



Food Sustainable Cultural Practices

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Figure 1: Overlook of Nanakuli Valley

Introduction

Ahupua'a is piece of land that goes from mountain (mauka) to ocean (makai). There are 3 levels in the ahupua'a that serve specific functions. The Upland is represented by the mountains and is used by Native Hawaiians to grow trees for construction materials like 'Ohia Lehua, Koa and Olonā trees. The Midland was used for the production of taro (Kalo) in lo'i (wet gardens) and māla (dry gardens). The Lowland is the area close to the ocean. A fishpond is usually built by Hawaiians to raise fish as a source of protein and grow algae for food. Fishponds are structures unique to the Hawaiian Islands. No other Pacific Islands have similar system to produce fish in such an efficient way. The Ahupua'a system is more than a piece of land. It is an area where Hawaiian communities were thriving. They were 100% resilient, relying only on their local food production. Hawaiian people were following environmental cycles to produce food in the respect of the ecosystem.



Figure 2: Eucalyptus forest and soil damages



Figure 3: Forest restoration with Koa trees

I- Water, an essential resource for life

Water is collected from the mountain. They attract rain clouds and the water drips into the soil and fills the watershed. Rivers are created from the water collected in the mountain. When the mountains are unhealthy, they cannot fulfill their function. For example, in camp Pālehua, the mountain was covered with a Eucalyptus forest. Eucalyptus is an invasive specie that absorbed all the water from the area making the soil extremely dry and infertile. As the leaves of the Eucalyptus break down, they change the pH of soil, making it more acidic and hydrophobic. Therefore, all the water available in the area is absorbed by the Eucalyptus making it difficult for other plants to grow in the area. Camp Pālehua and the Mālama Learning Center are studying the effects of planting Koa (*Acacia koa*) in the area in hopes to restore the soil quality and the watershed of the mountain.



Figure 4: Ka'ala farm's lo'i kalo

II- The Nutrient Cycle, the recycling of organic matter

In nature, the waste of an organism become the source of nutrient of another organism. In Ka'ala Farm, farmers use the nutrients dissolved in water and the waste of organism like fish to grow their crops (taro). Farmers from the Mililani Farmers' market use the waste product of their food production (sugar cane fibers, dead leaves and branches, fruits and vegetable peels...etc.) to make compost and fertilize their crops. Mari's garden's aquaponic system recreates a nutrient cycle artificial to produce food with limited space and using less water. Indeed, the water in constantly recycled in a closed system. The organic wastes of the fish are filtered and used to nourish the crops. In Otsuji farm, they use the invasive algae from Maunaloa Bay as compost for their food production. Indeed, gorilla ogo, leather mud weed, and prickly seaweeds absorb the nutrients available in the bay and retain the run offs making it difficult for native algae to grow. As a result, little to no fish can be raised in the area. By removing and repurposing these invasive algae, we are able to reuse the nutrients of the algae and produce food from invasive.



Figure 5: Invasive algae in Maunaloa Bay



Figure 6: Otsuji farm's food production using algae compost

Conclusion

Producing food in Hawaii following traditional practices in the ahupua'a would help residents of the state to face and deal with the problem of food security and resiliency. Indeed, as more and more food are produced in the state, residents will rely less on the importations and be more prepared to face natural disasters, climate change and other anthropogenic threats. Moreover, Hawaii will be able to reduce the pollution associated with the importation of food in the state. Finally, residents will also benefit from better quality, less processed and healthier locally grown food. Moreover, local farmers' agricultural techniques follow the environment's natural cycles in order to limit the damages done to the ecosystems in Hawaii.



Figure 7: Usagi Team (Kai Yama 2019) doing algae removal in Maunaloa Bay

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