 7 percent as compared to the previous January. This number of sugarcane and pineapple workers remained steady at 800 workers through April 2013. In January 2013, all other (diversified agriculture) hired workers decreased by 150 workers or 3 percent compared to January a year ago. During the second quarter of 2013, the number of workers hired in diversified agriculture industries declined by 200 workers or 4 percent compared to January 2013.

Drawing from Azizi Fardkhales' s research on "Food security and self-sufficiency":

*During 2014 to 2016, the author worked with a local farm operation called Naked Cow Dairy in Waianae, Oahu and attended a weekly farmers market in Pearl Ridge. Several relationships formed with farmers at the market led to their participation in interviews. On average the farmers had 3.8 acres in production and often extra land that was not in production. The median farm size was 3 acres in production. The smallest farm was less than ½ acre in production and the largest farmer had ten acres in production. About 75% of farmers had private ownership of the lands they operated on, four of the remaining five farmers operated on privately leased land and one farmer had a public lease. Farmers had operated 7.8 years on average and 5 years median. The longest operation was thirty years and the shortest was less than one year. All but three farms had operated less than ten year and thus 84% of the farmers are considered beginning farmers with less than 10 years in operation at the time of the interview. Almost 90% of farmers were new farmers in that they had not had parents who were farmers or any family or plantation legacy of farming. About 95% of farmers operated with volunteers and interns either from outside the farm or unpaid help from within the family. Intern programs including stipends were often developed by farmers as an extension to existing volunteer programs for volunteers from outside the farms. Some farmers had these programs alongside paid labor; only 58% of farmers*

*operated with paid labor. Almost a third of farmers had non-profit organization and several more had plans of incorporating non-profit status in the future. About 37% of farmers had received grants and in some cases they were not non-profit operations.*

Cases such as these make it clear that it is not financially rewarding to work as an agricultural laborer. This is one of the reasons why there are fewer takers as time goes by. Internship programs are common, but do not solve the problem of transience of labor. Another common occurrence, as gleaned from interviews with farmers, is the practice of homestay labor. This practice involves the reimbursement of labor by providing residence on the property of the farm.

While providing a stop-gap solution, none of these options encourage long term labor agreements. Perhaps a good option would be to have a good amount of funding from the government set aside in the form of a provident fund, perhaps, for agricultural labor.

#### **7.10 Cost of Land, implements and fertilizers**

The high cost of land has always been a constraint to the expansion of Hawaii's agricultural industry. On the islands, approximately 50% of the land under agricultural use is owned by the farm operator, while the remaining 50% of the total acres farmed are operated on rented property.

In order to assess the issue, I have sourced charts from Shawn Arita's paper Comparison of Cost Structure and Economic Performance of Hawaii and U.S. Mainland Farms. In figures 1a and 1b below, the land value and rental rate per acre across different farm sizes in terms of acreage is broken down. The data shows that the value of Hawaii's agricultural real estate is significantly higher than U.S. Mainland farms across all farm sizes. The differences in land rental rates are significantly smaller.



As seen in figure 1, the findings suggest that while Hawaii’s rental rates are significantly higher for small sized farms of 1-9 acres (\$375/acre for Hawaii vs. \$256/acre for U.S. Mainland), for larger farms of 2,000 plus acres they are actually lower (\$22/acre vs. \$28/acre). The average rate across all rented agricultural land, for U.S. mainland and Hawaii are approximately the same, (\$37.4/acre for Hawaii vs. \$37.3 acre for the U.S. Mainland). This evening out is possibly due to the much larger proportion of lands rented by 1,000 plus acre farms on the U.S. mainland. Without counting the smaller-sized farms, the similar land rental rates found for Hawaii are rather surprising, considering the significantly higher value assigned.

This implies that land might not be a significant cost constraint for Hawaii farmers. However, it is very important to note that large land leases are not accessible or affordable for new farmers. Hence if cheap rental rates are not accessible to new farmers or others wishing to expand, the costs may not comprehensively reflect the relative differences.

Implements and fertilizers that must be imported are also much higher than their mainland counterparts. More to be covered on this in the findings section.

Figure 1a. Agricultural Real Estate Value per Acre in \$ by Land Size for 2007

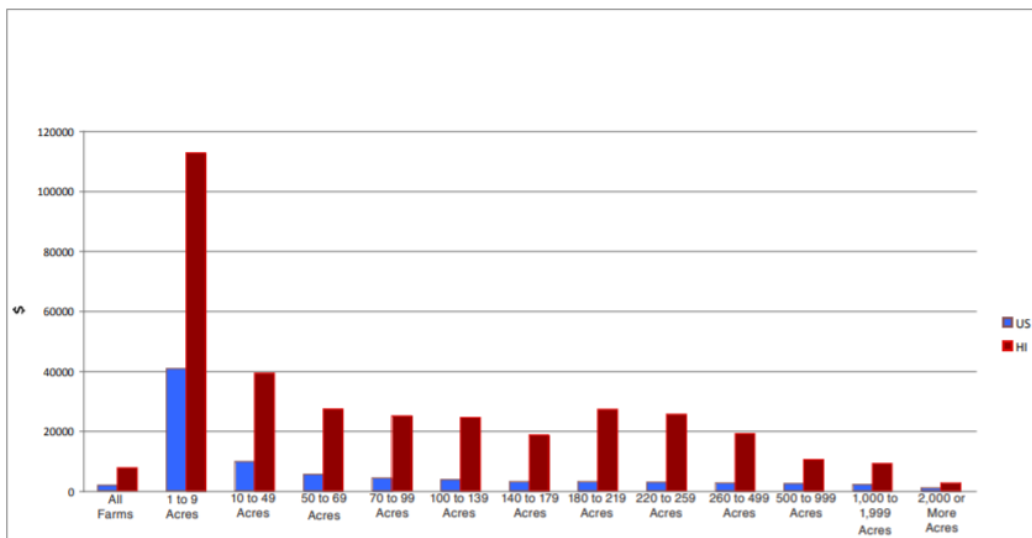
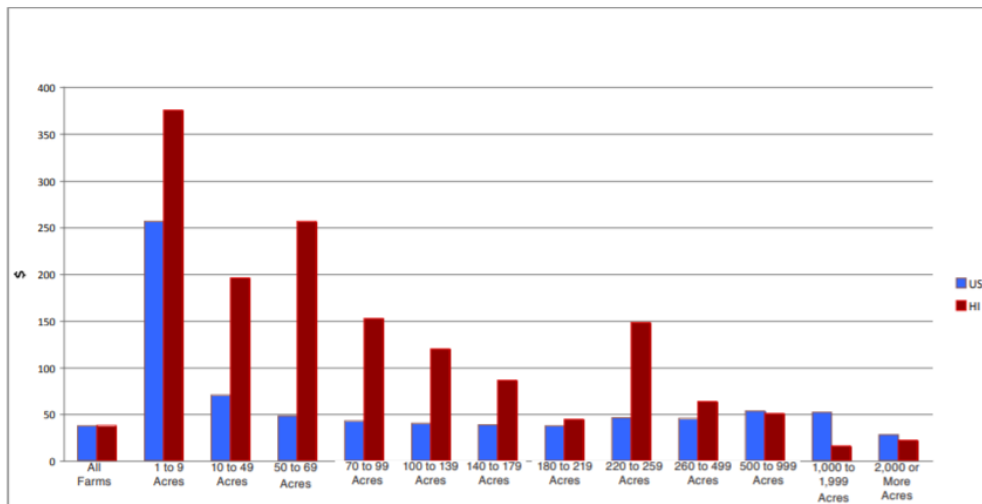


Figure 2a: Source: Arita, S., Naomasa, E., & Leung, P. (2012). Comparison of cost structure and economic performance of Hawaii and US mainland farms.

Figure 1b. Rent per Acre in \$ by Land Size for 2007



Notes. Agricultural real estate value per acre = value of land and buildings/farm acreage  
 Rent per acre = rent expense for land and buildings/farm acreage

Figure 3b: Source: Arita, S., Naomasa, E., & Leung, P. (2012). Comparison of cost structure and economic performance of Hawaii and US mainland farms.

### 7.11 Low cost of food in competing markets

To illustrate this point, I will use the case of papayas. Besides pineapples, Hawaii’s fruit industry produces bananas, papayas, avocados, guavas, and other specialty fruit including lychees, mangoes, rambutans and starfruits. Papayas account for 56% of the non-pineapple fruit industry (Hawaii agricultural statistics service 2000). Enthusiasts of diversified agriculture view papaya exports as the next big potential market to promote.

Papayas have been grown commercially in Hawaii for quite some time, however, they became an export industry only in the 1960’s, with a focus on the U.S. mainland. Papaya production grew steadily year by year until the mid-1980s when a number of problems in Hawaii, including adverse weather, a shipping constraint and a viral disease, threatened the industry.

While Hawaii’s farmers were battling the ring spot outbreak and were embroiled in the irradiation controversy, the popularity of papayas on the U.S. mainland continuously grew

throughout the 1990s. The consumption of papayas increased from 19,500 metric tons in 1991 to more than 79,000 metric tons in 1999. During this time period the papaya imports skyrocketed. Today the U.S. is the biggest importer of fresh papayas in the global market.

Giant food corporations such as Dole and Del Monte Fresh, have listed papayas among their products, however these papayas come primarily from Mexico and to a lesser degree from Central America and Brazil. Brazil's papaya exports more than doubled, and Brazil is now the main supplier of fresh papayas to the European Union (led by the Netherlands, Portugal, the United Kingdom, and Germany). In 2000, Brazil and Mexico were the two largest exporters of papaya in the global market, their joint outputs amounting to more than 80,000 metric tons (Suryanata 2002).

Equipped with newly discovered disease resistant papayas and a new fruit-treatment facility, Hawaii papaya growers are now ready to expand their production to out-of-state markets. However, they are presented with an economic landscape that has completely restructured in the past decade. As recently as 1980, papayas in the U.S. market came exclusively from Hawaii. However, today, Hawaiian papayas account only for 14 percent of the papaya market on the U.S. mainland. The same pattern followed in Japan, the primary export market for Hawaii, where the Philippines has become Hawaii's largest competitor.

