e at the Honolulu Board of Water Supply are working hard to preserve and protect our most essential resource—our water. We are blessed with many gifts here in Hawai‘i, and a plentiful supply of the best water in the world is at the top of that list. We have also been blessed with a community that has worked with us when we have asked for conservation.

This is a new era, with new challenges, and the Board is meeting those challenges with a renewed commitment to our vision and mission. We invite you to participate in our vision through planning efforts that will be undertaken in your community. To understand where we are going, it is necessary to understand where we have come from. To that end, we have prepared this booklet—Water for Life: The History and Future of Water on O‘ahu. Thank you for your participation in making the Board’s conservation efforts a success.

Welcome to Water for Life.
How O‘ahu Makes Our Water

Born of Fire and Water

There is no life without water. Hawai‘i’s volcanic landmass and high-rain-catching ridges gave each island the tools to create an efficient and dependable water source. This land of water allowed a wealth of ancient life forms to take hold and flourish. A complex network of plants and animals evolved and filled each geographic and climatic sub-zone with a web of life.

The Origins of Water

Evaporation from the sun converts ocean water into water vapor.

Precipitation—Water vapor condenses and falls to earth as rain.

Draining volcanic activity on an older island moves farther from the hot spot.

Diminishing volcanic activity on an older island moves farther from the hot spot.

Upper layers pulled deeper.

Hot magma moves outward from the earth’s core.

The island of O‘ahu was built by two volcanoes, the remnants of which are the Waianae and Ko‘olau mountains. Over time, the two volcanoes joined to form a single island that was further shaped by erosion and volcanic eruptions. Erosion lowered the coastal reefs and built the high, fertile plateau of central O‘ahu.

The Hawaiian Islands are part of a long chain of volcanoes rising up from the sea floor. Eruptions over hundreds of thousands of years built an island that finally emerged above sea level. As the Pacific Plate moved to the Northwest, thousands of years built an island that finally emerged above sea level. As the Pacific Plate moved to the Northwest, thousands of years built an island that finally emerged above sea level.

Water vapor condenses at cooler heights over the island. This fund of water each island the tools to create an efficient and dependable water source. This land of water allowed a wealth of ancient life forms to take hold and flourish. A complex network of plants and animals evolved and filled each geographic and climatic sub-zone with a web of life.

How the Age and Shape of Our Mountains Affect Rainfall

On young, high mountains such as the Big Island, cloud droplets precipitate before they are pushed to the highest elevations, leaving the upper reaches dry and desert-like.

On older, eroded islands such as O‘ahu and Kaua‘i, rainfall is heaviest on the windward slopes and mountain peaks, allowing lush vegetation to cover even the highest ridges.

A relatively flat island such as Ni‘ihau has very little rainfall because it lacks the high elevation slopes. Without the slopes, winds cannot push moist air upwards to produce clouds and precipitation.

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The Watershed is Our Collection Basin

The Watershed is an area of land, such as a mountain or a valley, that catches and collects rainfall. Topography influences whether rainfall moves toward the sea via rivers and streams or via movement underground. Whether rainwater moves toward the sea via rivers and streams or underground depends on the island’s topography, augmented by a network of aquifers, which are storage chambers formed of nonporous, dense volcanic rock or submarine water that forms a root shape beneath the island, usually 40 times as thick as its bottomless root as below. These plants form a spongy absorptive layer just above the soil. They help retain moisture from the ground and prevent soil erosion.

The Hawaiian Rain Forest is the Ultimate Watershed Cover

Emergent Trees These trees are the first to intercept heavy rainfall, absorbing the energy of the fall. True leaves pull moisture from aqueous solutions via transpiration (frog drip). Water runs down leaves, branches, to plants at lower levels.

Canopy Trees Shrub

Subcanopy Trees

Ground Cover These ferns and shrubs absorb additional water from higher plants as well as the energy of dripping water.

Desalination: A process by which seawater is converted into fresh water by forcing through it a liquid which has been heated to its boiling point. The intent of desalination is to remove salt from seawater so that the freshwater can be used for drinking or irrigation.

