

ENVIRONMENT AND AGRICULTURE

Organic Farming in Hawaii

Keep in mind

Ground water

Ground water is an invaluable but fragile resource. According to the USGS, ground water provides about 99% of Hawaii's domestic water and 50% of all freshwater consumed in our islands. Hawaii's public is largely unaware of the "water wars" and the importance of aquifer conservation.

Soil conservation

The rate of natural soil formation is very slow; it takes about 1000 years to produce 1 inch of fertile soil. Poor soil management reduces farm productivity. Fertilizers can compensate for some nutrients needed by plants, but they can also have negative impacts in the environment, especially in marine ecosystems.

Pesticide use

Farmers need to protect their crops from insects and disease, however, some farmers choose to work farm using organic methods of control, instead of utilizing conventional pesticides. These farmers often need to devote more time and effort to their crops, but also, when the market is suitable, their products may command a higher sale price.



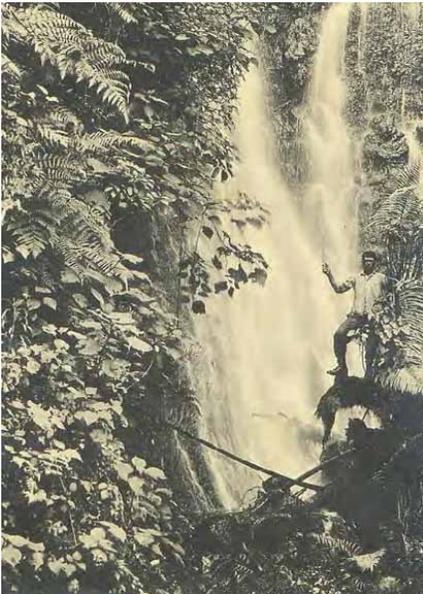
Waiāhole Valley History

The Waiāhole valley was one of the nine ancient ahupua`a of windward Oahu. Along with the nearby Waikāne valley, Waiāhole was an extremely productive land that helped support a large population of native Hawaiians prior to the arrival of Captain Cook in 1778.

Commonly grown crops in these valleys included taro, breadfruit, sweet potato, and bananas. During the late 1800's however, sugar cane was introduced to windward Oahu. In 1865, Queen Kalama partnered with Charles Coffin Harris to create the Kane`ohe Sugar Company. When Queen Kalama passed away in 1870, Harris acquired the land and increased sugar cane production. The sugar boom lasted until the beginning of 1900's when the production declined due to poor soil conditions, while at the same time competition from Ewa plantations increased.

Following the collapse of the sugar industry on the windward side of Oahu, the Waiāhole valley was transformed into a rice growing community. Pineapples were also planted in the early 1900's, but productivity was low compared to the Ewa plains and the cannery closed in 1923.

Changes in water levels in native streams



Diverting water flows has ecological consequences that may not always be predictable. Currently, efforts are being made to understand the impact of stream alteration on native fauna by tracking organisms such as the Hīhīwai (a native fresh water snail) and the O'opu. (a native fish).

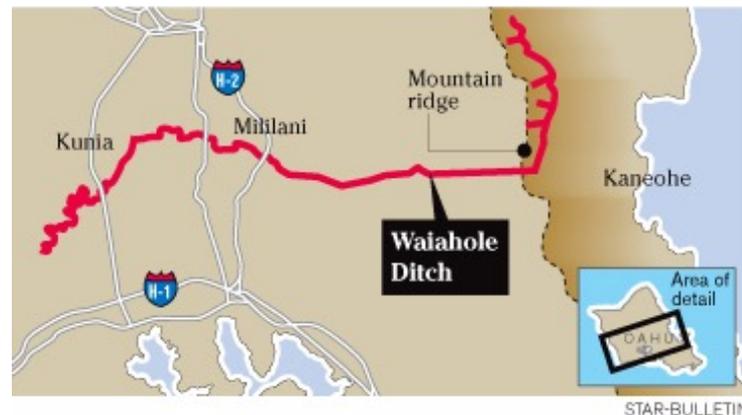


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The Waiāhole valley has had a long and dynamic history of agricultural use, and it is not surprising that land tenure, water rights, and the concern for environmental changes has been a priority for the residents of this area.