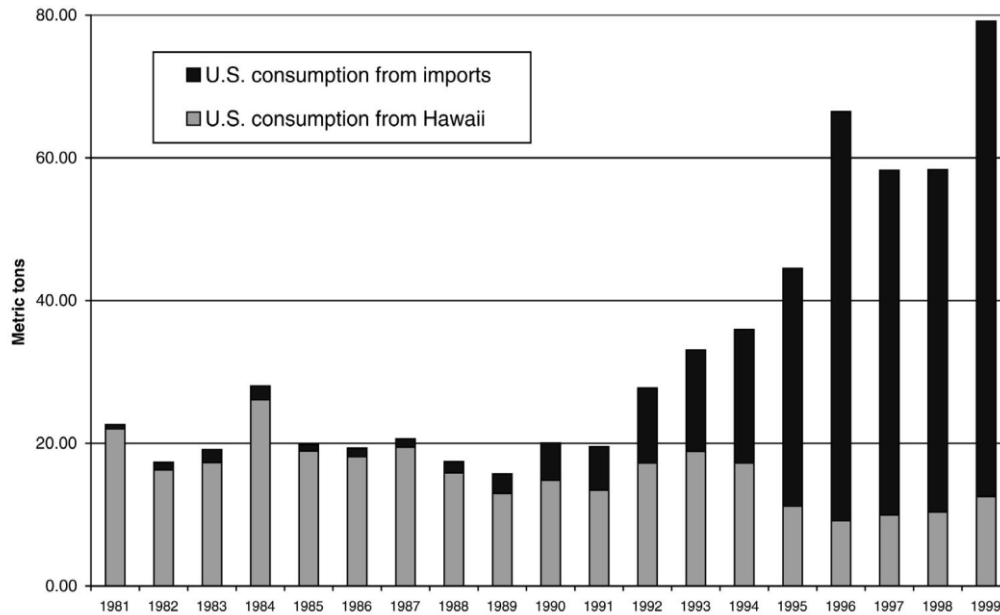


Figure 4: U.S. consumption of papayas. Source: U.S. Bureau of the Census (2000); Hawaii Agricultural Statistics Service (annual)

This tough market competition, in combination with the increase in papaya production has forced Hawaii growers to drastically lower prices. In 1998, the average farm price for papayas was \$1.21 per kilogram, by January 2001, it was \$0.46 per kilogram, which amounts to a 60% reduction in two years (Hawaii Agricultural Statistics Service 2001).

Many would be under the impression that Hawaiian papayas, developed by scientists at the University of Hawaii, are far superior to the quality of the varieties grown in Mexico or Brazil. These varieties such as Kapoho Solo, Sunrise, Sunup, and most recently Rainbow, incorporate such elements as color, size, texture, and sugar content that cater to the tastes of the average American consumer.

However, the most critical problem still remains that the quality of any fresh fruit or vegetable depends on how much it is handled and distributed between the farm and the ultimate consumer. In this respect, Hawaiian growers are at a particular disadvantage compared to the vertically integrated networks of giant food companies. Policies such as the

Jones act, make it difficult to establish efficient networks of distribution. Consumers preference the corporate standards of quality, far higher than the regional or varietal identity, effectively disadvantaging Hawaii's papayas in the marketplace.

## IX. Methodological Approach

In order to conduct my research, I have utilized the following methodological approaches:

1. The use of ArcGis and land-use map-based analysis to perform a spatial analysis of the following factors:

- **Proportion of small to large scale farming operations:** For the purposes of this research, on an area-wise basis, small farms have been defined as farms below an area of 300 acres. This map displays that although there are over 4800 small farms, of a total of 5024 farms, the acreage of small farms is 121,546.06 acres, of a total agricultural acreage of 913,237.68 acres.

In other words, while small farm operations comprise a mere 13.31% of all farm acreage, they comprise 95.5% of the total number of operations.

- **Government-owned lands:** Judging by the data from the Hawaii Statewide GIS Program, the area under publicly owned land amounts to 2,144,102.54 acres while the total acreage of the islands is 4,121,389.98 acres. This indicates that the total land under Government ownership is at 52.02% of all land.

- **Land ownership under the Bishop trust and the Kamehameha schools:** Determining the land ownership under the Bishop Trust was a challenge, as I could not find any indicators either in the literature or the databases. It is unclear whether the Hawaii Statewide GIS Program database includes these lands under the category of Government Owned lands: "state DHHL". Which would indicate that they are categorized under the Hawaiian Homelands. However, this seems unlikely, and further it is not possible to determine exact ownership under these broader categories, so it is impossible to actually evaluate which lands belong to the trust.

- **Shrinking Agricultural lands:** When referencing the map in figure 4 comparing the total areas under cultivation, the sum for 2015 is 913,237.68 acres which is 43.77% less than the 1978-80 sum of 1,624,191.096 acres. Looking at the mean farm size, the mean size for 2015 is 181.77 acres, which is a considerable 76.19% less than the 1978-80 mean size of 763.61 acres.
- **The proportion of land utilized by the military:** This topic posed a challenge in terms of the availability of data that would indicate the amount of acreage under the use of the military. There was scarce data about the exact amount of land under military use although there are many sources in the literature that cite this as an obstruction to land availability.

2. The method of in-depth semi-structured interviews was used to determine local opinions on the various obstacles to establishing resilient systems of food production. In this case respondents were carefully selected through the method of snowball sampling. It was important that all of the interviewees were somehow directly associated with the process of food production. Hence, I selected farmers and researchers, who were actively engaged in finding ways of improving food supply in Hawaii. The sample size for the interviews was 8 respondents.

The questions for the interviews were based on an interview script and the last question in the script dealt with what the respondents could identify as the top obstacles to farming in Hawaii. Much of the discussion is based on the answers to this question.

3. The method of online surveys was used to glean the food-based preferences of locals. The sample size for the online interviews is 17 respondents. The method of snowball sampling was used in order to identify respondents.

This data would help to establish the food and dietary preferences of the locals in contrast to the food that is easily available for consumption. In so doing, I would like to drive home the point that the food that is freely available for consumption does not match the preferences of the local palette, and that the preferred foods should be made more easily available at a lower price.

The surveys also contain qualitative material such as the opinions of local farmers and influencers who have faced food or farming-based struggles in the area. The interviews will then tie into a narrative of the research, to allow me to gain insight into the opinions of locals. Two important findings were that 100% of respondents preferred to consume local produce if the option was available. 88% of respondents indicated that they would definitely like to grow their own food if they had access to the facilities, 12% indicating that they might like to grow their own food, 0% responded that they would not like to.



## X. Findings

### Chapter 1: Obstacles related to land-use

#### 10.1 The impacts of large-scale crop monocultures

With over 4800 small farms (less than 300 acres) in Hawaii, by number, the small-scale farms far outnumber the medium and large-scale farms, as of 2015 the total number of farms was at 5024. However, in terms of acreage, the large-scale farms far outnumber the small-scale operations, as evidenced by figure 5. In the figure, the patches illustrated in yellow indicate farms below the size of 300 acres, and the green patches indicate farms over the size of 300 acres. The total acreage of farms below the size of 300 acres was 121,546.06 acres, whereas the total acreage of all farms was 913,237.68 acres.

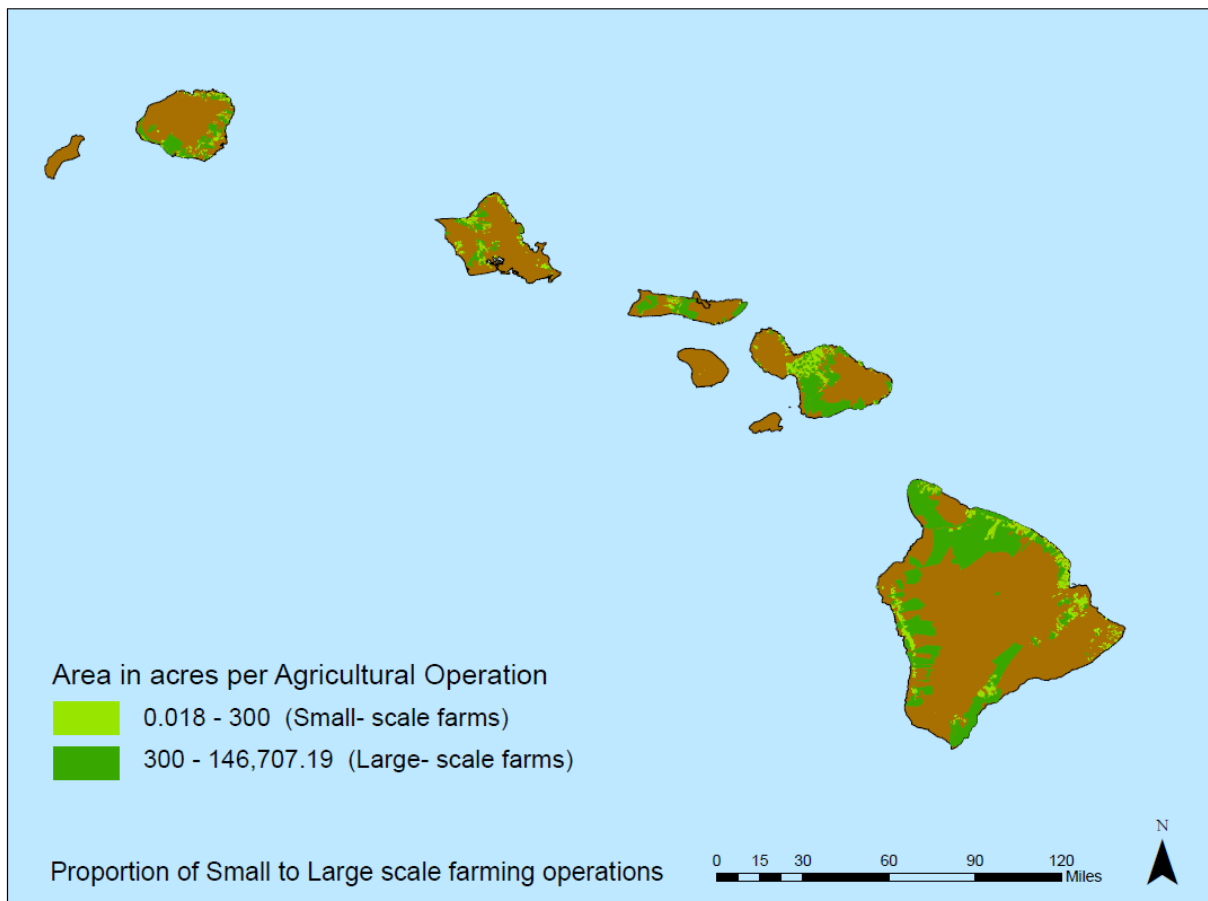


Figure 5: Proportion of small to large scale farming operations, created by Kirthana Sudhakar, 2020, data source: Hawaii State office of Planning, Hawaii Statewide GIS Program. Retrieved from <http://geoportals.hawaii.gov/>

Hence, while small-scale farms comprise 95.5% of the total number of operations, they cover a mere 13.31% of the acreage of all farms. This establishes a number of issues that are pitted against the development of local networks of food production. This is because most large farms cater to the export market alone, producing items such as sugarcane, coffee, macadamia nuts and papaya. To quote from an interview with respondent 6, a Professor and food systems researcher:

*"I'll provide you with a little bit of context if that's helpful, Hawaii is in this sort of post plantation arguably it's been roughly 150 to 200 years since the pineapple sugarcane and other plantations. There hasn't been any other structure to agriculture in our tradition that people remember. And so, it's difficult for smaller scale more diversified food producers here to gain a foothold and achieve economic viability. Now the few large-scale crop producers are doing really well. But there's an estimated 7000 small farms in Hawaii, and most of them are coffee farms producing very small incomes for the family, and producing very small scale produce for the market. So, the diversified agriculture is burdened by the very high cost of production compared to the mainland, primarily California. So, the food system of Hawaii is mainly focused around export driven produce such as sugarcane coffee mac nuts, maybe a few other crops. Biotech seed is a major export. The most valuable crop in Hawaii is transgenic corn seeds. And that's kinda shifting. And its number one still though. A major part of the biotech industry is that they sell the seed corn to you know the other parts of the world that grow it out for all the other products that come from it. So anyway, the food system has gotten very much focused on export commodities. And because of the high cost of production, the imports are probably at about 90% of the total food consumed. High levels of food imports is the tendency, and the way that they're brought into Hawaii is through the port of Honolulu. On massive shipping containers from Matson. So, the way that the food system struggles here is that we're importing overwhelming*