Aquifer: an underground bed or layer of permeable material, such as sand, gravel, or rock, in which water is stored. Aquifers serve as a natural water supply, often providing water for many communities.

Evaporation: the process by which water changes from a liquid to a gas (vapor) due to an increase in temperature. It is a key component of the water cycle, as it helps to replenish the Earth’s water supply.

Transpiration: the process by which plants release water vapor into the atmosphere through their leaves, a key component of the water cycle.

Groundwater: water that is stored beneath the Earth’s surface in the spaces between soil particles, rocks, or other materials. Groundwater is a critical source of drinking water for many communities.

Rain shadow: an area sheltered from rain or moisture. Rainfall is less than the surrounding area, typically occurring on the leeward side of mountains.

What Happens When the Rain Forest is Degraded?

When a forest is degraded, rain falling on bare earth-what’s left after logging-causes more runoff, with more rainwater percolating through the thin vegetation now offering few layers to intercept rainfall and the energy of dripping water. More water is lost to evaporation rather than filtering down to replenish the aquifer. This eroded, barren land used to be a healthy native rain forest. The thrived vegetation now offers few layers to intercept rainfall and the remaining root systems are insufficient to hold the soil, so erosion worsens. Rainfall isn’t greater and more water is now lost to evaporation rather than filtering down to replenish the aquifer. Weedy grasses move in to take advantage of exposed soil.

What is a Watershed?

A watershed is an area of land, such as a mountain or a valley, that catches and collects rainfall. Topography influences whether rainfall moves toward the sea via rivers and streams or via movement underground. What is a Watershed?

Rainforests and the Water Cycle

Rain is only part of the water cycle. A rainforest also interacts with the skies above: Through evaporation, oxygen and water vapor rise through the canopy and transport water through the atmosphere. Rainfall is only one part of the water cycle.

The Water Cycle

The Water Cycle

- Water cycle equation: O'ahu also interacts with the skies above: Through evaporation, oxygen and water vapor rise through the canopy and transport water through the atmosphere. Rainfall is only one part of the water cycle.
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Ka Wai Ola a Kāne

T he Hawaiians saw gods everywhere in their world: in rocks, clouds, trees and all other parts of the land, sea and sky that surrounded them. Man and nature were believed to be part of a larger story of divine creation, and water, the basis of all life, was seen as one of the gods’ greatest gifts. It enabled birth, growth and prosperity; it was essential to both physical and spiritual well-being.

Every Hawaiian, regardless of class or occupation, took an active part in maintaining and conserving water. Waste of the priceless resource was believed to draw divine displeasure and lead to drought, famine and gradual death.

T he term Ka Wai Ola a Kāne (Life-Giving Waters of Kāne) reflects the special link between the divine and all life forms in nature. Hawaiians believed that the god would always bless the earth with water. Waste of the priceless resource was believed to be seasoned with death. When thirst overcame them, each would plunge his digging staff into the ground to bring forth water. Waste of the priceless resource was believed to draw divine displeasure and lead to drought, famine and gradual death.

Kāne and Kanaloa, The Gods of Hawai’i’s Water

T he Hawaiians knew some 40,000 gods in nature. Kāne and Kanaloa, the gods of water, were two of the four primary deities in the Hawaiian pantheon. They traveled throughout the island chain, creating water sources to benefit and sustain all living things.

Both gods were fond of drinking water. When thirsty overcame them, each would plunge his digging staff into the ground to bring forth water to be seasoned with ‘āea root. Kāne was said to be somewhat gruff and impatient in nature, so the water that he drew from the earth rumbled and roared in the form of large rivers and streams. Kanaloa was said to be very passive and easy-going; he is responsible for calmer water sources, such as springs and pools.

Kāne and Kanaloa were known to roam the earth and more desolate countryside to test the generosity of its people. In areas where fresh water was meager or absent, they would appear and ask for water. If they were turned away without being offered a drink, they would punish the inhospitable host with drought.

Lono, God of the Winter Rains

L ono was another of Hawai‘i’s four primary gods; he was the god of rain clouds, the sea, agriculture and productivity. His ʻīlo (winter) was the season of Lono, the time when the rains fell. Ho‘ōilo (winter) was the time when the harvest occurred, taxes were paid and spectator sports and sham battles took place between chiefs and royal champions.

