

‘Āina a ke akua i noho ai ... Land where the goddess dwells

Volcanoes are monuments to Earth's origin, evidence that primordial forces are still at work. Volcanic eruptions remind us that our planet is ever-changing, with its basic processes beyond human control. As much as we have altered Earth's face to suit our needs, we can only stand in awe before the power of a volcanic eruption.

Volcanoes are land builders—they created the Hawaiian Island chain. Kilauea and Mauna Loa, two of the world's most active volcanoes, still add land to the island of Hawai‘i. Mauna Loa is Earth's most massive mountain, with an estimated volume of 19,000 cubic miles.

Today the summit of Mauna Loa volcano is about 56,000 feet (17,000 m) above the depressed sea floor—over 27,000 feet (8,230 m) taller than Mount Everest.

Unlike explosive continental volcanoes, the more fluid and less gaseous eruptions of Kilauea and Mauna Loa produce fiery fountains and rivers of molten lava. Added layer

upon layer, the flows created a barren volcanic landscape that became a foundation for life. Wind and water carried hundreds of species across the vast Pacific. Some survived, adapted, and prospered on the isolated archipelago, making it a showcase for evolution. Humans from other Polynesian islands, Europe, and elsewhere also introduced plants and animals, drastically altering the natural balance that once prevailed.

Hawai‘i Volcanoes National Park shows the results of 70 million years of volcanism, migration, and evolution in the Hawaiian Island-Emperor Seamount chain. These processes first thrust bare land from the sea and then clothed it with

complex, unique ecosystems and a distinct human culture. Created to preserve the natural setting of Kilauea and Mauna Loa, the park is also a refuge for the island's native plants and animals and a link to its human past. Park managers and scientists work to protect park resources and to promote understanding and appreciation of the park. Research by US Geological Survey scientists makes Kilauea one of the best-understood volcanoes in the world. It sheds light on the birth of the Hawaiian Islands and Earth's beginnings. Each volcanic eruption reminds us of the power of natural processes to change the air we breathe, the ground we walk on, and the sea that surrounds this volcanic island.

Trouble in Paradise

The Hawaiian Archipelago, once celebrated as islands of evolution, are now islands of extinction. The arrival of people changed the conditions that fostered the original diversity of life. As land was cleared to plant crops and build communities, forests vanished. Polynesian and other settlers introduced invasive plants and animals, and some thrived and multiplied in their new home. The impact has been catastrophic.

Pigs destroy the understory of tree fern and ‘ōhi‘a forests. Their muddy wallows become breeding grounds for the mosquitoes that transmit avian malaria and pox to native birds. Mongooses, cats, and rats eat native birds and their eggs. Invasive plants, like faya and Himalayan ginger, displace vast areas of Hawaiian forests. The onslaught of introduced plants and animals drove countless native species to extinction and still threatens unique life forms in Hawai‘i.



Saving an Ecosystem

Hawai‘i Volcanoes National Park is like an island within an island. It shelters remnants of the once-rich tapestry of Hawaiian life now unraveled by invasive species. In some parts of the park, natural habitats are damaged beyond recovery.

Park staff concentrate on the most biologically diverse habitats and those that offer the best chance for restoration. The strategy is to control or eliminate the most disruptive invasive plant and animal pests. Crews build fences to keep out feral animals. They track and kill feral pigs and destroy faya, guava, and Himalayan ginger. As native plant communities reestablish, the populations of Hawaiian honeycreepers, nēnē, Kamehameha butterflies, and happyface spiders may flourish.

In recognition of its outstanding natural values, Hawai‘i Volcanoes National Park has been named an International Biosphere Reserve and a World Heritage Site. The park continues to promote the vitality of this remnant of Hawai‘i.

