



# Hō'ike o Haleakalā

A Multidisciplinary, Science-Based  
Environmental Education Curriculum  
for High Schools

Produced by  
Hawai'i Natural History Association  
*Nā Kumu o Haleakalā*  
Haleakalā National Park  
The Nature Conservancy

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Hawai'i Natural History Association  
Post Office Box 74  
Hawai'i National Park, Hawai'i 96718

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Cover art and border: Sophie Cayless

Design and layout: Michele Archie and Howard Terry, The Harbinger Institute

*Hō'ike o Haleakalā* Development Team

Elizabeth Anderson	Project Coordinator, Haleakalā National Park
Michele Archie	Writer, The Harbinger Institute
Sandy Buczynski	Advisor, Seabury Hall
Ann Coopersmith	Advisor, Maui Community College
Jackie Davis	Advisor, Baldwin High School
Ann Fielding	Writer, researcher
Carol Gentz	Project Coordinator, The Nature Conservancy
Keith Ideoka	Advisor, Lahainaluna High School
Lyle Kajihara	Advisor, King Kekaulike High School
Lloyd Loope	Scientific Advisor, U.S. Geological Survey, Biological Resources Division, Haleakalā National Park
Kim Martz	Researcher and advisor, U.S. Geological Survey, Biological Resources Division, Haleakalā National Park
Dan Schulte	Advisor, St. Anthony High School
Forest Starr	Researcher and advisor, U.S. Geological Survey, Biological Resources Division, Haleakalā National Park
Howard Terry	Writer, The Harbinger Institute

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# Foreword



*Nā Kumu o Haleakalā* is a partnership on the island of Maui, Hawai‘i, comprised of teachers from public and private high schools, members of interested community organizations, and staff from the Hawai‘i Natural History Association, Haleakalā National Park, and The Nature Conservancy. The *Nā Kumu* partnership has worked with a highly qualified curriculum writing and development team to produce the beginnings of a comprehensive environmental education curriculum, *Hō‘ike o Haleakalā*, specific to Maui to promote understanding of island ecosystems, a feeling of shared ownership, and a commitment to active stewardship. The target group is primarily high school level, though testing will occur in the local community college and in intermediate schools, as well. The effort was initiated by the National Park Service and local teachers in 1996, and gradually gathered momentum until 1999, by which time sufficient funding had been raised from several private sources to move ahead. The partnership has recently completed ecosystem-based modules for aeolian, rainforest, and the coastal/marine zones of Haleakalā. Future plans call for these to be followed by modules on dryland forest, the subalpine zone, watersheds, and a culminating module on alien species.

Although not entirely conceived as such originally and having much broader educational objectives, *Hō‘ike o Haleakalā* can be thought of as an innovative effort at educating local students to understand the overwhelming effects of invasive alien species (IAS) on biodiversity, agriculture, health, economy, and quality-of-life of an oceanic island ecosystem, and to obtain long-term public support of and participation in such efforts. Each ecosystem-based module has one or more units on the effects and/or future threats of alien species. Haleakalā National Park is the most biologically intact summit-to-the-sea reserve in the Hawaiian Islands and among the most important reserve sites in the United States for conservation of biodiversity. However, the park’s future depends on resource managers’ success in combatting invaders already present and on efforts to prevent additional IAS from establishing on the island of Maui. Since oceanic islands are particularly vulnerable to biological invasions, IAS threats to Hawai‘i and to Haleakalā National Park on Maui are an order of magnitude greater than threats to most other U.S. national parks. The red imported fire ant and Asian longhorn beetle are not yet established in Hawai‘i, but both have been recently intercepted in quarantine. Unless major action is taken – a circumstance which will require solid public support — invasions can be expected to erode the biological integrity of oceanic island ecosystems, eventually even the last strongholds of the endemic island biota.

Lloyd Loope  
Research Biologist, U.S. Geological Survey,  
Biological Resources Division, Haleakalā National Park



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## Advisory Teachers

Don Chaney

Graham DeVey

Althea Magno

Marie Perri

Cecilia Romero

Sister Sara Sanders

## Technical Advisors and Reviewers

Eric Andersen

Steve Anderson

Jeff Bagshaw

Hannah Bernard

Pat Bily

Gus Bodner

Nan Cabatbat

Bill Evanson

Lenny Freed

Thomas Giambelluca

Dan Gruner

Leon Hallacher

Jodi Harney

Bob Hobdy

Kai and Linda Kaholokai

Bully Kapahulehua

Dennis Kawaharada

Carol McNulty-Huffman

Christy Martin

Art Medeiros

Robert Mullane

Glynnis Nakai

Maura O'Connor

Sharon Ringsven

David Sherrod

Russell Sparks

Wendy Swee

Kalei Tsuchi

Ellen VanGelder

National Park Service

Haleakalā National Park

Haleakalā National Park

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# Introduction

## *Hō'ike o Haleakalā*

*Haleakalā revealed: an opening to view our past and embrace our future*

*Reveal yourself, summit to sea*

## Project Background and Purpose

There are some 6,000 high school students in Maui County. Many of them have never seen a native bird or experienced a native Hawaiian forest. Many of them have no reference point, no experience to know whether the birds they see or the forests they visit are native to the Hawaiian Islands.