During Makahiki, the time of rituals and celebrations in honor of Lono, his carved image was always present, a constant reminder of his role in continuing the productivity and fertility of land and sea.

Priests of Lono appealed to him for rain at heiau kīaulua ua (temples to increase the rains). When severe flooding threatened the islands, Lono’s priests invoked him at heiau kīaulua ua (temples to rain). Pleading for relief, priests used underground ovens to bake offerings of rainwater wrapped in folded and cupped ti leaves.
Ancient Hawaiians Lived in Harmony with Water

Water in the Native Hawaiian Landscape

In ancient times as now, fresh water was the key to life and prosperity. The early Hawaiians settled by perennial streams and springs where water was plentiful and reliable. The abundance allowed the Hawaiians to develop an extensive agricultural system and a sophisticated aquaculture: they built complex systems of canals, ditches, terraces and fishponds and used water in highly efficient ways to grow taro and raise fish. Water was a gift from Aka‘a (gods), and none could claim ownership.

The Ahupua’a Encompassed All

In pre-contact Hawaii, the land was divided into districts and then into smaller units called ahupua‘a. The lines of an ahupua‘a mirrored the lines of the natural ecosystem: its boundaries stretched from the mountain top through upland forests and river valleys to flatlands and the shore. Every tenant of an ahupua‘a was given access to upland timber for houses and canoes, to agricultural lands for growing crops, and to the ocean for fishing and travel to sea. Everyone was allowed to take what they needed to live a full life: spiritually, economically, educationally and physically. But the concept of partition also governed the ahupua‘a: no one could remove or take more than what they could immediately use. The ahupua‘a system ensured that natural systems were kept in balance and acknowledged the inherent relationships between land and sea, and water and life.

Rivers and Fishponds

Rivers brought life to the landscape. A moderate rainfall sent rivers to the ocean, with waterfalls spilling into rivers that carried water to lower elevations. As water flowed to the ocean, it passed through perennial streams and springs where water was plentiful and reliable. The abundance allowed the Hawaiians of old to be masters of aquaculture. They built complex systems of canals, ditches, terraces and fishponds and used water in highly efficient ways to grow taro and raise fish. Water was a gift from Aka‘a (gods), and none could claim ownership.

Brother Taro

Taro was central to Hawaiian society. It was known as man’s older brother, the first-born child of Papa and Wakea, the earth mother and sky father. Hawaiians grew dry and wet taro. Wet taro was grown largely in lo‘i (pondfields), which were irrigated with diverted water that flowed through a complex network of a‘i (ditches). A‘i (ditches) were seen to be merciless in this regard.

Formal Rules Governed Distribution and Discouraged Waste

Sirit rules governed the use of water in ancient Hawaii. Any dishonorable offense to water or misuse of the precious liquid. The alli‘i (chief) was the trustee of water and exercised control over it as an instrument of the gods. They established and enforced regulations over the use of water in upland areas of an ahupua‘a in such a way that it was always available to those who lived at lower elevations. In addition, they set rigid schedules for clearing and diverting rivers and streams. Rights and privileges to water were earned, not guaranteed. Farmers were expected to keep their taro fields free of weeds and clutter and to help clean communal streams and rivers.

Those who failed in either regard were dispossessed of their land and banished. If a farmer dared to water his taro fields without the approval of the alli‘i, he was put to death. Disobeying water regulations jeopardized all; the gods warned that the best and purest form of land division. Land and water resources are administered within the ahupua‘a through a system of land division.

Hawaiians used gourds to transport many things, including water.

A typical scene from a leeward coastal village.

1778 Captain Cook arrives.


A Century of Change

In the 1800s, everything changed in the Islands. The kapu system was abandoned. Traditional land and water rights were abolished. A cash economy grew up, fostered first by whalers and traders, then by sugar planters. Thousands of immigrants arrived to work on the plantations. As the century drew to a close, the monarchy was overthrown and Hawaiʻi was annexed by the United States. Oʻahu reeled, trying to cope with it all.

