

# **Native Hawaiian Dry Forest Plants**

**Developed by:  
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**Grade Level:** Sixth grade

**Purpose:** This curriculum is designed to communicate:

- I. How dry forest ecosystems are affected by natural and non-natural events.
- II. The structure and function of seeds and flowers and how they might be adapted to dry forest habitats.
- III. How to properly use the scientific method.

## **Hawai'i Content and Performance Standards (HCPSIII) Addressed:**

### **Science**

Standard 1: The Scientific Process: Scientific Investigation: discover, invent, and investigate using the skills necessary to engage in the scientific process.

Benchmarks:

SC.6.1.1 Formulate a testable hypothesis that can be answered through a controlled experiment.

SC.6.1.2 Uses appropriate tools, equipment, and techniques safely to collect, display, and analyze data.

Standard 2: The Scientific Process: Nature of Science: understand that science technology, and society are interrelated.

Benchmarks:

SC.6.2.1 Explain how technology has an impact on society and science.

### **Math**

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS: Understand various types of patterns and functional relationships.

Benchmarks:

MA.6.9.1 Represent visual and numerical patterns with tables and graphs and generalize the "rule" using words and symbols.

### **Language Arts**

Standard 1: Reading: CONVENTIONS AND SKILLS: Using knowledge of conventions of language and texts to construct meaning for a range of literary and informational texts for a variety of purposes.

Benchmarks:

LA.6.1.1 Use grade-appropriate vocabulary, including content area vocabulary, learned through reading and word study, including structural analysis of word parts.

LA.6.1.2 Use grade-appropriate online and print sources to research a topic.

Standard 4: Writing: CONVENTIONS AND SKILLS: Use the writing process and conventions of language and research to construct meaning and communicate effectively for a variety of purposes and audiences using a range of forms.

Benchmarks:

LA.6.4.1 Write in a variety of grade-appropriate formats for a variety of purposes and audiences such as: narratives that establish a point of view and experiment with a range of devices (i.e., dialogue, suspense, flashback), poems that experiment with poetic devices (figurative language, graphic elements) to convey a theme or impression, reports with a narrowed focus that allows for thorough treatment, business letters, responses to literature, functional pieces that complete a task or fulfill a civic responsibility, pieces to reflect on learning and to solve problems.

LA.6.4.2 Form and use the following grammatical constructions correctly when editing writing: consistent verb tense across paragraphs, comparative and superlative forms of adjectives, coordinating and subordinating conjunctions, prepositional phrases, compound sentence joined by semicolon rather than conjunction and comma, subject-verb agreement with intervening phrase.

LA.6.4.3 Edit writing to correct punctuation: commas in direct address, colon after salutation, hyphens in written numbers, italics or underlining for emphasis, and semicolons to join related independent clauses.

LA.6.4.7 Cite various grade-appropriate sources using a consistent format when reporting information.

Standard 5: Writing: RHETORIC: Use rhetorical devices to craft writing appropriate to audience and purpose.

Benchmarks:

LA.6.5.1 Select appropriate details, examples, reasons, and/or facts to support an insight, message, or thesis.

LA.6.5.2 Use an organizational structure (e.g., chronological, comparison and contrast, spatial order, climactic order, order of importance) to support meaning.

LA.6.5.5 Adjust voice to suit the audience and situation (e.g., informal note to a peer, business letter to organization, research report).

**Rationale:**

The Hawaiian dry forest is a threatened ecosystem and surrounds many of the towns on the west side of the Big Island. It provides habitat for many Hawaiian plants and animals that are found nowhere else in the world. Some of these plants have been traditionally used by native Hawaiians for a variety of uses. This curriculum promotes an enhanced view of the Hawaiian dry forest, how scientists study it, and different factors that affect it. It uses hands-on, inquiry-based activities to promote an enhanced learning about the Hawaiian dry forest.