*majority of the food. Most of the food comes in on shipping containers, primarily from California, they come in through the port of Honolulu, it very temporarily stays in warehouses in the port of Honolulu, and then it's onto the shelf and safeway foodland and all of the other grocery retail. There's not commercial food storage here, it's very short term. So, the idea is there's no standing inventory."*

In discussion with researcher and farmer, interview respondent 5, more was revealed about the dismal state of the soils because of the leaching caused by pesticides, fertilizers and herbicides. This is another huge issue with the cultivation of lands over 300 acres. The land cannot be tended to manually and is usually treated chemically in lieu of manual labor and organic fertilizers. To quote from the interview:

*Well, I mean there's probably like a grocery store and their schools and it's not a large population. And it was all sugar. And then it was in what? I'm sorry, it was pineapple. The whole Island was pineapple, but pineapple has gone too, because we can't produce pineapples as cheaply as third world countries can. So, all of that, all of the sugar, pineapple and, and those lands that were vast tracts on every Island. Um, they are not just good farmland. The amount of chemicals that were put on those soils for many, many, many, many, many years, those soils have to be remediated and there has never been any work done on that. Um, by the university. No one has said, Oh, maybe we should look at this. What can we do to pull the arsenic out of the soil in this whole area? Because arsenic is the one that's really high, especially on this Island. They would spray it from the air as an herbicide.*

*So, the lands that you do have are degraded, but they could be brought back. You take work. But it could happen, especially if there was incentive and interest in bringing back these lands and like the County, you know, the County could have sold off those lands. They got vast tracks of lands and instead they just, you know, they sold the Kamehameha schools because it was the*

*easiest thing to do. Subdividing a piece and putting it in a road and a water system and electricity. It was just like too much for them. They're not planners and not architects. They're not, we don't have people like you, the County, looking at this as an opportunity.*

In addition, currently Government subsidies favor large-scale farms over small-scale farms in terms of providing subsidies. Excerpting from respondent 5's interview:

*Most of our farms are small. They're one to nine acres. But then one big farm throws the whole thing off. If you look at the, what do they call it, the median or my statistics days. But yeah, I think between 80 and 90% of the farms in Hawaii are small. Okay. Yeah, I think that would be pretty easy to corroborate with USDA statistics. So, so since we know that that's true yet the policies at the legislative level are favoring only the big farms in terms of subsidies.*

Taking into consideration all of the above information including the mismanagement of soils, the indiscriminate spraying of pesticides and fungicides, and the focus exclusively on cultivation for the export market, I believe that it would be best for the state of Hawaii to make the shift to small to medium scale, locally focused, mixed cropping. Of course, it might be unrealistic to anticipate that this shift may happen with 100% of the agricultural land, however it would be wise to incentivize small to medium scale farming through policy, tax and other incentives.

Talking about the challenges faced especially by medium scale farmers, we have an excerpt from an interview with respondent 4, a researcher:

*In a sense, going back to small scale farming can be very challenging in these conditions, right? Certainly, well in a sense small holder umm taking sort of a try-it -all sort of an end of the 19th century analysis, peasant farmers at the time, would self-exploit. So small holders because they're not necessarily capitalist farmers, continue to exploit themselves in the system, when the budget gets tight. But with capitalist operations, commercial operations, they just shut down. So,*

*from having this landscape of many small operations will probably continue to persist in this new marketplace flooded with foreign capital backed local food. But the ones that are going to face most challenges are the currently larger scale operations here, that are an order of magnitude larger than all of the small holders, but an order of magnitude smaller than these new wave foreign investors.*

This alludes to the challenges that medium-scale farmers are likely to face in the future from “new-wave” large-scale farmers fueled by foreign investment. The risk here is of these interests completely overtaking the market and effectively killing off small and medium-scale operations.

## **10.2 Government land ownership**

On inspection of figure 6, one begins to notice that the land under the ownership of the Government in Hawaii is considerable. Judging by the data from the Hawaii Statewide GIS Program, the area under publicly owned land amounts to 2,144,102.54 acres while the total acreage of the islands is 4,121,389.98 acres. This indicates that the total land under Government ownership amounts to 52.02%.

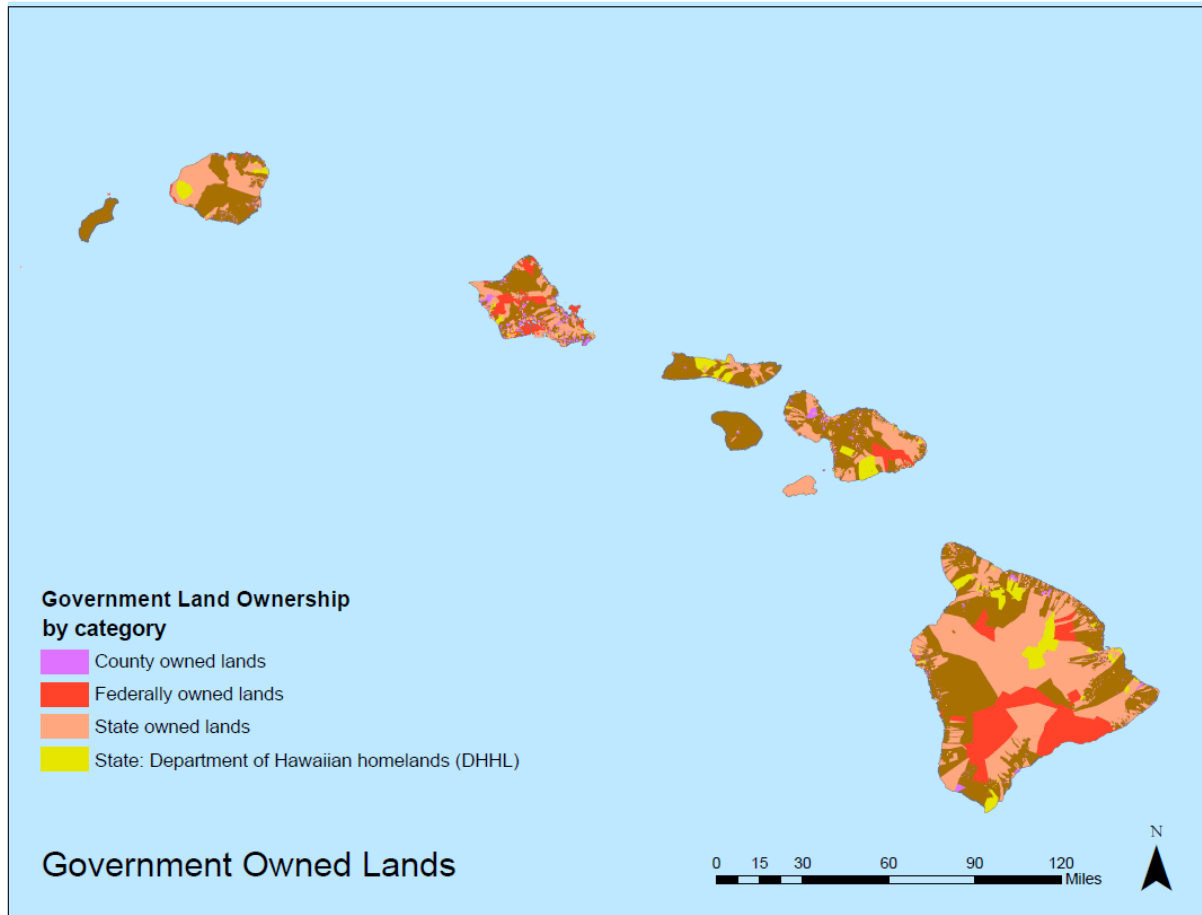


Figure 6: Government Owned Lands, created by Kirthana Sudhakar, 2020, data source: Hawaii State office of Planning, Hawaii Statewide GIS Program. Retrieved from <http://geoportal.hawaii.gov/>

While most of the land under county federal and state ownership has been outside of public reach, the Hawaiian Homelands (indicated in yellow in fig. 6) have been under contention since 1920. The Hawaiian homelands were first established after Captain Cook's arrival in 1778. When Cook arrived, ruling chiefs held lands in trust for the use of their subjects. These chiefs then made temporary land grants to lesser chiefs who then made land grants to land managers, who then made grants to commoners to farm the lands.

In 1848 a land reform act along with Government land sales soon provided many hundreds of Hawaiian chiefs with an alienable title to about 1.9 million acres. By 1893 individual Hawaiians had abandoned, sold or otherwise lost all lands but 369,000 acres (Louis

A. Rose and Sumner J. La Croix, 1995). This decline in land ownership is also in part due to the transfer of acreage to the Bishop Estate (see section 7.4). By 1919, Hawaiians owned only 9.8% of the value of assessed real property.

The Hawaiian Homes Commission Act (HHCA) was enacted by the President of the United States in 1921. Through the act over 203,000 acres of public lands (ceded by the Republic of Hawaii to the U.S. Government in 1898 along with 1.2 million additional acres) was to be held in trust under the control of the Hawaiian Homes commission. This commission comprised the Governor of the territory of Hawaii and his appointees. The commission's task was to lease the lands as homesteads to Native Hawaiian applicants for a term of 99 years at \$1 per year.

As per subsequent changes in the program, homesteading is no longer allowed. It is illegal to have any program on these lands that does not align with the primary land use (agricultural). This makes it very difficult for farmers to tend to their land (see section 7.7). In addition, the lands under the trust are not being distributed among needy Hawaiians. Rather only limited parcels are currently being offered out under temporary leases, and the leases must expire for new farmers to have access to agricultural leases through 'ag parks'.

While vast tracts of Government owned land fall under the ceded lands and the Hawaiian Home lands, these lands are not actively being used for agricultural development. This unused, negates the very reason for which the lands were meant to be put to use. The lands were given in trust to the Government, to be distributed among needy Hawaiians.

In addition, the military land holdings on the island are vast. For the purpose of this research it was not possible for me to obtain data as per the exact locations and acreage of military land holdings. However, it is important to keep in mind that this is an issue all the same. Drawing from respondent 5's interview:

*Definitely, the military controls more than any of us realize here.*

*Yes, exactly. Um, and my thinking is, is it really required to have that much land under military holdings? I mean, I don't think that it's going to change in the sense that it's too valuable. The Island is too valuable a stronghold for the military too. But I think it's just a lot of land.*

*The land they own on this Island though, people wouldn't live there. Okay. It's up by the mountains between Mauna Loa and Mauna Kea at and around the 4,000-foot level. It's all rock, you know, it's all lava flows and um, cold and wet. And I mean the trees only grow really small. And so, the military doesn't really control a lot of land around the edges.*

While the interviewee has been an immensely valuable source, I cannot say that I fully agree with her estimation that the military controls mostly land that would be unusable for the purpose of agriculture. Especially on the island of Oahu, the military still has ownership over prime lands on the island. However, it has been a challenge to ascertain what lands are currently under the control of the military.