New Ways, New Water Systems

Oʻahu's new industries—whaling, logging, sugar-planting, and rice—required new water systems. Oʻahu's kapu system was abandoned. Traditional land rights were abolished. A cash economy grew up, fostered first by whalers and traders, then by sugar planters. Thousands of immigrants arrived to work on the plantations. As the century drew to a close, the monarchy was overthrown and Hawaiʻi was annexed by the United States. Oʻahu reeled, trying to cope with it all.

Watersheds Under Attack

Oʻahu's forests were not immune to the changes occurring on the island. They faced a double threat: from the sandalwood trade and from newly introduced goats and cattle. In the 1820s, Hawaiians burned vast tracts of dry forest on Oʻahu's northern slopes. Eventually, a ranching industry developed in response to demands for meat, hides, and tallow. Feral animals did even more damage. Goats and cattle brought by Western ships soon began to roam free and devour native plants. With no fences in place and with their populations spiraling, the feral animals wreaked havoc. They destroyed the delicate undergrowth of many of Oʻahu's forests, disrupting a complex web of interdependent plants and eventually causing trees to die off and whole forests to disintegrate. Without the forests in place, erosion became a serious problem.
**The Discovery of Groundwater Promised Unlimited Growth**

In 1879, James Campbell and John Ashley discovered O‘ahu’s vast underground water lens. Campbell had purchased 41,000 barren acres on the Ewa Plains. Here the McCandless brothers were drilling a well on the site.

James Campbell wanted to bring water to the rich pineapple plantations on the windward side of the island. He saw the possibility of tapping the water lens below to create a reliable water supply. The goal was to create a centralized system to provide water to the city and surrounding areas. This was a major undertaking, and it would require significant investment.

**Exploiting the Resource**

As O‘ahu’s rapid growth continued, demands for water escalated. Honolulu’s population was booming, and by 1910, it had quadrupled to 100,000. The city, the city, and the new suburban areas along the windward coast were hungry for water. The solution seemed clear: tap the underground water lens.

**Tunnels Carried Water from Windward Valleys to Arid Central Plains**

Plants began to sprout in the heat and dust of Honolulu. The Honolulu Water Board was formed, and Dr. Augustus Marques drilled the first public well. By 1906, the board had opened up new areas of Honolulu and provided a bounty of water and power for the city.

**Ditches Crossed O‘ahu, Delivering Stream Water to Plantation Fields**

By 1910, ditches on O‘ahu carried some 70 million gallons a day. They took water from the Koolau, Pali, Kahuku and Waimānalo, and delivered it to Waialua, Kualoa and Waimea. O‘ahu’s population was growing but the water usage was growing faster. By 1920, the rate was 260 million gallons a day in one month. In 1921, water panics became a reality. The impacts of over-drawing the aquifer became apparent, and it was clear that something had to be done.

**The Impact of Over-Drilling**

In 1917, the fledgling Honolulu Water Commission warned that Honolulu’s water system was in danger of “complete failure or at least extreme diminution.” Water panic began to hit the city. To compound it all, the driest weather on record hit O‘ahu in 1926. A change had to come.

**Wells Tapped the Aquifer and Fueled the Island’s Growth**

By 1925, Honolulu residents were being bored all over O‘ahu and suddenly, the magic happened. John Ashley dug 273 feet into the soil and hit liquid gold: the water lens beneath the island. By 1925, he was pumping 105 million gallons a day from one well.

**Uncontrolled Drilling Led to Chaos and Drought**

In 1926, Honolulu was hit by the “Great Drought,” a period of severe drought that lasted from 1926 to 1928. The city and its surrounding areas were hit hard by the lack of water. The impact was devastating, and it highlighted the need for a reliable and sustainable water supply system.

**O‘ahu’s Water Boom Goes Bust**

The water free-for-all couldn’t last forever. When Ashley tapped the water lens beneath O‘ahu, it aired 42 feet above sea level. With 100 wells being taken, the rains couldn’t replenish the aquifer. The wells began to run dry, and the city was forced to cut back on its water usage.