**Concept Map:** see attached

**Formative Assessment:**

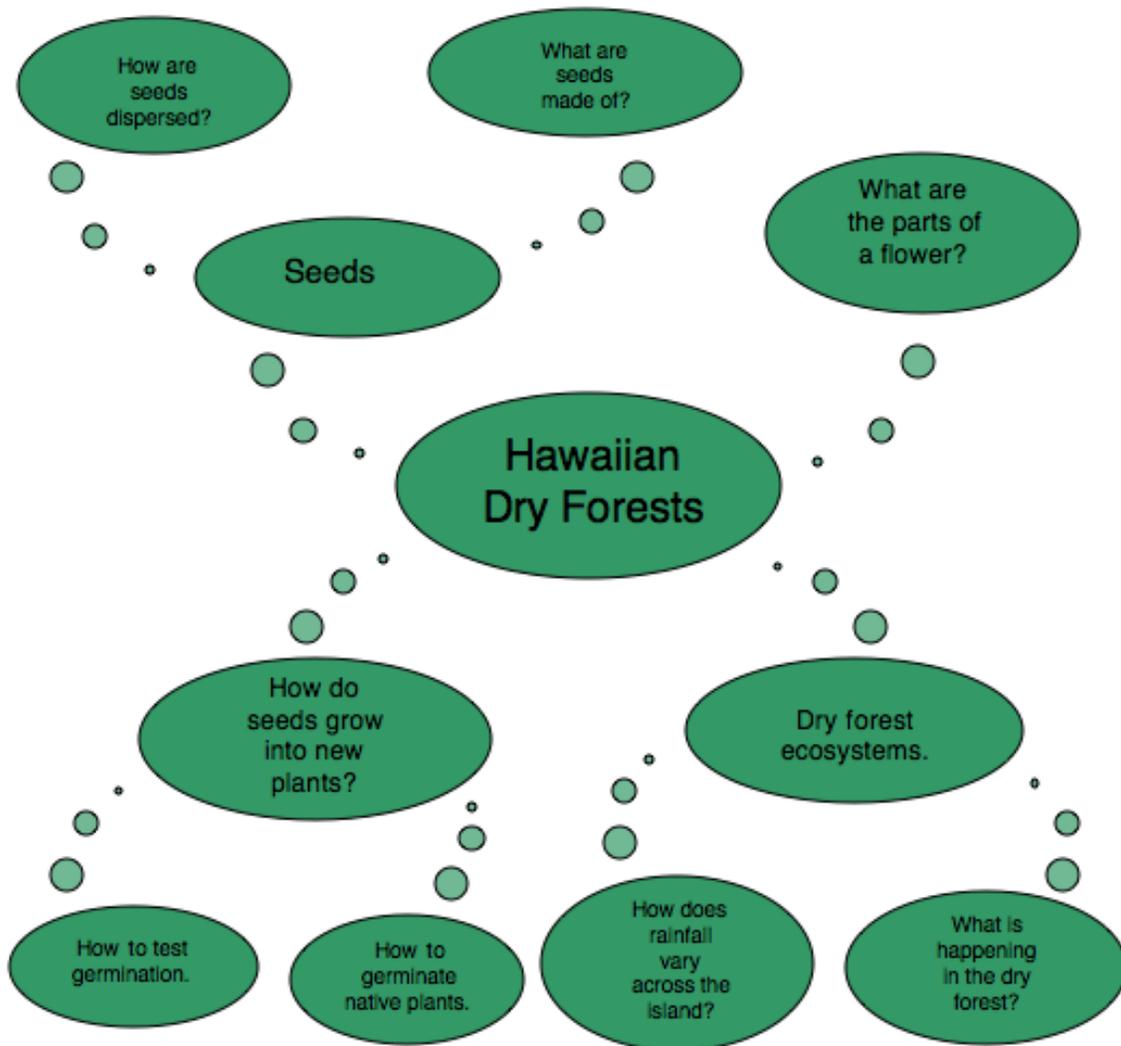
Students will demonstrate continued learning through the completion of worksheets based on the content material as well as what they wanted to learn.

**Summative Assessment:**

Students will present their complete knowledge of the Hawaiian dry forest through the writing, design, and presentation of an educational brochure that could be distributed to the public. Students will choose one native plant species, one invasive species, provide background information on the dry forest, and discuss current efforts going into preserving the Hawaiian dry forest. This project will meet HCPSIII science standards and benchmarks along with standards and benchmarks for math and language arts.