### **10.3 Land ownership under the Bishop trust and the Kamehameha schools**

As detailed in section 7.4, the Bishop trust was formed on August 1<sup>st</sup> 1895, when Princess Bernice Pauahi Bishop bequeathed 400,000 acres of royal lands in trust to Charles Bishop to create a school. Today, years after the decision to entrust the lands, the lands themselves, often fertile and arable, lie in disuse, fallow. In conversation with respondent 5, I learnt more about the trust:

*The land they own on this Island though, people wouldn't live there. Okay. It's up in the mountains between Mauna Loa and Mauna Kea at and around the 4,000-foot level. It's all rock, you know, it's all lava flows and um, cold and wet. And I mean the trees only grow really small.*



*And so, the military doesn't really control a lot of land around the edges. That's more controlled by Kamehameha schools. They control almost 500,000 acres on the island of the best farmland.*

*Q: Kamehameha schools?*

*Kamehameha schools. So that is the crown lands. Yeah. Or what they call ceded lands. And the crown lands that came down through the queen and, um, those lands were, were put in trust to, and the profits from them would be the education of Hawaiian children. So, Kamehameha schools has schools on Oahu. They have a school here on the other side of the Island, a big school and one on Maui. And then they have lots of preschools and that they're at pretty much a \$10 billion nonprofit. So, I don't, I don't know how it all works. Okay. But they also don't pay the same amount of land taxes that the rest of us do because if they did, we would be wealthy.*

*Q: So, this is a government-controlled organization? or is it a separate organization?*

*It's totally separate. Yeah. It probably has a profit for profit arm and a nonprofit arm. And um, they have holdings all over the United States land and shopping malls and yeah, they're a huge corporation. And you know, the last time they leased farm land here in Kona was in 1980 they opened up one little street, it was like a street that came up and a culdesac. So, it was like dead end on both sides. And around the outside were five-acre parcels. So, there was maybe, I don't know, 12, five-acre parcels in the subdivision. And that was the last time they have ever opened anything. So that's a long time to not open up your farmland. That's right. Yeah. And the state doesn't really develop ag parks. Um, the ag parks here were developed 30 years ago. Probably. It's gotten expensive to develop things, especially if you have to put in infrastructure, roads and water and yeah, I'm not really sure what the answer to this is, but, but I think, you know, if, if there was more, if there was more of an emergency, then there might be more interest from our*

*decision makers to see what they could do to support this. Because after reading these documents that you have on your proposal I mean going back and looking at when they tried to break up, you know, Kamehameha schools or when they tried to, um, wrestle away and condemn land so that it could be resold to smaller and smaller parcels that they were not able to do that, that right. So, it's not like it wasn't tried, it was tried, it hasn't been tried and kind of modern history, that was quite a long time ago. I can't remember the date, but fifties may, something around in there. So, nothing has been tried since then. I mean, the people who live with just below me, the walls, they own the land all the way to the ocean. Okay.*

*It's like \$7,000. Is it ancestral? Then it came to them through their family. And if you go back and back and back, all of the people, a lot of the people right around me here were missionary families. So going back to the early, early times, so maybe 17 hundreds, then, um, the missionaries came from the U S here to first colonize us and you know, to bring the heathens, the good word. Right. And, um, but then they were, they became close to the King. And then in the great Mahali Mahalia, um, 1879, 59, 79, I forget the, and when the King distributed, he, he took his lands and gave them out to his friends. Then they were, they received one of those. And, and what it was, is this, have you heard this word? ahupuaha okay, so I'm like the missionary family across the street.*

*They received this whole, uh, uh, ahupuaha of cavanui in the 18 hundreds on the King. And so, they, over time have sold off some of it. And then a lot of it has gone to family members. So, a lot of people around me are a part of the same family. And remind me what it means. It means that, um, well it's a land division, a land division, one of the many land divisions and it's also a designation of the um, taxation system. Okay. So that once a year during Maka Hickey, which is now when the Hawaiians would, they got four months off, can you imagine having four months?*

*Ah, they're So lucky they got four months off and all the copu system of all the things they couldn't do because there were so much, they couldn't do, could do, couldn't do whatever those, um, the capo system was relaxed and there was easting and games and things performance. And so, during that time that would be a procession of the chiefs of the different districts around the Island and they would collect their taxes at the [inaudible] Ahu meaning the altar puaha meaning the pig. So, you could give them a pig or you could give them some of your, what you grew or, yeah. Is that still in place though? Not for long. But that sort of determines how land is distributed. It's, it was probably, yeah. Because of the great mahele when it happened then these ahupuaha went to different families.*

*And a lot of that land is still in the families. But then it also like on Oahu you've got the five families that overthrew the Hawaiian government. So, you've got the sugar magnets and the, you know the castles and the cooks and the Athertons and the, so there's five different families and they received land too and they still have their land. So, you've still got the land. It's in the big five, they call them the big five. And then the um, whoever were the recipients of the Kings gifts. So, there's a lot of Royal lands that's usable but not being used. Cause no one's D, you know, they're just kind of waiting to develop because they know if they wait land will become more expensive and then they can't get more money for it. Yeah. It's just business sense.*

*But the government doesn't have a way to sort of take control of that. They tried that, right? They tried that with those two different, the case with, um, what was that called? Midkiff.*

*I think that was successful. They were successful in that one case.*

*Respondent 5: I don't think so. Not really. Because otherwise we would, there would be, it would be different today. I mean these lands are still in the hands of the large land owners who have not*

*been forced under any kind of public law to offer their lands for sale. I mean it seems like if they wanted to, they could make so much money, but you know, it's like, so a lot of this Island was in sugar cane. Right. Until, because that, that's the other problem, did respondent 6 talk about the plantation system. No, no, because I know, right. So, I mean, the basis of agriculture for Hawaii is you have the Hawaiian agriculture where, where you have almost as many people as live here today. Back then, like in the 16 hundreds probably before. Um, so many of them died off from diseases that came in with foreigners, but, and they were, you know, they were food self-sufficient for a very large population. But then after that came in the plantation systems, so in, in the sugar. And so then you had all of these people, immigrants coming from, especially Asian countries to be the workers on the lands and Chinese and Japanese and Filipinos and um, they all came and it was a rough life. It was not easy to work on the sugarcane in the fields.*

*And then when sugar went out because it just, we couldn't compete with other third world countries on the open market and for sugar. I mean it just wasn't viable. Even with the subsidies that the federal government was giving our sugar companies, they couldn't stay in business. I think the last one closed in 98. Okay. So maybe 20 years ago. And so there was vast tracks of land on the, especially on the other side of the Island that was all in sugar cane. And when Houma Chui sugar closed, which was a very large a sugar company on the other side, they had a lot of back taxes that they couldn't pay. And so after going through the courts, um, the court ruled that the County of Hawaii could receive all those lands, all the lands in lieu of the baptizes for the state. And the County was given the choice to sell, assign, lease, give away whatever, all those lands.*

*And they didn't do anything with it. They sat on the lands for about the first 10 years after that judgment was made. And then the, the idea came in to put in the, um, eucalyptus trees and make*

*eucalyptus tree plantations on that land. And so, the County put up parcels for sale, but they were huge parcels and the only person who could afford to buy them was Kamehameha schools. So, Kamehameha schools owned most of the farm land there. And when they got the rest of it from the County, because they could afford to buy these large parcels, then they started putting in these 400,000 acres over there. And now in eucalyptus, the reason they did it was to have the industry of making plywood with a veneer on top. But the um, the funders of the, um, plants of the manufacturing plants at the last minute after the lands had been purchased and the baby trees had been put in, all of the, um, funders pulled out. So now you had 400,000 acres of trees and no industry, nothing to do with them.*

Today vast tracts of land lie unused, under the ownership of the Bishop Trust. Several Hawaiians pay the price for this, as there is less available land. This then translates into the inflation in cost of the available lands.

#### **10.4 Shrinking Agricultural lands**

When referencing the map in figure 4 comparing the total areas under cultivation, the sum for 2015 is 913,237.68 acres which is 43.77% less than the 1978-80 sum of 1,624,191.096 acres. Looking at the mean farm size, the mean size for 2015 is 181.77 acres, which is 76.19% less than the 1978-80 mean size of 763.61 acres. In figure 4, the non-agricultural lands are seen in brown, the agricultural lands for the year 2015 are seen in green, which are overlaid on the agricultural lands for the period 1978-80, seen in yellow. Hence the lands seen in yellow are effectively the amount by which the agricultural lands have shrunk. Judging from the map, it is clear to see the staggering shrinkage of land under cultivation in the period between 1978 and 2015.

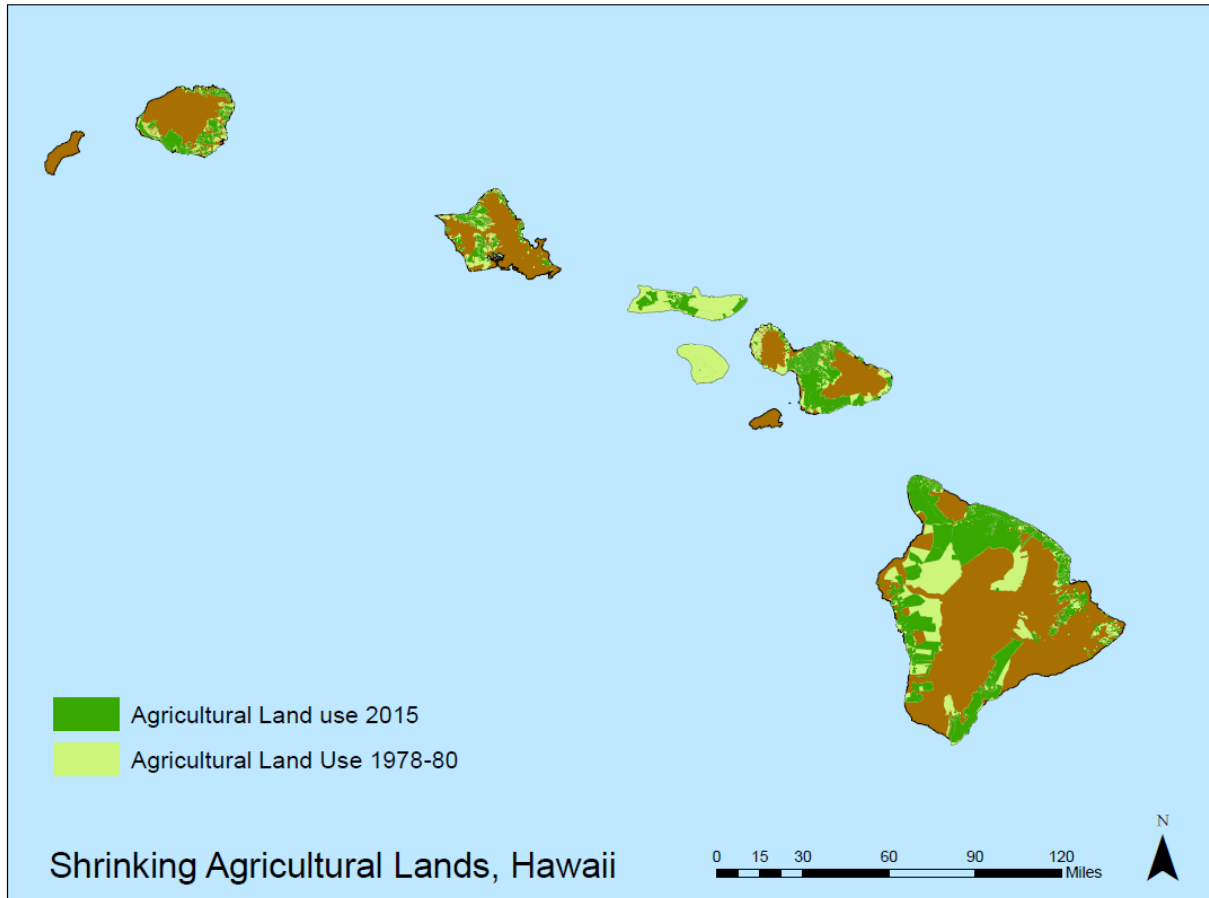


Figure 7: Shrinking Agricultural Lands, created by Kirthana Sudhakar, 2020, data source: Hawaii State office of Planning, Hawaii Statewide GIS Program. Retrieved from <http://geoportal.hawaii.gov/>

