

# Hawaii Volcanoes NATIONAL PARK

Elevation Map



Site 1

# Puu WaaWaa Summit



Site 2

# Rainbow Falls



Site 3

# Mauna Loa Summit



**Site 4**

# Thurston Lava Tube



Site 5

Oo Crater



Site 6

# Kamoamoa Beach



# Water in Hawaii Volcanoes National Park

The Big Island of Hawaii is an island surrounded by the salty Pacific Ocean, yet Hawaii is advertised as a tropical paradise. Thanks to the water cycle, the salt is left in the ocean and rain clouds regularly soak the islands with freshwater.

## Climate and Atmosphere

There are many different climates on the island—often based on the availability of water. In fact, you can find desert, mountain, and tropical areas within just a few miles of each other. You do not have to travel very far to be in an entirely different climate.

Precipitation on the Big Island varies a lot. Some places on the island receive less than 1 foot of water, while others get over 21 feet in a single year. The park totals vary from 1-8 feet. Overall, the northeastern part of the island is more humid and gets more rain than the southwestern part. The mountain peaks are by far the least humid places on the island. However, the peaks receive large amounts of snow because they get cold enough in the winter.



**Bamboo Forest** –The northeastern side of the island supports rainforest.

## Glaciers

There are no glaciers in the park today, though there is evidence that glaciers once formed on the mountain peaks.



## Lakes and Oceans

There are very few lakes on the island, but the Big Island does have one of the highest natural lakes in the world. Lake Waiau is over 3,900 meters above the level of the ocean. This lake forms from snowmelt and rainwater collecting inside an old volcanic crater. Water flows into the center of the crater but does not easily infiltrate the rock of the crater. It only leaves the surface through evaporation.

While there are very few lakes on the island, much of the water that reaches the surface flows directly into the ocean. The ocean is important to figuring out the landforms in the park. The constant waves weather recently formed igneous rock. Over time, the waves are also eroding the sides of the island, making it smaller.



## Rivers and Streams

While there are many streams on the island, very few actually flow through the national park. This is because the rock in the park is young, and the younger rock on the island allows water to infiltrate easily. Water infiltrates the older rock (i.e. peaks outside the park) more slowly. Because of this, more water stays at the surface and can carve out impressive landforms like waterfalls.

Waterfalls form when rock above the waterfall has eroded much more slowly than rock below the waterfall. This creates a cliff. When a stream flows over the cliff, water drops over the side creating the waterfall. The water that flows over the falls weathers the cliff. The stream quickly carries away the weathered material and the cliff erodes.



**Akaka Falls** – The northeastern part of the island is made up of older rock where there are more rivers and streams. Waterfalls are dramatic examples of how flowing water is eroding the landscape.

## Groundwater

Groundwater is the main source of water for both animals (including humans) and plants on the island. Most precipitation quickly infiltrates the “holey” and “broken apart” rock of the island. In fact, even the streams and rivers are fed mainly by groundwater.



**Steam Vents** – Where groundwater flows close to recently formed rock or molten rock it changes to vapor and moves into the atmosphere.

Sometimes groundwater rises back up to the surface in the form of steam. This happens when groundwater flows through hot volcanic rocks below the surface and turns to vapor. If you get close to one of the vents where the steam is escaping, you can actually hear a hissing sound.

## Soil, Plants, and Animals

Volcanic eruptions are common in the park. It is one of the few places you can regularly see magma at the surface. When the lava first cools into igneous rock, very little life can live on it. But over time, small plants begin to grow. Weathering of the exposed rock increases the amount of soil, and new plants and animals begin to make it their home. Eruptions constantly disrupt and renew life on the island.