**Overview of Lesson Chart:** see attached

## Unit Concept Map



<b>Grade:</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>
<b>Science/Math</b>  <b>Benchmark</b> <b>S6.1.1</b> <b>S6.1.2</b> <b>MA6.9.1</b>	Student produces an accurate and imaginative brochure about native Hawaiian dry forests. Student is able to <b>thoroughly</b> explain the habitat's background information, problems, solutions with <b>many</b> details, correct scientific vocabulary words, and the use of graphs.	Student produces an accurate brochure about native Hawaiian dry forests. Student is able to explain the habitat's background information, problems, solutions with <b>some</b> details and <b>some</b> correct scientific vocabulary words, and a mostly correct use of graphs.	Student produces a somewhat accurate brochure about native Hawaiian dry forests. Student is <b>somewhat</b> able to explain the habitat's background information but has few details, lack of correct of scientific vocabulary words, and inaccurate graph.	Student produces an <b>inaccurate</b> brochure about Hawaiian dry forests. Student is <b>unable</b> to explain the habitat of the dry forests and/or the facts are inaccurate. Scientific research was not done properly. No use of graphs.	Student <b>has no product</b> to show the class, or project is <b>not turned in by the due date.</b>
<b>Language Arts</b> <b>Writing</b> <b>Benchmark</b> <b>LA 6.1.1</b> <b>LA 6.1.2</b> <b>LA 6.4.1</b> <b>6.4.2</b> <b>6.4.3</b> <b>6.4.7</b> <b>LA 6.5.1</b> <b>6.5.2</b> <b>6.5.5</b>	Consistently uses many plant vocabulary words to explain habitat. Provides insightful details about dry forest. Format is correct. All words are spelled correctly. There are no punctuation and grammatical errors. Uses substantive information from appropriate sources.	Uses many plant vocabulary words to explain habitat. Many details about dry forests. Writing is understandable. A few words are not spelled correctly. There are a few punctuation and grammatical errors. Uses relevant information from appropriate sources.	Uses a few plant vocabulary words to explain habitat. A few details about dry forests. Writing is somewhat understandable. Some words are not spelled correctly. There are some punctuation and grammatical errors. Uses some relevant information from appropriate sources	Barely uses any plant vocabulary words to explain habitat. Barely any details about dry forests. Writing is not understandable. Format was not followed. Most words are not spelled correctly. There are many punctuation and grammatical errors. Uses little relevant information from appropriate sources.	
<b>Language Arts</b> <b>Oral</b> <b>Communication</b> <b>Benchmark</b> <b>LA 6.6.0</b> <b>LA 6.7.0</b>	Gives a highly effective presentation speaking loudly and clearly with great intonation, looking at the audience, able to describe brochure comfortably, able to answer questions from audience.	Gives an effective presentation speaking loudly and clearly, looking at the audience, able to describe brochure, able to answer most questions from audience.	Gives a somewhat effective presentation by not doing 2 of the following: Speak loudly and clearly enough, look at the audience, able to read report, able to answer questions from audience	Gives an ineffective presentation by not doing 3 or more of the following: Speak loudly and clearly enough, look at the audience, able read report able to answer questions from audience	

<b>Timeline</b>	<b>Lesson and Topic</b>	<b>Concepts</b>	<b>Student Objectives</b>	<b>Activity description</b>	<b>Assessment</b>
<i>Week 1</i> Two, hour and a half lessons per week	Unit introduction to the Hawaiian dry forest & mapping exercise.	The Hawaiian dry forest is a rare and threatened ecosystem. The range of the habitat has decreased greatly.	Students will identify what they know about the dry forest. They will also learn about factors that cause habitat loss for the Hawaiian dry forest.	Students will learn about the dry forest and do a mapping exercise in order to learn the historical and current range of the dry forest.	KWL worksheet and map completed.
<i>Week 2</i> Two, hour and a half lessons per week	Students will learn about seed structure and dispersal methods.	Seed germination strategies are dependent on seed anatomy and seed dispersal. These strategies affect germination of dry forests plants.	Students will learn about seed structure and adaptations as well as how some seeds disperse.	Students will design a seed adapted to the dry forest as well as learn how humans and animals can disperse seeds.	KWL worksheets, dry forest seed designed, and seed dispersal lab activity completed.
<i>Week 3</i> Two, hour and a half lessons per week	Flower structure and the Scientific Method	Students will examine floral structures and the effects different adaptations have on pollinators as well as develop an understanding of the scientific method.	Students will learn the structure and function of flowers and how they attract pollinators. They will also review the scientific method and re-examine the seed dispersal lab with the scientific method in mind.	Students will dissect and scientifically draw a flower with all of its floral structures. Students will learn the steps to the scientific method.	KWL worksheet, floral drawings and dissection worksheet, and scientific method worksheet completed.

<i>Week 4</i> Two, hour and a half lessons per week	Seed germination requirements	Seed germination can be affected by biotic and abiotic factors. These factors can have both a positive and negative effect.	Students will get a basic understanding of seed germination and then use the steps of the scientific method to design and conduct their own experiment.	Students will design and carry out a scientific experiment that they designed based on seed germination.	KWL worksheet and scientific experiment and worksheets completed.
<i>Week 5</i> Two, hour and a half lessons per week	Seed germination requirements	See above	See above	See above	See above
<i>Week 6</i> Two, hour and a half lessons per week	Native plant germination	Students will learn about restoration efforts in their area and plant native seeds to germinate.	Students will learn about restoration efforts and help local efforts by germinating native plants for out-planting.	Students will learn about specific dry forest plants and plant native plant seeds to grow for out-planting.	Participation in germination of native plants and appropriate listening skills based on HCPS.
<i>Week 7</i> Two, hour and a half lessons per week	Rainfall mapping on Hawaii Island	Students will learn how weather patterns and topography affect the rainfall in the state and its resulting affect on forests.	Students will understand the concept of a rain shadow and why certain forest types are found in specific areas.	Students will create a vegetation map based on rainfall patterns on Hawaii Island.	KWL worksheet, colored map, and worksheet completed.
<i>Week 8</i> Two, hour and a half lessons per week	Brochure work	Students will summarize everything they have learned about the dry forest in an informational brochure.	Students will synthesize the information they have learned into an informational brochure.	Students will create an educational and informational brochure about the dry forest.	Completed brochure.