Waiāhole Ditch irrigation system

The Waiāhole Ditch irrigation system was constructed between 1913 -1916 with the intention to divert water from the wet Windward side toward the dry plains of Central Oahu.



The following quotes come from a 2007 Star Advertiser interview with Mr. Vernon Pico, the water systems manager for the area. In this interview Mr. Pico explains the length and purpose of the irrigation system.

“A: It starts up in Kabana Valley on the Windward side, and it ends in Kunia (on the Leeward side). The total length is approximately 26.5 miles. We have 10 miles of ditches and 15 miles of tunnel, and 1.4 miles of siphons, to bring the water across the gulches.”

And what's the purpose of the system?

A: Mainly to deliver the water to the farmers on the Leeward side, but we have a court order to make sure that we release a certain amount of the water into streams on the Windward side.”

The original force behind the construction of these series of tunnels was the Oahu Sugar Company, which benefited greatly from the low cost of water derived from this project. Over time the sugar company closed but water from the Windward area continued to be used for golf courses, housing, and agriculture at a rate of approximately 27 million gallons per day.

Ground water recharge and aquifer depletion

Ground-water in Pacific islands accumulates as water filters down volcanic rock to form what is called a freshwater lens. Basically a lens shaped body of freshwater that floats over brackish water and saltwater (see diagram on the right). Ground water reservoirs can be recharged through rainfall and irrigation water, but when water is diverted or pumped from the aquifer the balance of water withdrawal and natural water recharge is altered. Large water withdrawals and/or reduction of stream flows to other areas may lower the water table and result in a decrease of the freshwater lens. If the removal is too high the brackish and saltwater will rise towards the upper levels and the aquifer as a natural fresh water storage will be compromised by the intrusion of saltwater.

Aquifer depletion is not unique to Hawaii, there are many examples of large rivers and aquifers across the mainland US that have been overused and where water has been overdrawn to the point that the wells are no longer usable. The Colorado River and the Ogallala Aquifer are examples of water issues that have occurred due to short term planning and excess water removal. The Ogallala Aquifer, the largest aquifer in the world, has been severely compromised by overuse in recent years. It is estimated that a third of its water was removed from 2001 to 2008, and it will likely take many decades to recharge. The depletion of the Ogallala Aquifer is of dire importance because this aquifer sits below states that have low annual precipitation and are heavily agricultural, thus making water an extremely valuable resource for urban and farming communities in those areas. In the NBC News diagram on the right, we see comparative rainfall for various states, Mount Waialeale in Maui is compared to Vega in Texas, emphasizing the obvious dependence on ground water for some states.

We should, however, remember that although some areas in Hawaii have large annual precipitation, much of the rainfall that falls on the islands flows into the ocean or evaporates before penetrating in the soil. Consequently, we are still highly dependent on our ground water and as such we should protect and conserve this valuable “stored resource”.