- At-Risk Species

1 Common mynah

2 Faya (Firetree)

3 Japanese white-eye

4 ‘Ōhelo

5 Nēnē (Hawaiian goose)

6 Tree snail

7 Happyface spider

8 ‘A‘ali‘i

9 Kūkaenēnē

10 Koa‘e kea (White-tailed tropicbird)

11 Pueo (Hawaiian short-eared owl)

12 Predatory caterpillar

13 Pinao (Green darner dragonfly)

14 Kilauea Naupaka

15 Small Indian mongoose

16 ‘Io (Hawaiian hawk)

17 Koa

18 Black rat

19 Hawai‘i ‘Amakihi

20 Damsel selfly

21 Pa‘iniu

22 Hawai‘i ‘Elepaio

23 ‘I‘iwi

24 Hāhā

25 Blackburn butterfly

26 Hāpu‘u

27 Māmane

28 ‘Ala‘alawainui

29 Feral pig

30 ‘Ōhi‘a lehua

31 ‘Apapane

32 Kamehameha butterfly

33 Māmaki

34 ‘Ōma‘o

35 Pilo

36 Hawai‘i wolf spider

37 Kalij pheasant

38 ‘Ōpe‘ape‘a (Hawaiian hoary bat)

39 Pūkiawe

40 Dark lava flow cricket

41 Kōlea (Pacific golden-plover)

42 Niu (Coconut palm)

43 ‘Ama‘u

44 ‘Ae

45 Feral cat

46 Humpback whale

47 Noio (Black noddy)

48 Honu‘ea (Hawksbill turtle)

Life Comes to a New Land

A few million years ago, spores released into the wind from a fern in southeast Asia were carried by air currents high into the jet stream, where they drifted eastward. Eventually they settled on lava fields in the middle of the Pacific Ocean. This is just one way that life came to the Hawaiian Islands.

Insects, seeds, and spiders also rode air currents to the islands. Migrating or storm-driven birds carried seeds in their digestive tracts or on their feathers. Ocean currents carried salt-resistant seeds and insects, plants, and snails on floating debris. Amphibians, reptiles, freshwater fish, and most mammals were unable to cross the ocean expanse—only the monk seal and hoary bat

succeeded. Few of the millions of organisms embarking on this chance voyage made it here. Of those, only a few survived.

Over a span of 32 million years, plants and animals colonized the Hawaiian Islands at a rate of one insect every 68,000 years, one plant every 98,000 years, and one bird every one

million years. The species changed gradually, evolving new forms better adapted to island life. Without the predators and competitors of their former homelands, they didn't need elaborate defense mechanisms to survive. Qualities that once protected them proved unnecessary and were eventually lost. Contradictory terms now describe these new life forms: nettleless nettles,

mintless mints, stinkless stink bugs, and flightless birds. About 90 percent of Hawai‘i's native flora is endemic, found nowhere else on Earth. The islands' 110 endemic land birds evolved from as few as 30 original ancestors; about 1,100 kinds of flowering plants evolved from 270 to 280 immigrants; over 1,000 mollusks evolved from at least 22 immigrants; and about

10,000 endemic insects and spiders developed from 350 to 400 separate original colonizers. The diversity of life that came to flourish on these isolated, once-barren islands bears witness to the force of evolution and the tenacity of life.

Ho‘oulu Lāhui ... People of the Islands

I ke ao kahiko, hiki maila ka po‘e oiwi ma ka wa‘a kaulua mai Kahiki mai. Alaka‘i ‘ia ia po‘e kākāka e ke ao kūlohelohe me nā mea pono o ka nohona nōhīe e la‘a me ka ‘ai, ka ‘ike ku‘una, a me ka ho‘omana akua. ‘O Pele kekahi o kēia mau akua i ‘ike mua ‘ia ma ko ka po‘e hiki ‘ana mai. Nāna nō i hānau ka ‘āina mai kinohi a hiki i kēia mau lā, a no ia kumu ka lehulehu e ho‘ohanohano ai ‘o ia. He mea nui nā akua a me nā ‘aumākua i ka Hawai‘i. E like ho‘i kēia pilina i ka mea e pūlama ‘a nei me ka ‘āina.

He po‘e na‘auao ka Hawai‘i. Ao maila ka na‘au i ka ‘ike i waiho ‘ia mai uka a i kai. Inā aloha kākou i ka ‘āina, e aloha nō ka ‘āina iā kākou. Ola ka ‘āina, ola ke kākāka. ‘O ke aloha o ka ‘āina, he mea pau ‘ole ia. ‘O ko kākou ‘āina aloha nō ia.

—People of the Islands story in ‘ōlelo Hawai‘i (Hawaiian) (right).