This lack of knowledge and experience may not be surprising. Roughly 75 percent of the original Hawaiian forest is gone and the remnants of native forest that remain tend to be difficult to access. Forests, scrublands, and coastal areas dominated by nonnative species are all many Hawaiian residents know. Over 100,000 species of plants alone have been introduced to the Hawaiian Islands since the arrival of the first Polynesians, and many of these now predominate in areas once covered by native vegetation. Furthermore, while the Hawaiian Islands make up well under one percent of the total land mass of the United States, 75 percent of the country's recorded plant and bird extinctions are of Hawaiian species.

Intimately tied to the land, traditional Hawaiian culture, values, and ways of life have declined along with the native plants and animals. Today's residents have little connection to the land—and little connection with the achievements and customs of the ancient Hawaiians. Like many native Hawaiian birds, insects, and plants, Hawaiian cultural values sometimes seemed threatened by extinction—through lack of awareness and understanding.

*Hō'ike o Haleakalā* aims to help sustain the native Hawaiian landscape and culture by helping students establish and deepen connections to the land and the culture it supports. Project goals are to enable high school students in Maui County—and elsewhere throughout the Hawaiian Islands and beyond—to:

- Gain a greater understanding of island ecosystems;
- Develop an awareness of relationships between people and the environment;
- Build observation, critical-thinking, and decision-making skills;
- Feel a sense of inspiration for and shared ownership of natural areas; and
- <sup>a</sup> Become informed decision-makers active in the stewardship of their island home.

## From Vision to Reality

Since 1996, educators from public and private Maui high schools, Haleakalā National Park, Hawai'i Natural History Association, The Nature Conservancy, and members of several community groups have been sharing ideas for improving natural history education in Maui County's secondary schools. Out of these discussions came the idea to, in effect, bring the mountain and its fascinating array of natural systems to the classroom.

*Hō'ike o Haleakalā* is a fulfillment of that vision. This classroom-based curriculum provides educators with background information, resources, teaching suggestions, and activities for teaching science



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and other academic skills in the context of topics and issues relevant to Haleakalā, Maui, and the other Hawaiian Islands.

*Hō'ike o Haleakalā* is a multi-disciplinary, science-based environmental education curriculum that supports State of Hawai'i high school educational standards, particularly in the science disciplines. Each activity is correlated to state science standards, offering educators a way to fulfill educational requirements using local ecosystems and issues as a context. These materials help you bring science home for your students while fostering a strong science background and critical-thinking skills.

Today's young people have the future of Hawai'i in their hands. They need to know the value of our natural and cultural environment before they can be active stewards. *Hō'ike o Haleakalā* is a celebration of this unique heritage, an exploration of the modern landscape, and an invitation to stewardship.



# How to Use This Curriculum

*Hō‘ike o Haleakalā* can be used to structure a semester-long (or longer!) course focusing on native ecosystems and natural resource management issues. Alternatively, the modules, units, and activities in this curriculum may be taught separately. Activities may be infused into standard science classes and some are also suited to use in language arts, mathematics, Hawaiian studies, or social studies classes.

## Curriculum Components

The *Hō‘ike o Haleakalā* curriculum is divided into four modules, each of which covers a discrete ecosystem on Haleakalā. The modules—and the icons used to represent the ecosystems—are:



### Alpine/Aeolian

The wolf spider (*Lycosa hawaiiensis*) is an endemic species found only near the summit of Haleakalā.



### Rain Forest

The ‘ākohekohe or crested honeycreeper (*Palmeria dolei*) is an endemic forest bird once found on both Maui and Moloka‘i but now found only on East Maui. It is endangered.



### Coastal

The honu or green sea turtle (*Chelonia mydas*) is an indigenous reptile that spends much of the year in the coastal waters around the main Hawaiian Islands, migrating up to 800 miles to the Northwestern Hawaiian Islands for summer nesting season. The honu is listed as a threatened species.



### Marine

The humuhumunukunukuapua‘a or Picasso triggerfish (*Rhinecanthus rectangulus*), a common fish on shallow reef flats, was voted the Hawai‘i State Fish in 1984. Its Hawaiian name means “nose like a pig.”

You’ll find the icon for each module in the header of each page of that module.