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**Comparison of Population to Water Usage.**

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**The Generating Work of Drilling was Often Done by Hand.**

The growing work of drilling was often done by hand. Water usage continued to increase, and the water lens began to show signs of stress. By 1925, sugar companies were pumping some 260 million gallons a day from almost 200 wells.

**Putting in the Canaveral Well in Pearl City circa 1922.**

By 1925, sugar companies were pumping some 260 million gallons a day from almost 200 wells.

**The Flume, built from reduced, was part of the Waimānalo Sugar Company’s ditch system.**

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**Wells Tapped the Aquifer and Fueled the Island’s Growth**

By 1889, just ten years after Ashley’s discovery, there were over 100 wells on O‘ahu. By 1926, there were 430. In town, landowners bored private wells on their properties. Outside the city, sugar companies were drilling a storm. By 1925, sugar companies were pumping some 260 million gallons a day from almost 200 wells.

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The Early Years of the Board of Water Supply

How Control of Honolulu’s Water Supply Changed Hands

In the hundred years before the Board of Water Supply, government control of water passed from the Kingdom to the Republic to the Territory and then to the City. Engineers laid some water pipes during Kingdom years and drilled municipal wells at Beretania and in Kaimuki and Kalihi during the time of the Republic. During the City’s era, the Honolulu Water Commission was established. But no group had devised a comprehensive water system, something the city needed desperately as its population boomed.

Droughts and dropping water tables heightened the public’s concern, and when an embezzlement scandal arose in 1927, the Honolulu City Council. The Board is responsible for appointing six of whom are appointed by the Mayor and approved by the Civilian Conservation Corps. He led the Board from 1929 to 1952.

1928 Dietry on record for Oahu.

1929 Civilian Conservation Corps.

1935 1940 World War II.

1940 DIS water distribution system includes 22 miles of pipe and covers 273 square miles. From Pearl Harbor to Koloa. 324 new fire hydrants are built, bringing the city’s total to 2,140.

1948 130 ships of U.S. fleet arrive in Hawaii.

1955 Airmail service introduced between California and Hawaï.

The Board Gets Down to Business

The newly created Board of Water Supply was a broad group sworn over water to develop it, sell it and plan for its future on Oahu. The BWS used the mandate to create the island’s first truly effective water management system.

Board employees located and capped wasteful artesian wells. They put casings inside leaky wells to prevent water loss. They created educational campaigns to teach the public about Oahu’s hydrology. All installed water meters in homes and businesses all across the city and billed water users at fixed rates (in 1930, the going rate for 1,000 gallons of water was 12 cents).

All of the effort paid off. There was a marked reduction in the draw from Oahu’s aquifer and the water table stabilized. To deal with Oahu’s growing population—which doubled in the Board’s first 20 years—BWS staff built water reservoirs, laid larger and better pipes, and made sure the city’s pumping stations were in top shape.

They also looked for new sources of water for the city. Just before the outbreak of World War II, they began to develop their first facility outside in the Honolulu Valley.

By 1940, the Board was monitoring 23,956 water meters.

1932 41 wells sealed in 1932.

1933 Civilian Conservation Corps. 242 new fire hydrants are built, bringing the city’s total to 2,140.

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An Effective Island-Wide Water System

Keeping Up with Oahu’s Changes

At the end of the 1950s, statehood and the coming of the jet airplane forced another major shift in the Islands. As its population grew, Oahu’s water use increased dramatically: from 64 million gallons a day in 1960 to 118 million gallons a day a decade later.

In 1959, the Board consolidated its control of Oahu’s water when it took over the agency responsible for water use outside of Honolulu, the Suburban Water System. That year the Board was also given over $10 million to develop new water sources, stations and mains.

Your Water Today

The Board of Water Supply now pumps an average of 150 million gallons of water a day—maintains over 2,000 miles of pipes, which range in diameter from 3/4-inch to 42-inches. It takes care of four shafts and 12 tunnels around the island, as well as 84 well stations, 200 wells and a whopping 145 reservoirs. These green maintenance tricks you see on the road are part of good use!