Polynesians from distant lands came to the shores of Hawai‘i over a thousand years ago. Sailing on large, double-hulled canoes, they navigated by using the position of the stars, the sun, and the moon, by the movement of waves, and by the flight of birds. These ancestors of Native Hawaiians, guided by the elemental forces of nature, arrived with only bare necessities. By

drawing upon the resources of the land and sea, they sustained themselves and thrived.

Native Hawaiians recognized and revered a pantheon of gods, goddesses, and guardian ancestors with traditions that have evolved and are still practiced today. Woven into all aspects of life were ritual and reciprocal protocols that asked permission and gave thanks. These were

necessary for the perpetuation of resources upon which life depended. Accumulated knowledge and wisdom enabled Native Hawaiians to adapt to life on these volcanically active lands. They tended crops in shallow rock pits, dried salt along the shoreline to preserve fish, and captured birds to eat. Water was collected in gourds, drop by drop from the ceilings of lava tubes or from springs. Deities rewarded careful

stewardship, and their wrath was felt if they were displeased. Today, in these seemingly inhospitable lands, myriad resources feed, clothe, and house the people of Hawai‘i.

Some Native Hawaiian families trace their lineage to Pelehonuamea, a woman deified because of her power over volcanic eruptions and lava flows. Today Pele resides in Halema‘uma‘u.

Respect for her presence is essential in a land where evidence of her work abounds, and where landscapes can be transformed overnight. Through the centuries, in times of plenty and of scarcity, Native Hawaiians remain steadfast in their love of these cherished islands, their ‘āina aloha.



Exploring Hawai'i Volcanoes

aircraft like drones is prohibited. • For firearms regulations check the park website. • **Fishing** is allowed for the general public only between the park's southwest boundary and the halfway point between Halapê and Keauhou. • **Get backcountry camping** permits and brochures at the Backcountry Office. Groups are limited to 12 people. Prac-

pack it out. • **Fires** are allowed only in fireplaces and grates at Nāmakanipaio Campground and the Kīpukapuaulu and Kilāuea Overlook picnic areas. Vehicle exhaust systems can start fires in grassy areas; park only where designated. Do not smoke on trails. • **Lighting** or possessing fireworks is prohibited. • **Watch out for wildlife**, including the rare **nēnē** (Hawaiian goose) along roads. Slow down in nēnē habitat areas marked by signs. Stay at least 60 feet away. **Do not feed nēnē!** Feeding causes them to beg for food at roadsides and to approach vehicles, putting them at risk of injury or death.

Regulations Federal laws protect all natural and cultural features. Do not take rocks, lava, sand, artifacts, plants, or animals; climb on, build, or alter rock structures; or make rubbings or molds of petroglyphs. • Using remotely piloted

Safety Hiking Stay on marked trails. Avoid cliffs, earth cracks, and steam vents; these unstable features may collapse or be slippery. Hiking over cracks, holes, loose rock, and thin lava crust greatly increases your risk of injury. Wear sturdy, closed-toe shoes. Lava fields are shadeless and hot. Wear sunscreen, a hat, and sunglasses. Carry at least two quarts of water per person. Along the coast, expect strong winds, steep cliffs, high waves, and unpredictable surf.

Volcanic eruptions can be hazardous. Areas around erupting vents are closed to travel—even from a distance fumes and fallout (Pele's hair, cinder, and ash) can irritate lungs and eyes. Heed all ranger instructions and signs. For US Geological Survey eruption updates go to www.usgs.gov/observatories/hvo.

Campgrounds Park entrance fees and camping registration are required at drive-in campgrounds. Nāmakanipaio Campground (off Hwy. 11), managed by Hawai'i Volcanoes Lodge Co., LLC, www.hawaiivolcanohouse.com or 808-756-9625, has restrooms, water, and picnic tables. Campfires are allowed only in existing fireplaces or grates. Kulanaoikaiki Campground (off Hilina Pali Road) is first-come, first-served; no reservations. No water; campfires are prohibited. Use fueled camp stoves only. Stays are limited to 7 consecutive days per month and 30 days per year.

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**Welcome Center
to Kailua-Kona
via Highway 11
96mi / 155km
(2.5 hour drive)**