While there is some consensus over the fact that agricultural land must be preserved, the more contentious point of discussion is whether it is better to have small to medium scale establishments or to have large scale establishments. While I am of the opinion that small and medium scale farms are favorable as they encourage practices such as intensive mixed cropping, permaculture and organic farming, this might not be the norm. During the interview with respondent 4, a researcher, a different viewpoint was expressed which I found to be quite interesting:

*I guess that, I felt like for a long time, my work in permaculture focused on the site, the farm, the house the school the particular community, and obviously integrated with the neighborhood*

*community, how do you interface, but there wasn't as much consideration about how the broader systems interacted. And I feel like now, oftentimes there's almost an active ignorance as to how the remainder of the world functions, right? I know how to make a bunch of toilets, but it wasn't as familiar with how municipal waste water systems function, and there your understanding becomes incomplete. So, after my masters, my attention shifted more from Urban planning to a broader development, zoning, agricultural land-use, zoning lots. You know on the island of Oahu, when large agricultural parcels get taken out of use, and cut into smaller and smaller pieces, often for residential use, it becomes impossible to ever put them back together again to a productive landscape, they just become agricultural lands that are used for residents and only have residential uses, and so in that way, the large monoculture operations here, seeds for example, function as a land protection mechanism, in pretty much every case that these large plantations have shut down, the ag land is not used for large agricultural operation, and gets chopped up into small pieces and sold off for housing, kind of creating housing out of the agricultural land stock. It's certainly not my preferred type of production, or use, but it's at least banking the land, and ensuring that it'll be used for agriculture first, atleast there's possibility of it being used for agriculture in the future.*

This conversation really opened up my eyes to the reality that large agricultural lands act as an effective way to essentially provide a mechanism for land banking. Resultantly, saving the land from fragmentation and encroachment by other uses such as residential or commercial use. In practice I would say that the idea of having a mixture of small, medium and large scale farming establishments provides a great balance whereby the small and medium scale farms, when interspersed with larger farms are effectively provided with protection from encroachment or dissolution through sale.

## Chapter 2: Policy related Obstacles

### 10.5 The Jones Act

As detailed in section 7.1, the Jones Act has been active in one form or another since 1817. Post-World War I, under an 1817 Act Concerning Navigation within the United States, the law required that domestic shipping be conducted only with U.S. flagged vessels. Essentially, only U.S. built ships could be flagged, and so, by implication, the Act barred foreign competition. Iterations of this law have been restated through the course of history, with updates and addendums. Hence, although we know of the Jones Act or Merchant Marine Act was enacted in 1920, this policy has in fact, influenced global economy for over two centuries.

Through interviews with farmers and researchers I was able to get more insight into how the Act affects local farming practices. In conversation with respondent 7, a farmer, I learned how the act affects the cost of everyday implements for farmers:

*Q: The Jones act, that's what brought me to Hawaii, actually when I found out about it, I was quite shocked because it restricts the, amount of trade that Hawaii can do with other countries.*

*What is your opinion on the same?*

*I mean, this is a pallet here of plastic owls just used a week just testing how the chickens react to these plastic solar owls at squawk and move their head to ship This pallet here is \$1,000 to ship it from, from China to here, from China to LA is \$300. That's the Jones act. So it's the whole thing is absurd, and we get some of the best shipping rates in the world because I have these incriminating pictures of the owner and the shipping company coming to my third birthday party. You know, we go back a long time, so we get really good rates, but it's still, it's absurd. You know, I think politicians are just waking up to it just as the, the economics, despite what the media says and uh, are, are pretty bad.*

*Q: Well, what do you see as some of the biggest obstacles are to local farming?*



*Yeah, well the Jones act is, is definitely one because of the cost of inputs of, of to get fertilizers and to get the equipment, to get pots. Um, there's a lopper of big orange handled actually the black handle or the one next to it, it's \$180 here or the pickers are \$180 here. They're \$27 in Japan. So by the time you get them here with the cost of shipping, they have to sell them for \$180 and some places where usually they work on a 30% markup. Some places still want to work on a hundred percent markup, especially the small local stores because that's what they need to survive too. And the farmers, because they're not, they weren't born into farming. Most of them, most of them came here and retired or they got blinded by the lure of Kona coffee and um, they, they don't follow cost of production or they don't understand the amount of labor that it takes to be sustainable and in farming. And so that whole cost of production thing, that's an obstacle. But for me, it's just buying supplies are so much more here. I mean, when I go shopping, I shop in Japan. Everybody knows your plants are so expensive, much cheaper than Hawaii for those types of things. So, we were talking about the cost of trees, which was something that we could actually do something about. So, the cost of trees being 65 or \$85 here, what do you think they'd be in an economy like Japan for let's say a grafted orange tree? I have no idea. \$7, \$3 Philippines or Malaysia, 75 cents in India at the nursery. Some trees are more, but that's the average, especially for Jackfruit, um, which is getting popular worldwide now. So, it's um, being able to supply things, produce locally. So, we have to learn how to maybe utilizing the ocean to come up with more fertilizers or our own rather than having to import bag of fertilizer from Japan and paying three times more because of the Jones act for it. Then they have the pay in California.*

In this way, the cost of all implements, tools, fertilizers and pesticides, is exponentially increased. This causes an inflation in the costs of operation, and finally to the cost of produce. However, there were some respondents who were skeptical about whether having the act

revoked would have any effect at all. In conversation with respondent 3, I was exposed to a differing point of view:

*So, the Jones act, so, okay, let's say tomorrow they got rid of the Jones act. Okay, so who brings all our food to Hawaii Matson? So, at the moment, Matson brings all the food to Hawaii and they own zillions of boats. So how will that change the cost of food? They own the boats. So, until they build new boats, I don't see it costing more money.*

*I just don't see it affecting our price of food at any time soon cause I'm not sure anybody could get into the market. Since Matson has the market covered. I mean, yeah, I guess if somebody had way cheaper prices maybe, but I don't know the way Hawaii works. I'm not believing it would work, but that's okay. The Jones act thing isn't as big and I don't believe it because I don't think it would, I don't think our food would go down by 60% not even close. I mean in California right now I can go to a health food store and pretty much buy the food at mostly about not that much more. Don't that much cheaper than here in Hawaii. Well not 60% the Jones act does apply to the mainland as well.*

*I know people want to get rid of the Jones Act. I'm just not 100% convinced it's going to change. I mean, I'm not opposed to getting rid of it, but you know, it's there to preach. Obviously, it's there to protect American shipbuilders but are they even that many American ship builders left that are, but then struggling to match the price to costs that are offered by Japan and China, right? Yeah. Well, okay. So, if they get rid of the Jones act, I just don't see a whole lot of other shippers coming in that quickly. I think it would take a long time for it to sort of trickle down to us.*

Other experts are unsure about how much of a price differential the act actually creates.

This estimation is particularly difficult to make, as detailed in section 7.1, Justin Lewis in his paper “veiled waters” estimates this figure through the method of shadow pricing. He claims

that the price of goods would be approximately 61% cheaper without the Jones Act in place. In conversation with another expert, the respondent is surprised on hearing this projection:

*Q: As far as the Jones act goes, do you believe that it affects the cost of produce on the Island?*

*Yeah, so I think really, it's the same, and the reason I say that is because there's not really a resource that looks into the price differential with the Jones act in place. So the link that I sent you for the paper? So that was the first study I saw where people actually came up with a percentage. What I can also say, is generally speaking, I don't think there's a lot of disagreement that the Jones Act causes some sort of price differential. What the author of the empiro study finds that there is some price difference, but in terms of quantifying it I have not personally seen much literature on this. I think everyone can agree that the Jones act adds costs to shipping, but in terms of how much that is, I really don't know. The hard part of an economist studying the Jones Act, is what does it actually look to have a situation where the Jones Act is not in place. It's been in place for such a long time.*

*Q: yeah. Yeah. It's been in place in some forms in the, um, eighteen hundreds, I think, um, before that?*

*1920. It has all sorts of restrictions in place.*

*Congressional research service.*

*Okay. If you haven't seen that paper, you should definitely look into it.*

*Q: I also came across this paper that did a shadow study, which means it compared the prices on the mainland to the prices on Hawaii. And he concluded that there was a 60% inflation, of cost, which is really high.*

*Yeah. Yeah. You say 16%?*

*K: Six zero, 60%*

*Of shoot. I mean I don't know if that sounds right to me!*

In this way when respondents are made aware that it is possible that they are paying close to 60% higher for their products with the Jones Act in place, it seems as though there are far less amenable to the Act. This would quite possibly go unnoticed if the prices of items on the island were affordable, but this is hardly the case.

#### **10.6 Restrictions attached to land leases**

As detailed in section 7.7, one may apply for agricultural leases under the State of Hawaii's Agricultural resource management division. However, these leases, otherwise known as 'Ag Lots' may serve only the purposes of agriculture, thus making it illegal to build a house on this leased land. Several new farmers lament this conditional land lease as this causes great inconvenience for three main reasons. To begin with, farmers must often commute long distances to reach their farms. Hence there is a heavy time cost to this mandate. Second, agriculture as a practice is a heavily labor and time intensive process. Hence missing out on the opportunity to live and work on the farm has heavy implications in terms of reduced productivity for farmers. Third, agricultural theft is a big problem and reality for Hawaiian farmers, hence the costliest aspect of this mandate is not being able to ensure the security of the farm, which would require farmers and laborers to live on the farm.

