

Instruction Guide: Volcanic Effects Scavenger Hunt (Hiking Activity)

Objective: Identify how volcanoes affect a landscape. Compare volcanic landscapes to the geology of other areas.

<u>NGSS</u>	<u>HĀ</u>
4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	Strengthened Sense of Belonging Strengthened Sense of Total Well-Being Strengthened Sense of Hawai'i
4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	

Preparation: Print and laminate trail cards (pages 3-16). Print double-sided so bulleted information is on the same card as picture. Identify what will be encountered on the trail you plan to use. These were designed for the Crater Rim Trail from the visitor center to the steam vents at Hawai'i Volcanoes National Park, but they can also be used as examples of items you might encounter on other trails. Optional: Bring hand lenses to closely look at rocks, plants, and lava products on the trail.

Procedure:

1. Split school children into groups based on number of cards chosen for the hike activity. Students will work together and look for what is illustrated on their card during the hike.
2. When students find an example of what is on their card, ask them to read the bulleted information on back.
3. Use the questions on each card as starting points for discussions about geology in your area.

Trail Talking Points for group leader

Forms of lava – ‘a‘ā and pāhoehoe are both forms of lava, but different in appearance because of the way each flows. Pāhoehoe flows like water and has a smooth or ropy surface. ‘A‘ā flows are more gooe and have sharper and rougher surfaces.

Igneous Rock – Igneous rock is one of the three rock types, the others being sedimentary and metamorphic. Igneous rocks form when magma cools inside the earth, or lava cools outside of it. Much of the igneous rock found at Hawai‘i Volcanoes National Park is porous and is called basalt. Other places in the country have lots of granite, which is an igneous rock that forms inside the earth as crystals cool slowly. Sedimentary rocks form when pieces of other types of rocks, sand, and sometimes marine organisms get pressed together in layers, hardening into stone. Metamorphic rocks form when heat and pressure alter the appearance and composition of other rocks.

‘Ōhi‘a lehua - This tree, endemic to Hawai‘i, has special adaptations that enable it to be a first colonizer of fresh lava flows and to survive during periods of harmful volcanic gases. The tiny seeds of the tree easily blow into cracks in lava. As moisture accumulates in the crack, the tree starts to grow. ‘Ōhi‘a are also able to close their stomata when harmful volcanic gases blow in their direction, which enables them to survive in areas other plants cannot.

Rust/oxidation on railings along the trail – Some metals rust under certain environmental conditions. Because the summit of Hawai‘i Volcanoes National Park is in a rainforest, there is a great amount of rain. Also, volcanic gases can make the rain more acidic. Acid rain causes oxidization (rusting) of metals (like iron). You can also see rocks that are rust colored, when the iron in the rock has oxidized. Discuss with students where else they see rust. If you are doing this field trip in another type of ecosystem, what factors might contribute to acid rain and rust in your area?

Trail Erosion – Erosion happens naturally when wind and water wear away soil and rock. On trails, crowds and heavy foot traffic from visitors coming to see eruptions also contribute to erosion. Erosion might be increased in proximity to a volcanic area because of the higher levels of acid rain may wear away the rock. Discuss with students the dilemma of maintaining natural areas such as parks for the preservation of natural and cultural history, but also so that future generations can enjoy them. Is there a point at which parks should limit visitation in order to protect an area?

Danger Signs & Area Closures – In the dynamic environment of an active volcano, trail conditions change frequently. Earthquakes can cause sections of trail to break away, making it unsafe for visitors to continue to use the trail. Rock slides can block trails. People and pets can fall into cracks and steam vents in unstable areas. The park monitors the safety of trails that are open to the public, and posts signs in areas that are unsafe. There are over 300,000 acres of land to maintain within Hawai‘i Volcanoes National Park. Visitors need to read and obey all posted warning or closure signs, and use common sense if they are exploring areas off-trail. Sometimes trails are temporarily closed in order to protect wildlife, such as nesting nēnē (threatened Hawaiian goose).



Forms of Lava

- ‘A’ā and pāhoehoe are both forms of lava, but different in appearance because of the way each flows.
- Pāhoehoe flows like water and has a smooth or ropy surface.
- ‘A’ā flows are more gooey and have sharper and rougher surfaces.

Can you tell the difference between the two in the photo?

Do you know the difference between lava and magma?



Igneous Rock

- Igneous rock is one of three of the rock types. The two other rock types are sedimentary and metamorphic.
- Igneous rock is formed through the cooling and hardening of magma or lava.

What types of rocks are near your home?



'Ōhi'a lehua

- *'Ōhi'a lehua* is endemic to Hawai'i and can be found from sea level to over 7,000 feet elevation.
- 'Ōhi'a trees grow easily on lava, and are usually the very first plants to grow on new lava flows.
- These trees have some adaptations that help them live in volcanic areas.

What do you think helps the 'Ōhi'a grow on lava?



Rust on Railings

- Rust forms on certain metals when they are exposed to oxygen and water.
- Parts of Hawai'i Volcanoes National Park are in rainforest, so there is a lot of rain.
- Gases from the volcano can make the rain more acidic (acid rain), which makes metal rust faster.

What causes things to rust in your neighborhood?



Trail Erosion

- Erosion is when soil gets worn down and transported from one place to another. Wind, rain, and sun are examples in nature that cause erosion. Animals, like humans, also cause erosion.
- Many people visit Hawai'i Volcanoes National Park, and the trails become eroded from visitors.
- Eroded soils are harder for plants to grow in.

Where have you seen erosion in your neighborhood?



DANGER

**DO NOT
ENTER**

**AREA
CLOSED**

Land Beyond This Point Is Closed
To Public Use Due To
Volcanic Hazards
Authorized Persons Only



Danger Signs

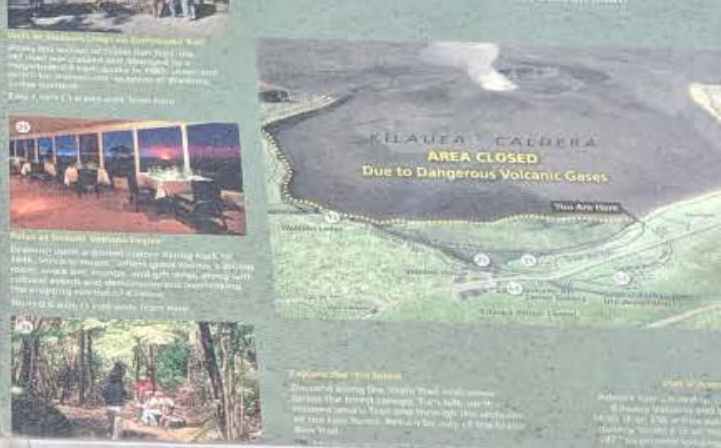
- These signs identify areas that may be dangerous for visitors. It's important to be aware of potential hazards when in the park.
- Volcanic landscapes can be dangerous due to deep cracks, steam vents, or broken ground.

Why is it important to follow these signs?



ALL NATIONAL PARK SERVICE AREA
BEYOND THIS POINT CLOSED TO
PUBLIC USE AND TRAVEL BECAUSE
OF EMERGENCY CONDITIONS

10

[illegible]

Area Closures

- When you have a national park on the world's most active volcano, trail conditions can change fast.
- Trails that were open in the past may need to be closed, if it becomes unsafe to visitors. Lava may cover a trail, the trail might go too close to dangerous volcanic gases, or part of a trail might be broken away in an earthquake.

What are some other reasons to close a trail?