All of the pages associated with the curriculum as a whole (such as this introduction or the glossary) are indicated by an icon depicting ‘āhinahina, the Haleakalā silversword (*Argyroxiphium sandwicense* subsp. *macrocephalum*). The ‘āhinahina is a threatened endemic plant found only on the upper slopes of Haleakalā, and associated around the world with this place.

Each module is divided into five units, each comprised of two to four distinct activities. Each unit and many of the activities may be used separately to supplement your existing lesson plans. Or teach one or more units or an entire module in sequence for a more complete learning experience.





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## Module Format

Each module consists of five units. Together these units comprise a thorough exploration of the ecosystem. Individual units in each module address key aspects of the ecosystem’s physical characteristics, plant and animal species and relationships, and related management issues.

## Module Introduction

- **Ecosystem Connections**—Two pages that give a visual sense of the ecosystem and, through quotations and Hawaiian chant, illustrate its importance to humans  
*Photocopy these pages for students or make acetates of them to introduce the ecosystem before beginning a module or unit.*
- **Ecosystem Summary**—An overview of ecosystem characteristics and status
- **Traditional Hawaiian Significance**—A brief account of the Hawaiian cultural significance of the life zone
- **Journal Ideas**—Suggested topics for journal entries or writing assignments to get students thinking about the ecosystem
- **To Get a Feel for . . .** —A brief activity to introduce students to the life zone
- **Units at a Glance**—An overview of the five units that comprise each module, including the topics covered, the importance of the unit, and constituent activities
- **Optional Field Activities**—A description of field trips, service projects, and other field learning opportunities related to the ecosystem

## Five Units

Each unit includes:

- **Introductory Information**—Includes a brief unit overview (read aloud to students before beginning a unit or an activity), length of the unit, and unit focus questions.
- **Unit at a Glance**—Activity-by-activity summary including:
  - Description
  - Length
  - Prerequisite Activity (if any)
  - Objectives
  - DOE Science Standards and Benchmarks met by the activity.
- **Enrichment Ideas**  
*Use these ideas to build on the activities in each unit. These include suggestions for independent projects, additional research, extending the activities, and putting knowledge into action.*
- **Resources for Further Reading and Research**  
*These resources may be equally useful to both instructors and students.*



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- **Activity Instructions and Materials**

- **Materials & Setup**—Materials and equipment needed for the activity
- **Instructions**—Step-by-step guidance for conducting the activity
- **Journal Ideas**—Topics for journal entries or stand-alone writing assignments

*These written assignments are integral parts of each activity, often helping students explore their personal connections with the subject matter and cement key learning objectives. Selecting from among these—or creating your own topics—also help you focus on the standards and objectives that are most important to you. Some of the journal ideas are appropriate for using before and after a unit to give students an opportunity to reflect on what they learned.*

*Have students keep a journal if you are teaching the entire curriculum or a substantial piece of it. Collect journals periodically to assess student learning and reflection. If you are teaching a single activity or unit, you may choose to use the journal ideas as writing assignments instead of topics for journal entries.*

- **Assessment Tools**—Ideas to help you assess student performance
- **Teacher Background**—Additional information, intricate activity instructions, and other support
- **Masters for Overhead Acetate Transparencies, Game Cards, and Other Instructional Materials**—These masters may be easily identified by looking for the descriptive label in the page header (e.g., “Game Card Master”).
- **Masters for Student Pages**—These activity, data, or reading sheets to duplicate for student use are easily identified by a shaded bar running the length of the page in the right-hand margin containing the label “Student Page.”

## Vocabulary Words

Technical terms and those that might be difficult for students to understand are explained or defined in the text of student pages and enclosed in quotation marks the first time they are used. These words are also included in the glossary that accompanies this curriculum at the beginning of each module. This glossary is designed as an easy reference for instructors, but it may be photocopied for student use as well. Most glossary words are followed by a notation indicating the unit(s) in which the terms are used. Those that include no unit number notation are words common to most of the units such as “ecosystem.”

## Additional Resources

A complement of additional resources such as reports, game boards, reference books, and video tapes accompanies this curriculum. See notations within individual activities that indicate these materials. Where possible, these materials are included in a pocket that accompanies the relevant unit. Resources that are too large to fit in such a pocket are included separately.



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## Beyond the Classroom & Beyond This Curriculum

With the help of *Hō'ike o Haleakalā*, you can bring Haleakalā into your classroom, helping to make the unique natural history and ecology of the island a part of your students' lives. The activities that are included in *Hō'ike o Haleakalā* are an excellent accompaniment to field trips, service projects, and other activities that take students outside the classroom to experience the unique natural environment they are studying. Each module contains suggestions and contact information for field-based learning.

Whether you select a single activity or teach an entire course using *Hō'ike o Haleakalā*, we thank you for joining us in spreading the word about the unique and imperiled environment of our island home.