In order to provide more detail as to the practical aspects of this land lease, I talked to several farmers. On this topic, unlike some of the other topics, all of the farmers were

unanimous in the opinion that this is an impracticable mandate. The following is respondent 3, a farmer's opinion on the issue:

*Land is expensive in Hawaii. We also have one other thing that's really, I think an easily solvable one, but it doesn't, they don't seem to want to do this. So, our state department of agriculture has agricultural leases, so they lease land out to people that want to farm. And it's absolutely against the rules for you to build a house on it. So, I've, you know, you've never been a farmer, I'm assuming. So, you know, you might not understand that you can't have two places you can't like pay rent here and farm over here. I mean, you need to be on your farm, you need to be there to do the work, and for security because there's a lot of farm theft besides, so you don't want to have a farm that's sitting exposed where someone can just come and steal the agricultural crop because that's big. Um, meth, the ice, we call it ice here, but the, you know what? Meth is a huge problem in Hawaii. Well it was a huge problem in the early 2000s and then it kinda got better and it's back again. And it's really problematic. And those people, you know, when you're on meth, you can stay up all night cause it's, you know, it's a speed and you don't, you don't, you're not afraid. You're very bold and daring. You know, you're not, you're not really realistic about fear. You know, they don't, they have no fear. And so they'll just go to some farm and like harvest everybody's fruits or vegetables in the middle of the night, if they're not around or if there's not a dog, you know, something. So, there's a lot of ag theft, a lot of ag theft. It's big. It's a problem that's really hard to solve. You know, the passing these laws about it. And I'm like, yeah, I mean it's just going to happen. And what are the police gonna do? you tell the police? Yeah, I don't, I don't see a lot of solutions to ag theft other than being on the farm and having like video cameras, and you know, whatever, whatever you can have, you know? But yeah, it's real problematic ag theft, but, but this thing of not being able to live on an agricultural lease, cause there's a lot of young people that would like to have those leases, but then they have to find another place to live,*

*you know? And if they would let, if they would just kind of let them build, you know, couldn't be, they're always so worried about, you know, you building something substandard, you know, or that isn't like a big mini mansion or whatever. You know, let people build mini homes, um, farms. So what, get the, keep the land in agriculture, you know, cause if you don't keep it in agriculture, what happens to it becomes houses. It's happening all over the country. It's happening everywhere in the United States. All ag land is being turned into houses now shrinking and shrinking and shrinking and uh, yeah.*

Agricultural theft seems to be a major concern for small to medium-scale farmers, who rely heavily on the security of their modest harvests. Especially with crops such as coffee, vanilla and macadamia nuts, which demand premium prices in the market and involve labor intensive processing, agricultural theft can be devastating to farmers. Respondent 5, a farmer explains some of the possible fears attached to allowing for homes to be built on agricultural land leaseholds. In addition, she provides innovative solutions that may be written into building codes within the policy, to safeguard against the abuse of this provision:

*The County is in charge of, um, codes for building on their Island. So, each Island has a little bit different building code. So, they would have to change their building codes to allow for, um, perhaps smaller dwellings that, um, could be off the grid or, you know, some different interesting ways of getting utilities too and water too. I mean, there, there's a lot of people on the island that are off the grid, so they have their own electrical systems. They have their own water catchment systems, so there's no Wells, but they're catching water from the rain and then filtering it for drinking and use. And so, I mean, there, there are ways, but we just have to change our codes and the counties have been reluctant to do that thinking that people will abuse, abuse this, that instead of it being used for agricultural housing, it'll be used for, um, low cost housing.*

In this way, intricately crafted policy can allow for more humane conditions for farmers, and also, importantly, it would serve to encourage new farmers to take up the profession in more numbers, which is what the state is in need of.

**10.7 Challenges in establishing local food supply and the midday meal program**

As detailed in section 7.8, there are several benefits to consuming local produce. Some of these include enriching the local community, thus strengthening local economies, in addition the nutritional content of local foods is higher, since many vegetables begin to lose their nutritional value after they are picked, consuming local may also decrease the “food miles” involved in transporting food, thus conserving energy and reducing our carbon footprint. When referring to figure 7, it becomes evident from the online survey as well, that people yearn to consume and support local food and growers. With the application of tags such as “locally grown organic” and “personally grown or wild harvested”, an overwhelming 100% preferred some form of locally grown food.

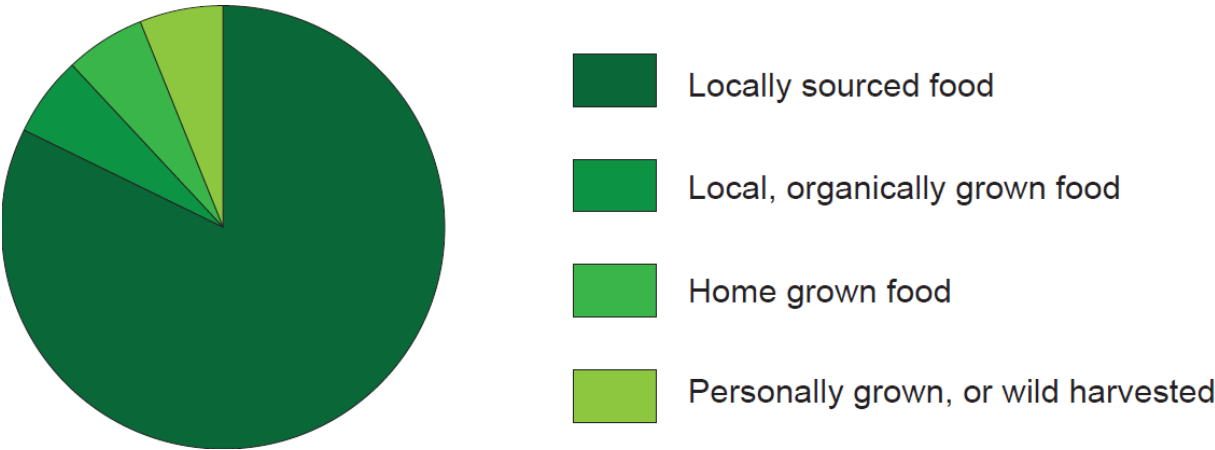


Figure 8: Food Preferences: Local v/s imported produce

However, some anticipate that the preference of the term “local” could lead to other problematic consequences in the future. Respondent 4, a researcher, anticipates that the future for Hawaii will bring with it a flood of large agricultural investments from foreign investors:

*And beyond that, I can tell you a little bit about what my research work is on now. My work is to document this wave of agricultural interest by foreign investors, they're starting production systems at a magnitude of order larger than any of the existing operations in place. They're going to flood the marketplace, with surplus value. Even though we'll have geographically local food, the surplus we'll be accruing through investment capital. Oprah is selling vegetables on Maui. And so, what Hawaii faces is this gradual use of the term “local” where people assume that buying local supports small farms, when in fact the operations that come in are run on lands owned by the richest man in Iowa. We're going to have the local food, but it's not going to be really supporting the people we think it's supporting.*

*Q: In a sense, going back to small scale farming can be very challenging in these conditions, right?*

*Certainly, well in a sense small holders umm taking sort of a try-it -all sort of an end of the 19th century analysis, peasant farmers at the time, would self- exploit. So small holders because they're not necessarily capitalist farmers, continue to exploit themselves in the system, when the budget gets tight. But with capitalist operations, commercial operations, they just shut down. So, from having this landscape of many small operations will probably continue to persist in this new marketplace flooded with foreign capital backed local food. But the ones that are going to face most challenges are the currently larger scale operations here, that are an order of magnitude larger than all of the small holders, but an order of magnitude smaller than these new wave foreign investors.*



In this way, it becomes imperative to find innovative ways to support small and medium-scale farmers. Farmer and activist, respondent 5, suggests changes in policy that would make it possible for local farmers to participate in the supply of school midday meals. As detailed in section 7.8, Hawaii, has only one school district which includes all 255 regular public schools throughout the Hawaiian Islands. Hawaii also has 34 public charter schools and approximately 100 independent schools, most of which offer food service to their students.

The Department of Education's School Food Services Branch (SFSB) is the only authority for all regular public schools in Hawai'i managing school food. SFSB feeds about 100,000 students and school staff every day. Assuming 1.2lbs per meal, this translates to 120,000lbs of food each day. To promote efficiency, the DOE has generally sought school food contractors that can supply the entire district with a given item or category of items. While efficient, this approach constrains the DOE's ability to procure local food, as local food production levels generally cannot support procurement for the entire district.

*and the farm to school piece. See, because that's the other part of it. So, farm to school is changing the food in a cafeteria. In Hawaii we have only one school district. Oh, that's very unusual.*

*K: The whole of Hawaii? Oh, okay.*

*It's as big as probably New York city. More than that. Probably. So. So Hawaii has one school district, Washington DC has one school district. Oh, same amount of schools. 255 in DC or here it's very similar.*

*it has some advantages and lots of problems. It's centralized in Oahu. And so, changing the food system in the cafeteria where the children are eating and introducing locally produced foods into that, into the menu system has been incredibly hard. Mainly because as you have found out, we don't produce very much food here. And the department, the school food services branch of department of education has had a really hard time working with the USDA to create contracts.*

*They do it in all other States. I don't know why we can't do it here, but you know, you contract with the farmer, we need this many pounds of lettuce at these dates and we will pay this much and you deliver it here and you sign the contract and we pay you. I mean it's done all over the United States. That's how this farm to school program is, is growing. And the farm to school program is so important because it's re-localizing agriculture.*

*. I was just working yesterday with a woman, a woman who started an Ulu, the breadfruit cooperative on this Island. The reason she did that was to increase bread fruit production to the point where then she could be on the department of education menu cycle. So they have a five week cycle. Every school in the whole state eats the same thing at the same time. Oh my gosh. There's no local local aggregation. So, everything has to come from Honolulu and the way that they have been doing it and still are there. Right. They're just beginning to make these contracts? So, I was telling you about the way that they had been doing it in the past is they would put out a contract for let's say lettuce and you needed to provide enough lettuce for 100,000 lunches a day. Oh my God. For 255 schools. Oh my God. Well, nobody can do that. Not one single farm. Not any of our farms. Not even the biggest. Larry, Jeff guys, sugar land, not even sugar land. No one was able to do that. So, they were like, Oh, okay, well we'll just give from the mainland. So, they were bringing in everything that was on our menu into Honolulu and because we couldn't have that many fresh things because it's too costly and it's just so then everything was frozen. So, then you know like in the school kitchen, like in one corner you've got a big walk in freezer and in the other corner you've got to walk in refrigerator, you walk into your refrigerator, there's like nothing there. Maybe maybe some onions or potatoes or something like that. And over on the freezer section, even math boxes to the ceiling, tater tots and chicken mc nuggets that we're going to be microwave and serve to the children. And that's what we've been doing this whole time. And that's why we pass the farm to school bill in 2015 I mean it was amazing that*

*the legislature passed our bill creating a farm to school program and the department of ag with a coordinator.*

*But it could drive the agricultural industry here. I mean, it could be like, we're doing this for our kids. On this Island, the children and our schools get 50 over 50% of their calories at school every day. Their total calories. So, school food is important. You know, there's, um, our free and reduced, uh, programs that we have in school, food through the USDA. This is, we have a lot of schools on our Island that are 100% free and reduced. And the way you become a, a child that receives a free or reduced meal is that your parents, their combined salaries have to be 29,000 or less. You can't live on this island for \$29,000 a year. It's just not possible. So now we've got a majority of our schools where the kids are receiving free and reduced. And so, our population here on this Island is getting poorer.*