# Rock in Hawaii Volcanoes National Park

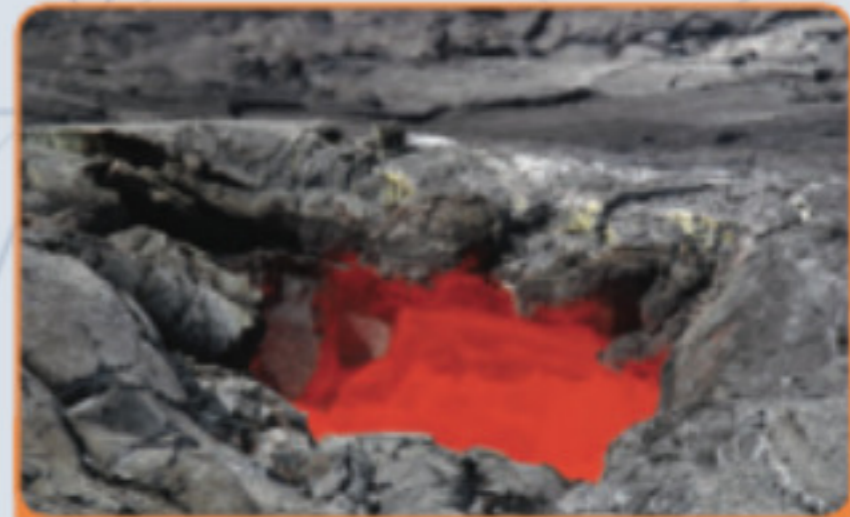
The Hawaiian Islands are a product of 70 million years of volcanic activity. It is only within the last 1 million years that the Big Island has been around. Erosion continually acts to bring down the elevation of the island. Today, rock-forming processes are winning as the island gets bigger and higher.

Most of the island is made up of igneous rock. The most common igneous rock on the island is called basalt. Basalt is usually dark gray or black in color. Other kinds of igneous rock form when what the magma is made of changes. For instance, Puu Waawaa was made from a different kind of lava. That is why its rock has different characteristics. Unlike the "holey" basalt rocks that surround it, it does not allow much water to infiltrate it. This causes more water that hits the surface to flow. This is what causes the unique erosion pattern at Puu Waawaa.

One of the reasons the rocks are so "holey" is because they cool so fast. In some rock, gases in the lava actually leave spaces in the rock. Sometimes layers of rock are unevenly formed on top of each other. In other places, whole "channels" of lava drain while the tube around it has turned into rock. This is called a lava tube. Water flows through these empty spaces once the rock has cooled.



Igneous Rock – This is the kind of rock found at Puu Waawaa.



Kilauea Lava Tube – When lava flows, the surface will often cool into rock. Then the lava will flow just under the surface, creating features like this lava tube. The roof is already starting to collapse as the lava drains.

Another dramatic feature of volcanoes is craters. Craters can form where a volcano erupts. New rock is added to the sides to build a peak. When the eruption stops, the center of the peak can collapse under its own weight. Craters can get very large and are one of the few places on the island where precipitation does not immediately begin flowing towards the ocean.



Kilauea Crater – A crater often marks the center of activity in a volcano.

Sometimes the lava does not turn into rock until it reaches the coast. This can produce very dramatic sea cliffs. Lava that falls directly into the ocean can form a spectacular, glassy sand that is then weathered by the ocean waves. Eventually, the wave action erodes away the cliffs as the sides start to fall away into the sea. Many parts of the coastline in the park alternate between being volcanic cliffs and black sand beaches.



**Kamoamoa Cliffs** – Notice the beach next to the cliffs. Lava flows directly into the ocean and forms small glassy sediments that are then weathered by the waves.

### Metamorphic Rock

There are not many metamorphic rocks on the island. While mountains are often formed by compression, Hawaii's peaks are formed by volcanic rock stacking on top of each other over time.

### Sedimentary Rock

Sedimentary rock is also rare on the island. However, lots of sediment is weathered on the island and taken out to sea. In the future this sediment will become part of new rock.

## Weathering, Erosion, Deposition, and Uplift

The beaches in Hawaii can tell you a lot about the kinds of rock that are being weathered, eroded, and deposited in the park. Beaches can be many different colors. Beaches on the Big Island are made up of white (from ocean coral), black (from igneous rock), or even green sand (from other kinds of igneous rock). The sand is the color of the sediments that are weathered and deposited on the coastline. In the national park, most of the beaches are made up of black sand. There is very little uplift occurring in the park. Instead, volcanoes cause the island to get bigger and higher. Above is a zoomed in view of sand found on a beach near Hilo, HI. The sediment is the weathered and eroded material from the volcanic rock called basalt.



**Green Sand Beach** – This is a rare green sand beach located on the southern end of the Big Island. It gets its color from nearby igneous rock.