And the word isn’t stopping in the field. The BWS still track the water use of over 110,000 services and make sure that each one of them is billed correctly; test samples in BWS labs to ensure that Oahu’s water meets state and federal standards on public education and conservation programs; look for innovative new sources of water and work constantly to ensure that our water is as good, safe, and secure as it can be.

How We Deliver Water

When you turn on your tap, you wet in motion a fantastic journey. Water is pumped from the aquifer via wells, shafts and tunnels. Once up on the surface, it enters an island-wide transmission system. Within the system, water is moved from pumping stations, sometimes via booster stations, to mains and reservoirs where it is stored until needed by homes and businesses.

Looking to the Future

Since its beginning in 1929, the Board of Water Supply has been committed to balancing community needs, economic vitality and environmental integrity.

With the coming of the new millennium, the Board has taken the challenge more seriously than ever. Water shortages are looming around the globe. The United Nations predicted that 2.7 billion people will be faced with severe water shortages by 2025.

On Oahu, we have been blessed with a bountiful supply of clean, fresh water. But as the events of the early 1990s taught us, we cannot afford to take our water for granted. Our water supply is not infinite and we must protect its health carefully. Our health—and the health of all living things in Hawaii—depends on it.

At the Board of Water Supply, we remain committed to taking care of Oahu’s people, Oahu’s economy, and Oahu’s environment and making sure that we all have enough water for centuries to come.

Reforesting the Watershed

By the beginning of the 1960s, thousands of acres of Oahu’s watershed forest had been destroyed. Sugar planters, who used most of the island’s water, were the first to act to protect the watershed. In 1953, the Hawaii Sugar Planter’s Association (HSPA) backed the creation of a Territorial Board of Agriculture Partnership. All groups have agreed to work together to protect this precious resource.

From 1943 to 1945, workers with the Civilian Conservation Corps planted an average of two million trees a year in island forest reserves.
sustainable future exists when the needs of the community, the economy and the environment are balanced and in harmony. The Board is committed to creating a sustainable future on O‘ahu, one in which there is enough water for many generations to come.

To understand our future, we at the Board believe we must understand our past. In old Hawai‘i, water was revered as the source of life. It was protected vigilantly and every member of the community was an active steward of the resource. Ancient Hawaiians understood that without careful planning and communal commitment, they might lose their water and with it, their lives.

Working together for the health of our water, we can ensure a sustainable future for all.

Our Work in the Community

The Board of Water Supply has a far-reaching program to teach O‘ahu residents all about water and how to preserve and protect O‘ahu’s precious water supply.

Education

The Board works hand-in-hand with schools to teach O‘ahu’s children about the importance of water. We provide schools with a wide range of educational materials, including activity and coloring books, and use appropriate curriculum. We are also working with schools on watershed management. Students from Waiau High School have begun monitoring the Makaha stream as part of a watershed project. Other schools are working with the Board to adopt watersheds in their areas.

Xeriscaping

A “xeriscaping” means using water efficiently in the landscape. The Board maintains a three-acre xeriscape garden in Hālawa that showcases hundreds of drought-resistant plants. The Friends of Hālawa Xeriscape Garden provides educational materials and leads workshops on a wide variety of plant-related subjects. Every summer the Board sponsors an annual Unthirsty Plant Sale to remind gardeners to xeriscape.

Field Trips

The Board regularly arranges field trips for school children and community members to tour the Fred Chert water museum, Hālawa Xeriscape Garden, and water facilities around the island.

Community Events

The Board participates in dozens of community events each year, including Children and Youth Day, Earth Day activities, to encourage responsible stewardship of our water supply.

Our Work with Other Agencies

In our quest to safeguard Hawai‘i’s environment and the health of our customers, we work with a large group of government agencies. For example, we have teamed up with the U.S. Geological Survey (USGS) to analyze the island’s water resources. USGS provides matching funds for BWS research projects and supplies hydrologists and geologists to study and map O‘ahu’s aquifers.

On the state level, we work with the Commission on Water Resource Management (CWRM), which regulates all water on O‘ahu, including military water and water controlled by private corporations. The CWRM regulates the amount of water the Board is allowed to withdraw from an aquifer. USGS, the CWRM and the BWS each have monitor wells and regularly share data to create a comprehensive picture of the island’s water supply.

