

VISITOR ALERT: High amounts of dangerous sulfur dioxide gas may be present in areas of the park.

‘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 an eruption.

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

Today's summit of Mauna Loa Volcano stands 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 Kīlauea and Mauna Loa produce fiery fountains and rivers of molten lava. Added layer upon layer, the flows produced a barren volcanic landscape that served as a foundation for life. Hundreds of species of

plants and animals found their way across the vast Pacific on wind, water, and the wings of birds. A few survived, adapted, and prospered during this time of isolation. The arrival of humans—first Polynesians, then Europeans—and the plants and animals they brought drastically altered this evolutionary showcase, this grand natural experiment.

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 a 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 Kīlauea 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 the park resources and to promote understanding and appreciation of the park. Research by US Geological Survey scientists makes Kīlauea one of the best understood volcanoes in the world. It sheds light on the birth of the Hawaiian Islands and planet Earth's beginnings. Each 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.

PHOTO © G. BRAD LEWIS/VOLCANOMAN.COM
HAWAIIAN TEXT (ABOVE) FROM PELE AND HIIAKA, A MYTH FROM HAWAII
BY NATHANIEL B. EMERSON

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, the 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 the faya and kāhili 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 on 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 concentrates 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, track and kill feral pigs, and destroy faya, guava, and kāhili ginger. As native plant communities establish themselves again, 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 pristine Hawai'i.

- Endemic:** Unique to Hawai'i, found no place else on Earth
Indigenous: Naturally occurring in Hawai'i but also found elsewhere
Invasive: Introduced by humans
- | | | | | | |
|--------------|-------------------------|--|------------------------------------|--------------------------|------------------------|
| • Endangered | 1 Common mynah | 6 Tree snail | 11 Pueo (Hawaiian short-eared owl) | 15 Small Indian mongoose | 20 Damsel selfy |
| | 2 Faya (Firetree) | 7 Happyface spider | 12 Predatory caterpillar | 21 Pa'iniu | 21 Pa'iniu |
| | 3 Japanese white-eye | 8 'A'ali'i | 13 Pinao (Green darter dragonfly) | 22 Hawai'i 'Elepaio | 22 Hawai'i 'Elepaio |
| | 4 'Ōhelo | 9 Kūkaenēnē | 14 Kīlauea Naupaka | 23 'I'iwi | 23 'I'iwi |
| | 5 Nēnē (Hawaiian goose) | 10 Koa'e kea (White-tailed tropicbird) | | 24 Hāhā | 24 Hāhā |
| | | | | 25 Blackburn butterfly | 25 Blackburn butterfly |

Life Comes to a New Land

A few million years ago, a spore released into the wind from a fern in southeast Asia was carried by air currents high into the jet stream, where it drifted eastward. Eventually it settled on a barren lava field 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 Island chain 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, ua ka'i nā po'e Hawai'i ma ka wa'a kaulua a pae ma kēia 'āina. Mamuli o ka 'ike ana i ke ahi o Pele—he 'āina, he 'āina i mua o kākou. Ua hele mai lākou me nā mea pono āpau no ka noho ana a noho lākou me ka 'ike 'ole. He 'āina he mea nui loa ia lākou pēlā me ke kai. Kēia mau mana'o lanakila lākou. Ua hele mai lākou me ke akua. O kō lākou akua oia no o Kāne, Kū, Lono, Kanaloa, Pele a me nā 'aumākua a me nā akua 'ē a'e. Aia o Pele mā nā 'āina āpau. Kekahi o lākou ke mālama nei nō. Mahalo lākou i kō lākou akua no nā mea āpau.

He po'e na'auao lākou. Mai ka 'āina nā mea 'ai āpau. Mai ke kai ka pa'akai a me ka i'a a mai ka lani ka wai. Mālama lākou i ka 'āina a me ke kai e like me ka mālama ana o ke kino o ke kanaka. O ke aloha o ka 'āina, he mea pau'ole—kō kākou 'āina aloha.

—Hawaiian translation of the "People of the Islands" story (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, a myriad of 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

- **Trails** The park has over 150 miles of trails. On **Mauna Loa**: Both backpackers and mountaineers can enjoy the challenges of this one- to four-day hike. **Warning:** You must be in good physical condition and be properly equipped for winter mountaineering.
- **Climate** At 4,000 feet of elevation the Kilauea summit can be rainy and chilly at any time. Usually the coastal area is warm and dry. Be prepared for variable weather. Bring a rain jacket and wear long pants and closed-toe shoes.

- **Collecting** rocks, lava, sand, cultural artifacts, plants, or animals is prohibited.
- **Archaeological sites and artifacts** are protected by federal law. Be respectful and do not climb on, build, or alter any rock structure. Do not make rubbings or molds of petroglyphs.

For Your 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 sea cliffs, high waves, and unpredictable surf.
- **Volcanic eruptions** can be extremely hazardous. Areas around erupting vents are closed to travel—and even from a distance fumes and fallout (Pele's hair, cinder, and ash) can irritate lungs and eyes. Heed all ranger instructions and obey all signs. For US Geological Survey eruption updates visit: volcanoes.usgs.gov/hvo/activities/kilaueastatus.php.

- **Hotel and Cabins** Volcano HouseSM Hotel and Nāmakanipāo Campground and Cabins are run by Hawai'i Volcanoes Lodge Co., LLC. Contact 808-756-9625 or www.hawaiivolcanohouse.com for information. Park entrance fees apply; campground registration required, and fees apply. Restrooms, water, and picnic tables are available. Fires are allowed only in existing fireplaces or grates.

This is one of over 400 parks in the National Park System. To learn more about national parks please visit www.nps.gov.

High amounts of dangerous sulfur dioxide gas may be present in areas of the park. These gases are a danger to everyone, particularly to people with heart or respiratory problems and infants, young children, and pregnant women.

Volcanic gas looks like smog. Keep your windows closed when it is visible. If air irritates, smells bad, or you have difficulty breathing—leave the area.

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