

# *Mālama ‘Āina: It’s Our Kuleana!*

## Forest Management

Grades 5-12



Island ecosystems, such as those found in Hawai‘i, are very susceptible to damage caused by humans and the alien (non-native) plants and animals they bring with them. More native species have been eliminated in Hawai‘i than anywhere else in the United States and in most places of the world. While habitat loss has caused extinction and endangerment, non-native species have also contributed to major ecosystem damage and are now the main cause of loss of biodiversity in Hawai‘i. We are all the stewards (caretakers) of the ‘āina (land) and it is our kuleana (responsibility) to mālama (protect and care for).

*Nani i ka ‘ōhi‘a ka ‘ōiwi o Kīlauea. (The body of Kīlauea is beautified by ‘ōhi‘a trees.)*

*Hahai no ka ua ia ka ululā‘au. (Rains always follow the forest.)*

**Essential question:** What is mālama ‘āina and why is it important to the future of our native forests?

**Photo Analysis:** What do you see in these photos? Compare what you see in these photos.

(see larger images to show students)



**Setting the Stage:** The problems with non-native species in Hawai‘i are the most severe of our 50 states. Federally significant resources are at stake, including prime national park and forest areas and a third of the nation's endangered species. In order to help our forests, we need to understand what makes a healthy forest so that our forests can thrive and be sustainable for many generations to come.

**Brainstorm: What does a healthy native forest look like?**

(By definition, a healthy forest is a balanced, bio-diverse ecosystem that is resilient to harmful factors, has an absence of predators, has a balance of new growth and morbidity (death) and has climate stability.)

**Determining the Facts:**

The loss of plant and animal species in our islands has been staggering, and what remains occupies only a small fraction of what they were just two hundred years ago. Much of the loss has been due to non-native invaders, which are particularly troublesome on island habitats, where native species don't have strategies to protect themselves against non-native newcomers and other threats.

**Brainstorm: What are the major threats to the native plants and animals of Hawai‘i?** Ask these questions to stimulate ideas:

1. What invasive species are prevalent in Hawai‘i Volcanoes National Park and what damage can they cause?

(Himalayan ginger, morella faya, alien grasses, feral pigs, Himalayan raspberry, mongoose, feral cats, mosquitoes are examples. In short, they crowd out or in one way or another destroy native species.)

2. How could Global Warming and Climate Change Threaten our Forests?

(Trees are our best natural defense against carbon-based global warming. They not only produce the oxygen we breathe, but also absorb huge amounts of the carbons that are leading to global warming! Also, if climate changes take place, some species of plants and animals might need our help to relocate/migrate to more hospitable areas –here in Hawai‘i Volcanoes National Park that would probably be higher elevations (move, adapt or die). We need to also determine whether different varieties of indigenous plants might have a better chance of surviving the changing conditions. Other considerations for our native forests include threat of mosquitoes migrating to areas that were once too cold for them.

We know that some species of native birds are very susceptible to avian malaria which is carried by mosquitoes. In addition, warmer and/or drier conditions could lead to insect infestations that could destroy trees and plants that have become weakened by drought and heat. In other words, our Hawaiian forests could become endangered or extinct.) So, what can each one of us do?

3. How do volcanic eruptions threaten our native forests?

(Native trees like the ‘ōhi‘a lehua have had to make special adaptations to survive with poisonous sulfuric gases emitted by volcanic activity. The leaves have a stomata (like pores) which closes when vog is present. In severely affected areas, trees will die. In addition, lava covers and/or burns any forests that are in its path. It takes hundreds of years for forests to re-grow to full scale. This forest is only a little over 200 year old.)

**Vocabulary-** Words to know have been underlined throughout the lesson:

alien species, habitat loss, biodiversity, native species, invasive species, extinct, endangered, stewards, *mālama ‘āina, kuleana.*

**Scientific Evidence:** Check prior knowledge:

How plants and animals came to these isolated islands is an exciting story. The few creatures that reached Hawai‘i before human influence had to travel over thousands of miles of open ocean by floating, being carried by the wind, or being attached to birds. The Hawai‘i that these plants and animals first inhabited was composed of a remarkably diverse habitat. Over time, and in near complete isolation, some 11,000 species are believed to have evolved from roughly 2,000 ancestors that arrived during a 70-million-year period. That’s an average of about only one new species every 35, 000 years!!

Today, in contrast, 20 to 50 new non-native (alien) species arrive in Hawai‘i every single year. Few visitors realize that the lush lowland vegetation and colorful flowers they marvel at are not native to the islands but are instead, part of a diverse collection of non-native invaders. Many of these pose major threats to the native landscape of Hawai‘i.

How do alien species threaten native forests: Non-native plants and animals take life-giving sunlight away from native plants, fight for space, change soil composition so that native plants no longer have the ability to thrive, and deprive the natives of needed moisture. These factors cause the natives to die out, making room for the aliens to take over the ground space. This will result in the extinction of many native plants as well as the native birds and insects that depend on them.

**Visual Evidence:** Field Activity

Follow the ranger’s instructions for mālama ‘āina in the park by aiding in the removal of alien species from the native forest.

**(Procedures for Ranger:** Demonstrate how to eradicate ginger by the use of safe tools, proper green waste disposal and clean-up procedures, then direct students to a suitable area for removal. Leave plenty of time for closing and clean-up.)

**In Closing:** Revisit the Essential Question.

Many factors determine the health of a forest. The first step to protecting and preserving a forest is to determine its current health and remove alien species like we did today!

Global warming and resulting climate changes may cause us additional challenges in the near future. What can you do to reduce these threats?