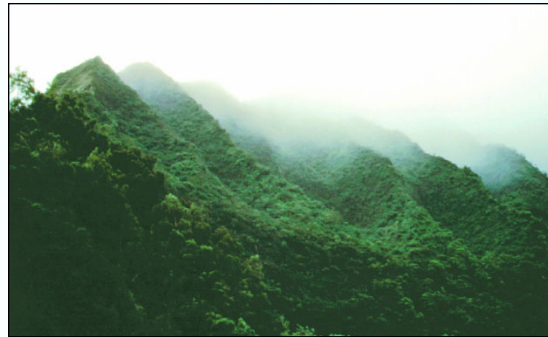


# WATERSHEDS PROVIDE OUR WATER FOR LIFE

## What is a Watershed?

A watershed is an area of land enclosed by mountain ridges that catches and collects rainwater to continually replenish ground water supplies.



*Hahai no ka ua i ka ululā'au – Rains always follow the forest.*  
(Ancient Hawaiian proverb)

Here on O'ahu, water from the ocean is heated by the sun and is blown in-land by trade winds. As the moisture-laden air approaches the high mountain ranges, it rises, cools and condenses, which causes rain on the island.

O'ahu's watershed can also be described as a Hawaiian rain forest, which captures and saves large amounts of water. Tall trees shade other trees and plant life from the sun and slows the rain as it falls toward the ground.



*Hawaiian forest*

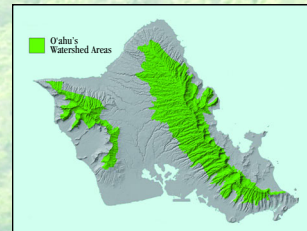
Although the trees themselves are nurtured by water, the trees help to reduce the amount of rainfall lost through evaporation and transpiration in the forest.

Shrubs and dense vegetation block the wind, which draws moisture from the ground, and stabilize the soil, allowing the water to seep into the earth to recharge the underground aquifer or to flow in streams to the ocean.

The Board of Water Supply (BWS) pumps water from the underground aquifer to meet the daily demands for water by O'ahu residents.

## Where are Watersheds Located?

Look to the mountains. The Ko'olau Range – from the North Shore, along the Windward coast, the backdrop for metropolitan Honolulu, and along the Central O'ahu plains in the east; and the Wai'anai Range – along the Central O'ahu plains on the west and the Leeward coast; shelter our Hawaiian rain forests.



*The Wai'anai Range in the west and the Ko'olau Range in the east shelter O'ahu's Hawaiian watershed forests.*

## Who is Responsible for the Watershed?

The State Department of Land and Natural Resources and the BWS are the governmental agencies entrusted with the protection and care of O'ahu's watersheds. Because the watershed benefits everyone, we are all stewards of the watershed and share the responsibility to safeguard these forested lands.

# HEALTHY WATERSHEDS ENSURE OUR WATER FOR LIFE

Hawaiian watershed forests are unique and fragile environments, and need our special care to flourish. Their uniqueness sustains the natural cycle of water, from rain falling on forested lands, captured by trees and plants, and eventually absorbed by the ground to seep into our ground water supplies.

## What is a Healthy Watershed?

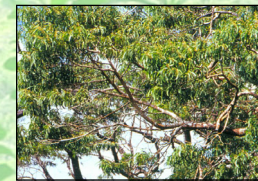


*Multi-layered forest*

Our Hawaiian rain forests are highly effective at capturing water. Each stratum of plant life within the forest serves a purpose, and collectively they form a multi-layered forest that soaks up rainfall and retains moisture in the ground and streams. Trees, shrubs, grasses, and other vegetation are integral parts of a healthy watershed.

### Emergent Trees

These trees are the first to receive the rain. Their branches and leaves emerge from the forest cover and intercept rainfall and moisture from the air. In some cases, they produce fog drip. Water runs from the leaves, down branches, to plants near the ground.



*Koa (Acacia koa)*

### Canopy Trees

These tall trees shape the canopy skyline of the forest and receive most of the rain and condensation. Water drips through the trees and runs down the branches to the trunk, where its momentum slows as it moves over the bark.