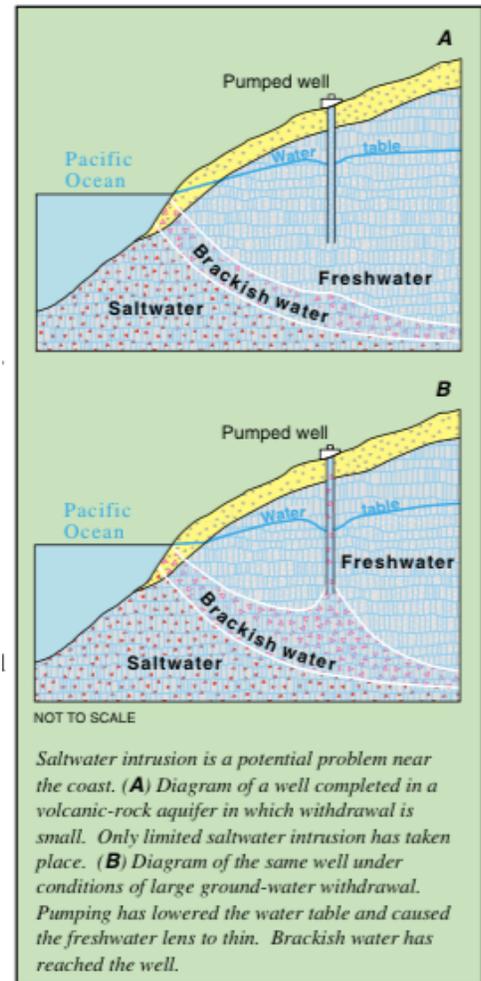
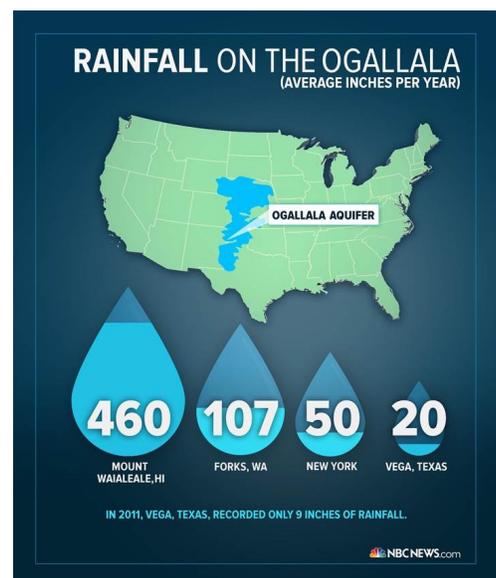


Image above taken from *Ground Water In Hawaii*, produced by the USGS.



Soil conservation

Top soil is the fertile part of the soil where nutrients needed by the plants are stored. Top soil is formed over long periods of time but can be lost rapidly due to wind and water erosion. The key element in soil conservation is to keep the soil covered with vegetation. Soils that are left without cover quickly lose their fertility and it becomes harder and harder to successfully plant anything in that land.

Conventional farming often involve periods where the soil is bare. Old crops that are past their peak get pulled from the ground and the land is tilled in preparation for the next crop. During tilling of the soil the farmer may add fertilizers to help improve yields, remove weeds, and lay irrigation lines. However, during this bare soil period, rain and wind can damage the soil and remove lots of precious organic matter that has accumulated over time. Some organic farmers, prefer to use no-till techniques, which vary depending on the crop, but basically involve keeping the soil covered and reducing disruption of the organic matter of the top soil, thus preserving soil fauna, such as earthworms and small arthropods. When conducted properly no-till can be very effective because it reduces labor costs related to tilling, increases soil fertility, thus reducing the need to purchase fertilizers, and retains soil moisture better.

Pesticide use and organic farming

One of the goals of organic farming is to produce crops without the use of synthetic pesticides that can leave behind potentially dangerous chemical residues. Organic food production often relies on cultural, and mechanical methods for pest control, as well as the use of biocontrol agents including beneficial insects. Organic farmers can and do use occasionally natural chemicals to deter or control insect pests. Organic animal husbandry also avoids using synthetic chemicals, especially antibiotics, when rearing or treating animals that will be used for meat or milk production.

Studies have shown that one of the main reasons customers prefer organic produce, meat, and milk related products is because they want to reduce exposure to potentially dangerous chemicals and antibiotics. For some people choosing organic also involves supporting a farming practice that is gentler on the environment. Recently, a strong debate erupted in the scientific community when a group of researchers from Stanford University conducted a review study summarizing years of research and found no health benefits to consuming organic foods. The researchers did, however, point out that the risk of detectable pesticide residues was higher in conventional produce compared to organic, in addition, the risk of encountering antibiotic resistant bacteria in conventionally grown chicken or pork was higher than when the animals were raised under organic regimes. Following the publication of the Stanford review, two additional papers, one from a research team from Austria and one from the US, challenged the Stanford group in their methodology, analysis, and their apparent bias in selectively ignoring some important work that highlights beneficial aspects of organic food. The Austria team also commented how unfortunate it is that consumers are caught in the middle of these scientific debates and how the public must rely on media reports to provide a “people friendly” and accurate version of the results.