<i>Week 9</i> Two, hour and a half lessons per week	Brochure presentation	Students will present their brochure to the class.	Students will clearly present their brochure to the class in a short presentation meeting many HCPS.	Students will use appropriate speaking, listening, and information interpretation skills during their own and others presentations.	Brochure presentation based on rubric.
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Name \_\_\_\_\_  
Pre-Assessment

Date \_\_\_\_\_

1. Seeds are transported by:
  - a. Wind
  - b. Water
  - c. Animals
  - d. All of the above
  
2. Plants and animals that take over environments are:
  - a. Invasive
  - b. Native
  - c. Endemic
  - d. Deciduous
  
3. How many whorls do flowers have?
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  
4. What part of a flower is pollen found on?
  - a. stigma
  - b. style
  - c. anther
  - d. stamen
  
5. What is a hypothesis?
  - a. A question
  - b. A prediction
  - c. Part of the procedure
  - d. None of the above
  
6. Which is a rare native tree that loses its leaves?
  - a. Kokia
  - b. Wiliwili
  - c. Uhiuhi
  - d. Ohia
  
7. Invasive species can be:
  - a. Plants
  - b. Insects
  - c. Mammals
  - d. All of the above

8. Putting plants grown in pots and then planted in nature is:

- a. In-planting
- b. Out-planting
- c. Out-sourcing
- d. In-sourcing

9. What part of the flower do seeds form from?

- a. Stigma
- b. Style
- c. Ovary
- d. Stem

10. Germination is when:

- a. Seeds begin to grow into plants.
- b. Plants begin to flower.
- c. Seeds are spread from the plant.
- d. Fruits develop from flowers.

11. How much do you like science?

- a. not at all
- b. a little
- c. some
- d. a lot

12. How often do you use science in your life?

- a. not at all
- b. very little
- c. some
- d. a lot

Put the 6 steps of the Scientific Method in order by placing the numbers 1-6 next to each step:

Develop a Hypothesis	_____
Collect Data	_____
Ask a Question	_____
Do Background Research	_____
Report Results	_____
Analyze Data	_____

Answers:

1. D
2. A
3. D
4. C
5. B
6. B
7. D
8. B
9. C
10. A

Scientific Method: 3,4,1,2,6,5

Name \_\_\_\_\_  
Post-Assessment

Date \_\_\_\_\_

1. Seeds are transported by:
  - e. Wind
  - f. Water
  - g. Animals
  - h. All of the above
  
2. Plants and animals that take over environments are:
  - a. Invasive
  - b. Native
  - c. Endemic
  - d. Deciduous
  
3. How many whorls do flowers have?
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8. Putting plants grown in pots and then planted in nature is:
- a. In-planting
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  - c. Out-sourcing
  - d. In-sourcing
9. What part of the flower do seeds form from?
- a. Stigma
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10. Germination is when:
- a. Seeds begin to grow into plants.
  - b. Plants begin to flower.
  - c. Seeds are spread from the plant.
  - d. Fruits develop from flowers.
11. How much do you like science?
- a. not at all
  - b. a little
  - c. some
  - d. a lot
12. How often do you use science in your life?
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  - b. very little
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  - d. a lot

Put the 6 steps of the Scientific Method in order by placing the numbers 1-6 next to each step:

- Develop a Hypothesis \_\_\_\_\_
- Collect Data \_\_\_\_\_
- Ask a Question \_\_\_\_\_
- Do Background Research \_\_\_\_\_
- Report Results \_\_\_\_\_
- Analyze Data \_\_\_\_\_

Answers:

1. D
2. A
3. D
4. C
5. B
6. B
7. D
8. B
9. C
10. A

Scientific Method: 3,4,1,2,6,5

# Dry Forest Brochure Guidelines

These educational brochures should:

- provide accurate information about the dry forest
- include all references that are obtained outside of class
- include four of the required elements
- be at a quality level that is appropriate to hand out to the public

Required elements for the brochure:

- background information about the Hawaiian dry forest (**required**)
- information about one native dry forest plant species
- information about one invasive species in the dry forest
- information about organizations that help the dry forest
- ways to help conserve the dry forest

Grading of brochures:

- meeting required elements
- presentation of brochure to class
- rubric is attached