Farmer and activist, respondent 3, talks about the importance of tax credit to local farmers, and is up-in-arms over the fact that the department of agriculture does not take the time to publicize these tax credits:

*I've been sending out these big blast emails about a meeting. So I'm the president of the Hawaii organic farmers association and we got a grant from the state department of agriculture to go around the state and inform these certified organic farmers that there's this amazing tax credit on the state level and the department of taxation and the department of agriculture, which are kind of working together in administering this tax credit. They didn't tell anybody about it. I didn't tell anybody that. Nobody even knew it was being implemented. I knew when they passed the law four years ago at the legislature, we were excited and I kept calling the legislator, the guy who introduced the bill. I kept calling his office. I'm like, when is this going to come into effect? He never called me back and then I find out a year ago that it's been, it's been in effect for two years and so I call this woman Sh heard, she's the, she's in the marketing branch at the department of*

agriculture in Honolulu. Lappin she is of all the people in the, in the Hawaii department of agriculture, she probably knows the most about what organic farmers do. And she helped us with all sorts of different cost shares and stuff. So, she's probably the friendliest two organic farmers in the state. And I found out about this credit, it was too late to take it for 200 2018 when I found out about it. In fact, I lost \$2,000 I would have \$2,000 in my pocket if I had known about this credit cause that's how much state income tax I paid. So, I call her up. I said Sh, cause she's really good at informing the farmer. She sends out, she sends out 20 emails a day, any, any ag thing she gets, she sends it out to all the farmers. Really great. Sounds like Sh, why don't you tell us about this tax credit, the organic tax credit. And she says organic tax credit. She didn't know she works in the ag department. So, she said, you know, Una, they didn't want you to know. Clearly, they didn't want us to know, even though they budgeted \$2 million a year to get this tax credit to organic farmers. So that in its sense in a sense is a subsidy organic local farmer, which is great. Um, I totally agree. We should have some subsidies. And I'm really big on carbon farming.

Respondent 3 is not alone in pressing for awareness about tax credit. Several farmers such as respondents 7 and 5 agree. Other farmers such as respondent 2, lament about the heavy taxes, such as the state GE tax that farmers exclusively from the state of Hawaii must pay:

*Q: What are the challenges to this type of farming*

*Off the top of my head the Hawaii GE tax. In the state of Hawaii, all people need to pay .4% of their income as GE tax straight to the state. A tax for the privilege of doing business in Hawaii. Every dollar you make, you have to pay a tax on it. For small struggling businesses this is what we're struggling with.*

As evidenced by the conversation, this is of especial inconvenience to new and small to medium scale farmers, but essentially deters agriculture.

## Chapter 3: Systemic issues

### 10.8 Invasive species and pests

In Hawaii imports account for approximately 85 percent of the food consumed throughout the islands, according to estimates by the Rocky Mountain Institute (Island of Hawaii Whole System Project Phase I Report, March 2007). Next to seed corn, the plant nursery industry is a thriving industry. Most of the plants sold are imported to Hawaii, and often bring with them a host of invasive species.

Farmers often cite invasive species and pests as the number one obstacle to establishing successful food systems. Respondent 2 is a farmer who runs a medium scale farm of about 20 acres. She is emphatic in citing invasive coffee berry borers as the number two challenge to farming, after the GE tax. Respondent 3 goes into some detail about the Poona nursery industry and pests known as the Australian Longhorn beetle, the Kochi frog and fire ants:

*So, the number one agricultural crop in the state is the seed corn companies that they have the highest value. Although we think it's rather overstated because they don't actually sell it here. They sell that corn, that corn is sold on the mainland. So, it's very overstated because they're going with the value of the crop way down the line. Anyway, they claim they're the number one. Number two is the nursery industry. So, Poona, which is where the land is super, super cheap, or the lava flow. Last year you knew about that, right? Where the lava flow last year Poona is the home of the nursery industry, so just miles and miles and miles of the, the shade houses with the black shade cloth and little plants inside, to sell to home Depot or whoever, you know, or to landscapers or whatever, you know, lots and lots and lots and lots of, lots of little plants and unfortunately they don't start them from their own little seeds or their own little cuttings. They import them. So, even though they quote unquote INSPECT know they don't inspect every*

*everyone, they're going to it probably just pull a sample out and inspect. So, Poona consequently is where is the gateway for every single invasive species we've gotten in the last 30 years. They all come into the nursery industry, do the importation of plants. This is our biggest, to me, this is our biggest thing. This is a worst thing that's happening, that's happened in the last 20 years and, and it's going to impact agriculture. So, we got the Kochi frog, they got the little fire ant, which is just devastating. It's not the fire and they have on the line. It's much, much, much worse. Um, I got the semis slug, which brings the rat lung worm disease. They got the, uh, there's a new one. There's a new one that could very well wipe out my chocolate and breadfruit trees, which are two of the biggest new up and coming food crops. It's called the Australian Longhorn beetle. Oh, we just keep getting new ones all the time and pretty soon we're not gonna be able to grow anything. It's really problematic. That to me, to me it's the number one issue. But anyway, I think though, I'd say those, well, yeah, the invasive species thing in Hawaii is the worst, in my opinion. That's the worst thing. That's the thing that's going to kill us all or not kill us. But I mean, that's going to kill agriculture.*

Respondent 5 illuminates this topic further as she discusses the diseases brought in from the mainland that destroy corn crops, and a new invasive species known as the avocado lacewing beetle:

*Q: So, I was talking to respondent 3 and she, her primary concern was in the importation of invasive species. Do you think the field trials could be, have something to do with that?*

*No, no. Some of the corn varieties that they brought in here from the mainland had diseases that we had not seen before. So especially the corn blights, there's an, there's a whole bunch of different ones. And so, you know, they would start growing in a certain area and then everyone around them would get this corn disease that they'd never seen before from bringing in varieties*

*that had the disease from the mainland. Um, we have a great, or had a great corn breeding program at the university of Hawaii, but they didn't want to use those varieties, um, to experiment with. So they brought in their own varieties and in some cases it was a disaster. But as far as invasive species, they come into the containers. The number of containers that come into Hawaii every day is astounding. I forget how many thousands.*

*Yeah. Because I think about 60% of our, more than that, 80% of the food Mmm. That is consumed on the Island comes in on or more. Yeah. Or more. And um, pretty much everything we use comes down from somewhere else either. So, I mean, a lot of the containers, they're not just offloaded in Honolulu, they're also off put on smaller ships and come over here and offloaded here too. And then their truck to places all over the place. So like Walmart here, I mean, sometimes like in the holiday season, in the Walmart parking lot, there'll be 50 containers sitting there that they've offloaded that you know, into their stores. And there's, we don't have any, any way of looking at what's in these containers. So, and we just got a new invasive species yesterday. Yes. Yeah. The department of agriculture is saying we've never seen before. The avocado lacewing beetle that eats the avocado trees. Okay. I'm somewhere from Florida. Okay. Where did, how did that get in and no one knows it doesn't come in with tourists. It doesn't come in and suitcases, it doesn't come in airplanes. Um, he comes in with all of the goods that we ship in cause we, we make so little of our needs here that we just end up shipping in things from all over the world. It's a problem. The more, the more we can manufacture, recycle, use, grow, the healthier this land will be, the less we bring in, the healthier it will be.*

In this way, we find that the issue of encouraging local production is closely intertwined with that of warding off invasive species. Invasive species cannot be tackled unless Hawaii makes the concerted effort to grow and consume local produce. There is an overwhelming 100% preference for locally grown produce (fig. 7), however this needs to be reflected in the provision

of government incentives for local growers, and the commercial preferencing of local produce in supermarkets.

## 10.9 Lack of labor

As discussed in section 7.6, according to findings recorded by the USDA, there has been a steady drop in wages over the years, this drop in wages corresponds to the drop in the number of people employed as agricultural labor over the years.

When corroborating the literature with interviewees, several concerns were revealed about the lack of high-quality agricultural labor, and of the challenges faced by farmers as they struggle to pay the market rate for labor. As detailed in section 7.6, several farmers resort to crafting homestay programs, where the labor is given room and board in exchange for working on the land. This is a system that is illegal in states such as California, but remains a grey area in Hawaii.

*Labor's a big deal. Labor's a big problem. So that's why I use like tank work, exchange, woof kind of volunteer ish labor. So the people that come to my farm that I have a house, I let them live in, I buy all their food for them and I pay them to pay coffee just because I want the best. And you know, I give them probably the best deal that there is because most people just do a straight work exchange where you, you work a certain amount of hours and you just get room and board. But I also pay them.*

*They (farmers in Hawaii) retire, they've got a pension or a five oh oneK or you know, 401k or you know, they, they're, they're, they're independently wealthy. When they bought the coffee farm because they thought it was a romantic idea, kind of like buying a winery or something. So, you*



got a lot of independent, you've got a lot of um, gentleman, farmer types. Nobody really wants to pick their own coffee. It's a lot of work. It's a tremendous amount of work. So, they bring in a crew and for about the last 35 years, the crews have been Latino. My friend Bob Wrigley was the first one to bring Latinos over here in the early eighties. Started with Nicaragua, because we didn't have Latino farm workers here at that time. And um, so they've been coming here a long time, some legal, some illegal, you know, and a lot of them has settled here and raised their families. And um, but you know, in the last three years with the immigration crackdown, we have less, less and less pickers. There's less and less. There's less and less labor and there's more and more people planting like big farms, big coffee, 100 acres, 200 acres. Super imbalanced between production and labor. Um, last two years, I know there've been a lot of farms that didn't get their coffee even picked cause there was no one to do it. So, the guys that are here, there's very few of them. And instead of picking the only the red beans, which is what we do, which means we have to go through a farm way more times, the guys that come through your farm, they're doing a lot of just stripping right down the brand. So, they're getting the ripe ones. Cause coffee goes from green to yellow to pink to red. So, they're getting, the red ones, but they're getting a lot of the half ripe ones too because they're in a hurry. There's so few of them and there's so much coffee to fake that they can't come to your farm very often. So, they have to pick this stuff. That's what we call half ripe. It's not as good because if you measure the sugar, the brix content of a fully red bean, it's a higher Brix content than an orange bean or a pink bean, you know, I mean not, it's very logical. We all know that our riper fruit is sweeter than an unripe fruit. And it's just so, it's not rocket science. It's really just, you know, well, we're lucky because we're a small, we're very small, so we're like a little boutique farm. Every little thing we do, we get to do with like intense detail because we don't have a lot. But if you're a real big farm, you know, so yeah, labor is a big problem. Real big problem.

