

HOW WE GET OUR WATER



Precipitation
Water vapor condenses and falls to earth as rain

1.

2.

3.

4.

5.

Sea Level
The level of the ocean's surface

Evaporation
Heat from the sun converts ocean water to water vapor

Native forests
are a wondrous, multi-layered natural canopy, evolving over millions of years, to soak up rainfall like a giant sponge that lets water drip easily and slowly into the ground.

Watersheds,
primarily thick rainforest regions on the mountain tops of each Hawaiian island, are our Islands' fresh water collection basin.

Loss of native forests
allows rain to fall on bare earth, increasing soil erosion, runoff and less filtering down to replenish the aquifer. Streams flood, debris lines ocean coasts and sediment rations permeates our reefs.

Spring
Groundwater released at the surface, fed by dikes, perched water or underground stream

Dike Confined Water
Groundwater trapped in compartments formed by walls of nonporous volcanic basalt

Well
Tapping into aquifers

Head
The layer of the freshwater aquifer that lies above sea level

Brackish Water
Intermediate zone of mixed fresh & seawater

Saltwater
Denser saltwater of seawater salinity

25 One raindrop takes about 25 years to pass from a mountain top native forest to an aquifer.

50 The percent a native forest can increase water capture by condensing passing clouds and reducing erosion.



FENCE BUILDER

We've put up close to 20 miles of fencing covering about 5,000 acres of remote watershed areas on Oahu and Kauai to keep out large hoofed animals to protect native trees and vegetation, but also the habitats of endangered species, such as birds. Fencing helps minimize erosion and preserve the quality of the natural water filtering system. An avid hunter and outdoorsman myself, we are very respectful of the recreational aspects of these remote areas.

Stuart Wellington
Owner, Wellington Fencing Co.
Lihue, Kauai



PRIVATE LANDOWNER

Kamehameha Schools recognizes that healthy native forested watersheds provide us with a variety of critical services that contribute to the well-being of our beneficiaries and sustain life for all of Hawaii. As such, we greatly value our participation in seven of Hawaii's regional watershed partnerships, which enable us to leverage ideas, funding and expertise with neighboring landowners to collectively manage threats to our native watersheds on a landscape scale.

Namaka Whitehead
Ecologist
Land Assets Division,
Kamehameha Schools



FORESTER

Fighting fires in our forested watersheds, one of our most important functions, involves fighting fountain grass, a hardy invasive species that comes back to overtake native forest areas destroyed by fire. Since 2006, we've fought 36 fires burning 31,000 acres and costing the state alone \$2.1 million. We fight back by replanting thousands of trees annually to bring back our forested watersheds. Our Kamuela tree nursery has produced over 1.5 million native and windbreak tree seedlings.

Steve Bergfeld
Forester
Division of Forestry & Wildlife, DLNR,
Hilo, Hawaii

Water production from ancient times to today is the result of our islands' unique volcanic origins and indigenous vegetation. Hawaii's fresh water cycle depends on the life-giving rain captured and absorbed by healthy native forests to sustain all of life on our islands:

- ▶ **1. CLOUDS FORM** as trade winds push moist air, created by evaporation of ocean water, over high cool mountain ranges.
- ▶ **2. RAIN RESULTS** when saturated cloud vapor condenses to water.
- ▶ **3. Ua (rain)**, beloved by native Hawaiians as the preserver of the land (kahiko o ke akua), falls on native forest tree leaves and branches, and low spongy growth that thrives on the forest floor. Also, mist passing through the forest condenses on the leaves, providing additional water.
- ▶ **4. RAINWATER SEEPS** through soil and rock to each island's natural underground reservoirs formed by lava flows – called aquifers – for storage. Rainwater also nourishes roots in the ground and flows into surface streams.
- ▶ **5. THE WATER** in underground aquifers pools in large lens-shaped bodies to be tapped by wells and tunnels to supply almost all of our vital drinking water.

SOURCES: Honolulu Board of Water Supply; State of Hawaii, Department of Land and Natural Resources; and Pacific Disaster Center, www.pdc.org.