*Ōhi'a (Metrosideros polymorpha)*

### Sub-canopy Trees and Shrubs

Raindrops and condensation filter through the leaves of the upper canopy and fall on the shorter trees and shrubs below. Some flow along leaf stems to seep into the ground. The dense shorter vegetation keeps the air near the ground saturated and slows evaporation from this layer of plants.



*Kōpiko (Psychotria sp.)*



*Hesperomannia arbuscula*

### Understory

Ferns and low shrubs absorb water falling from the tall trees and also cushion the soil from the impact of water dripping from leaves and branches.



*Palapalai (Microlepia strigosa)*

### Ground Cover

Plants like moss and grass form a spongy, porous plant layer just above the soil. They reduce evaporation from the ground and slow runoff, preventing soil erosion.

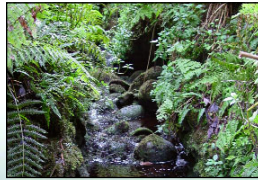


*Elaphoglossum fern*

# PROTECTING OUR WATERSHEDS

## What Threatens the Watershed?

For more than a million years, native Hawaiian birds, animals and insects played an integral part of a healthy watershed by pollinating and spreading the seeds of plants. However, foreign plants and animals introduced by Western settlement threaten our Hawaiian rain forest by destroying native plants and animals and invading the environment, and reduce the watershed's ability to catch and retain water.



Dense vegetation and flowing streams nurture O'ahu's watersheds.

The following are examples of non-native plants and animals that have invaded our Hawaiian forest:



Strawberry guava (*Psidium cattleianum*)

Miconia, Christmas Berry, Guava, and Clidemia are examples of plants that displace native forest plants and kill understory growth, causing erosion of watershed land.



Wild pigs uproot native plants and the soil, disrupting the delicate balance of the watershed environment.

Pigs, goats, and sheep eat and uproot native plants, creating soil erosion and space for foreign plants to grow.

Introduced birds like the Bulbul compete for food and harbor diseases transmitted via mosquitoes, reducing or completely destroying remaining native bird and insect populations and driving them to extinction.

# WATERSHEDS NEED OUR HELP

You can help to protect and restore our Hawaiian rain forests and watersheds by working with others in the community, participating in on-going protection programs, and educating others of the importance of our watersheds. No effort is too small, and every effort will help to protect this fragile environment.



Punalu'u Watershed Alliance – Looking at a stream gage.

Here are ways that you can help:

- Support the enforcement of existing laws and agriculture quarantine to prevent the introduction of foreign plants and animals in the watershed.
- Participate in projects that remove invasive plants and animals to allow native Hawaiian plants and animal populations to recover areas where they were displaced.
- Join community watershed partnerships, which plan and organize activities for watershed protection, restoration, and education.
- Conserve water every day, all year long. Water conservation reduces the need to use ground water that is essential for healthy watershed forests and stream ecosystems.



Koli'i (*Trematolobelia macrostachys*)



Wiliwili (*Erythrina sandwicensis*)

# GETTING INVOLVED

For more information on how you can join the effort to protect our watersheds and forests, please contact:

Board of Water Supply  
(808) 748-5936 or 748-5940

State Department of Land and Natural Resources  
(808) 587-0166

Board of Water Supply partnerships include:

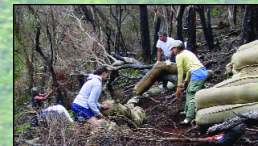
- Ko'olau Mountain Watershed Partnership
- Makua Implementation Team
- Mōhala I Ka Wai
- Punalu'u Watershed Alliance
- Wai'anae Kai Community Forest Partnership
- Waihe'e Ahupua'a Initiative (WAI)



Waihe'e Ahupua'a Initiative – Children planting native plants.



Mōhala I Ka Wai – Wai'anae High School students installing Makaha stream gage.



Wai'anae Kai Community Forest Partnership – Installation of erosion control material.



# PROTECTING OUR WATERSHEDS



*By protecting our watersheds, the watersheds will continue to sustain the natural cycle of water and support our need for a reliable water supply.*



[www.boardofwatersupply.com](http://www.boardofwatersupply.com)

bws/rev05

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