We work closely with the State Department of Health (DOH). The DOH monitors BWS labs and conducts its own water quality tests. Its Clean Water Branch works with us to ensure that BWS construction and repair projects don’t pollute streams.

We work with the Division of Forestry and Wildlife on watershed issues and with the State Historic Preservation Division to make sure water projects do not disturb cultural sites.

All around the island, we are working together to protect our water. In collaboration with the Department of Land and Natural Resources, U.S. Army Corps of Engineers, and the Department of Environmental Services, we have completed joint watershed studies in both west Honolulu and central O‘ahu.

We also work with community groups like Mōhala I Ka Wai and Waimea’s Kupa‘a Initiative (WAI) to encourage watershed protection. The watershed partnerships include watershed reforestation and protection projects and education programs.

How can you help create a sustainable future for O‘ahu?
New Technologies, New Water

Planning for the Future

The earth's population continues to grow and freshwater supplies are under threat. In the century between 1950 and 2050, the amount of water available per person is expected to decline by 74 percent. To combat a global water crisis, nations are inventing new technologies and strategies to deal with water shortages. They are using science and ingenuity to create new water sources and to recycle their existing water. The Board of Water Supply is at the forefront of this movement. As end users, we can help ensure we have enough water for today and for future generations.

New Water Recycling O'ahu's Water

Every day the world uses billions of gallons of pristine drinking water to irrigate crops, put out fires, and wash and cool industrial plants. There is no need to use valuable drinking water for these tasks, and communities around the globe are increasingly turning to recycled water to meet these needs. Recycled (also called "reclaimed") water is wastewater that has undergone a rigorous cleaning process. California, Texas, Australia, Namibia, the Middle East: many areas of the world now rely on recycled water. In 2000, the Board of Water Supply acquired the state's largest water recycling plant, the Honouliuli Water Recycling Facility. The plant sits next to the city's Honouliuli Wastewater Treatment Plant and can produce up to 12 million gallons of recycled water a day. The facility produces two grades of recycled water: RO (reverse osmosis) water for industrial uses and R-1 water for irrigation. Today, an average of 2 million gallons a day of RO water goes to industrial customers. Approximately 6.5 million gallons of R-1 water is used for irrigation of golf courses, parks and landscaping each day.

Honouliuli Water Recycling Facility

Before the Honouliuli Water Recycling Facility was built, wastewater was treated and then discharged offshore. Now, wastewater arrives at the Honouliuli plant for further treatment and eventual reuse. Using two separate processes, the Honouliuli plant produces two grades of recycled water: RO (reverse osmosis) water for industrial uses and R-1 water for irrigation. Today, an average of 2 million gallons a day of RO water goes to industrial customers. Approximately 6.5 million gallons of R-1 water is used for irrigation of golf courses, parks and landscaping each day.

Did you know there are technologies that can help ensure we have enough water for today and for future generations?

Stay Involved

Thank you for taking the time to learn about O'ahu's water. We hope that you have enjoyed this brochure and that you will stay involved in the ongoing story of our island's water.

There are many things you can do to get connected to conservation:

• Join a neighborhood stream cleanup.
• Learn xeriscaping.
• Look for water leaks in your house.
• Turn off the tap!

To learn more, please visit our web site at www.boardofwatersupply.com. If you would like more information, to schedule a speaker in your community, or to take a field trip into a watershed area, please give us a call at 748-5041.

Remember: each one of us on O'ahu can help to preserve our water supplies. Please do your part to conserve water and protect our watersheds.

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To create RO water for industry, microfiltration units are used to extract solid particles. Reverse osmosis (RO) units then filter out dissolved minerals such as calcium, iron and sodium. The processes also removes bacteria and viruses, which are about 1,000 times larger than a calcium molecule.)

On the R-1 side, rapid mix tanks blend chemicals that help remove solid particles. Flocculators, which gently agitate the mixture, cause these particles to stick together so that they can be filtered out and sent back to the wastewater treatment plant. Ultraviolet (UV) light is used to kill disease-causing organisms.

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