Recently, the government has begun to crackdown on the use of illegal immigrants as farm labor. This essentially protects laborers from being exploited by farmers, and also serves to ensure that the market rate wage is paid to labor. More about this topic is discussed in conversation with respondent 5:

*So, the legislature will buy a large parcel of land and then create small farm leases on it. And really the only people that are interested in those leases are, um, immigrants who the state is not happy with how they farm because they're used to farming from wherever they come from. They don't speak English. They, they're used to farming in ways that are, um, they think are too toxic for here. And so there has been a lot of problems finding young farmers and beginning farmers. They don't want to go on these lands, these state lands over there. So, it's, they have tried to buy some parcels and create leaseholds and it actually hasn't worked. and then, and then you've got the labor problem. You know, Hawaii was, um, at the, the federal, um, justice, the justice department at the federal level came into Hawaii maybe four years ago and was going to indict all of the large land on all the large farms.*

*There's only maybe three or four, but they were going to indict them all because their labor was being brought in from Thailand. People's, um, passports were being taken from them. They were being forced to live in containers. They weren't given their passports back. Um, they were kind of like slaves actually. And when that whole thing got exposed a few years ago, it was so interesting. It's like this is, this is what it takes to produce food in Hawaii. We have to do; we have to treat our workers like this in order to have food on our table. This isn't right. And in the end, the governor pretty much, or somebody, I think it was Barack Obama actually being from Hawaii, that somebody got to the justice department and they ended up not indicting these farms. They told them don't do it anymore and we'll let you go this time. But labor is a huge problem here. Again, no housing, a worker housing that is because we don't have worker housing policies, protocols,*

*um, and laws at the County levels for that kind of housing. And this is something that has been talked about here since I can remember.*

The lack of enthusiastic high-quality labor is not one that can be solved easily. It is not quite as simple as creating government subsidies for agricultural labor, as it would be impossible for the government to subsidize all agricultural labor. Perhaps farmers such as respondent 2 have stumbled upon a feasible solution by allowing for labor to become equal partners in the farming operation, thus effectively giving individuals a huge incentive to work hard and innovatively quest after sustainable agricultural solutions.

*There is no labor, nobody wants to do the work, everyone wants good wholesome food. I am first and foremost a father, and then a farmer. Matt (one of the partners at the farm) was a farmer who was working on a farm that was blown up by a volcano (Covered with lava), so he came to work with us. He has IT experience, solar experience. You have to be a mechanic to be a farmer. So, Matt has been a really really important addition to the practice.*

#### **10.10 Low cost of food in competing markets**

In section 7.10 we look at the reasons why the papaya industry in Hawaii, has been challenged by competing markets. Oftentimes Hawaiian fruits are handled by several middlemen before they reach the consumer, unlike produce sold by large corporations which have tighter supply-chain operations. Hence, they command a lower price when they reach the end user, which ultimately often does not cover the costs associated with production. This is where competing markets, such as farms on the U.S. mainland have an advantage, as produce does not have to be transported long distances to reach the end market. This is farmer respondent 5's take on globalization:

*Globalization has done a good job. Right. I mean, globalization has said you don't really need to anymore. Take care of yourself. Whoever can produce something for the lowest cost, that's what you should buy. We'll bring it in from other countries and then you, you can, you know, be better for you. It'll cost less, but that's not really true. It can't be.*

Respondent 7, a farmer, talks about the reasons why Hawaii is unable to compete with markets like Brazil and India:

*So, we have um, uh, influx of retired people moving to Hawaii who they may like the idea of having their name on a bag of coffee that they sell and, but they don't do, uh, do anything about it. They can't, it's not sustainable for them. So, some of them were here for five years and then they leave all their dotcom money's gone. They don't understand cost of production, which is a pet peeve of mine. I mean, I don't go to farmer's markets because I wind up yelling at everybody. You can't sell six Meyer lemons for a dollar when it costs you 27 cents to produce one based on \$12 an hour labor. When we did the studies, now it's \$15 an hour, which is still not a lot, but that's they, they just don't, don't get it.*

*It's too cheap. Yeah, they're selling them too cheap, yeah. I mean when you see, you can't compare our structure in India structure obviously, but I talked to the coffee growers in Wayanad and they complained about, you know, the cost of labor going up to \$4 an hour. Well if agriculture labor, and it was \$4 an hour in India, they took out a hundred thousand acres of cashew trees on a border area, Kerala and Karnataka, um, because they couldn't compete with Brazil because they paid \$4 a day. And between Mumbai and Poona they took out all the orchids on the, on the top row. The Southern road is all the Bollywood studios, but on the top road used to be all orchids. And they took those out because they couldn't compete with Thailand and pays, you know, \$4 a week or some, something like that. And so, when I have to take the experiences*

*that I learned in India and Japan, where I studied and try to apply them here to help farmers with sustainability.*

Within the local market in Hawaii, respondent 7 talks about the preferencing of imported produce by supermarkets and the end consumer, hence imported produce commands a higher price.

*It was since October, 1908. Uh, California complained about possible fruit flies getting in, in Hawaii and there are approved treatments. There's a new one that's only two years old.*

*Percentaging only one type of avocado to specific States within, you know, a four-month range. But your portrait, it has to be inspected, you have to have traps, the packing house has to be special packing house. There's only two of them. and it's not worth it. And why would we? if you look at the USDA statistics, we grow and sell a million pounds of avocados locally and we import 4 million pounds. We import 22 million pounds of oranges. I have no idea why we even import bananas and papaya and things that grow wild here along the, along the road. But it's just part of the problem is if you, if you look at the wholesale price list from the wholesalers, what they're willing to pay and sell local produce for and what they're willing to pay and sell imported produce before. Well, I'll just give you an example. So the one wholesaler will pay farmers 60 anywhere between 60 cents and a dollar for avocados that are sold for a \$1.49 for imported avocados, they pay a \$1.45 and sell them for \$3.99 so you're making two and a half times more money off the imports than you do off the local. Like you go into the grocery store and you see, Oh, these are the California oranges, Mexican avocados. You know, they may have some local stuff, then it's in the back corner.*

Respondent 7 also looks at the relationship between higher rates of local produce and the Jones Act, touting the Act as a reason for inflated prices.

*Yeah, well the Jones act is, is definitely one because of the cost of inputs of, of to get fertilizers and to get the equipment, to get pots. Um, there's a loppers of big orange handled actually the black handle or the one next to it, it's \$180 here or the pickers are \$180 here. They're \$27 in Japan. So, by the time you get them here with the cost of shipping, they have to sell them for \$180 and some places where usually they work on a 30% markup. Some places still want to work on a hundred percent markup, especially the small local stores because that's what they need to survive too. And the farmers, because they're not, they weren't born into farming. Most of them, most of them came here and retired or they got blinded by the lure of Kona coffee and um, they, they don't follow cost of production or they don't understand the amount of labor that it takes to be sustainable and in farming. And so that whole cost of production thing, that's an obstacle. But for me, it's just buying supplies are so much more here. I mean, when I go shopping, I shop in Japan. Everybody knows your plants are so expensive, much cheaper than Hawaii for those types of things. So, we were talking about the cost of trees, which was something that we could actually do something about. So, the cost of trees being 65 or \$85 here, what do you think they'd be in an economy like Japan for let's say a grafted orange tree? I have no idea. \$7, \$3 Philippines or Malaysia, 75 cents in India at the nursery. Some trees are more, but that's the average, especially for Jackfruit, um, which is getting popular worldwide now. So, it's um, being able to supply things, produce locally. So, we have to learn how to maybe utilizing the ocean to come up with more fertilizers or our own rather than having to import bag of fertilizer from Japan and paying three times more because of the Jones act for it. Then they have the pay in California.*

The interconnectedness of the inflated costs of Hawaiian produce, the high costs of land and labor and the Jones Act, cannot be denied. It is impossible to solve the problem of lowering costs of production without tackling these issues simultaneously. In this way, it becomes impossible to compete with markets that offer lower prices for the same goods. Perhaps the first

step is to focus on creating a local cycle of production and consumption, followed by looking to the Government for support through incentives and tax breaks.

## XI. Discussion

When comparing my findings through the research with the literature review, there were several factors that remained consistent with the literature, however, the in-depth semi-structured interviews, also revealed several new findings.

Through the literature, three factors emerged as the top obstacles to establishing resilient food systems in Hawaii. The initial formulation of my thesis was thus centered around these three factors, namely the Jones Act, the impact of large-scale crop monocultures and the military land holdings. However, while interviewing farmers and researchers alike, the top three obstacles identified were the lack of labor, invasive species and pests and the cost of land. The latter, is then correlated to the Jones Act and the degree of land ownership under the Bishop Trust, the military, the Government, large scale crop monocultures and also the restrictions attached to land leases.

The primary challenges in my research were the lack of available data on the land ownership under the military and the Bishop trust. In addition, interviewees were reluctant to discuss these two topics along with the Jones Act, often claiming that these were not in fact issues to contend with. However, when made aware of Justin Lewis's research that indicates that the cost of produce is cost inflated by an approximated 61% with the Jones Act in place, respondents were far less amenable to the Act, or in some cases refused to believe that this could be a possibility.

The purpose of this research is to shed light on the main obstacles to establishing resilient food systems such that new research may dive deeper into the topic and even discover more inventive means of overcoming these obstacles. In particular, the topics of the land



ownership under the Bishop trust, the military land holdings and the effects of the Jones Act, primarily require more quantitative and qualitative research in the area.

## **XII. Conclusion**

On embarking on this journey, and combing through the literature to construct my background research, it was not possible to fully comprehend how complex the issue really was. I imagined that understanding the obstacles to establishing resilient food and farming systems in Hawaii would be a fairly straightforward process. However, when I got to the stages to interpreting online survey data, conducting interviews and analyzing online GIS databases, that I began to understand how complex the issue really is.

I hope that this research will further the efforts of Urban planners to push for more subsidies for farmers in Hawaii. Considering that vast tracts of land are under Government land ownership; perhaps urban planning professionals can begin to formulate action plans to make land available to farmers at a subsidized rate. In addition, during new zoning revisions, it would be advised that planning professionals remain cognizant of the reality that land under agricultural cultivation is shrinking, and thus allocate more land to the purpose of agriculture. Planning professionals in the Hawaii department of emergency management may find this research especially pertinent and use it as a document to inform efforts to create a more disaster resilient system of food production, which would be extremely advantageous in the event of a natural disaster. In terms of research efforts, researchers might use this paper to inform future research, especially related to the Jones Act, land ownership under the military and the Bishop trust and the impacts of large-scale crop monocultures.

The thesis proposal identified three topics that I would dive deeper into exploring, these were, large-scale crop monocultures, the military presence on the island and the Jones Act. However, as I began to unravel more and more information through the research, the topic expanded vastly. The thesis now includes several obstacles to establishing resilient food

systems, and more importantly many of them are intertwined with one another, none can be dealt with in isolation.

While all of the issues discussed in section 10 serve as obstacles to establishing resilient food systems on the island, through the research I learnt that farmers cite the lack of labor, invasive species and the high cost of land, as the top three barriers. Which is a contrast from the forerunners in the existing literature, which include the military presence, the Jones Act, the Bishop trust, and large-scale crop monocultures.

In concluding there is wide consensus established during all three stages of the research, i.e., the background literature and mapping exercises, the online survey and the interviews, that the switch from consumption of imported produce to consumption and production of local produce will assuage a host of existing issues. This topic has not been listed as one of the obstacles, as it forms a thread that runs through the entire narrative. Hence, I would conclude, that establishing local supply and encouraging small to medium-scale mixed cropping, with a focus on organic farming and permaculture systems could pave the way for more successful farming operations on the island of Hawaii.

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